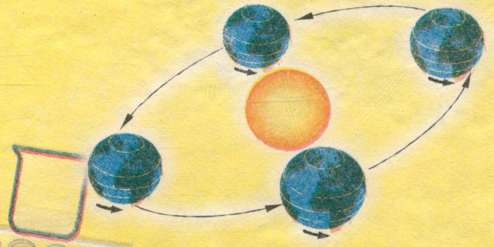
EXACT SCIENCES IN THE KARMA ANTIQUITY

By

LAXMI CHANDRA JAIN
With The Collaboration of
PRABHA JAIN

VOLUME - II



THE TRILOKASĀRA

THE ESSENTIAL INFORMATION ABOUT THE THREE UNIVERSES

SHRI BRAHMI SUNDARI PRASTHASHRAM
21, Kanchan Vihar, Vijay Nagar, JABALPUR

About the Author

He was born at Saugar (M.P.) on 1st July, 1926. He passed the M.Sc. examination in applied mathematics from the university of Saugar in 1949. Interestingly, he also holds a Diploma in Homoeopathy and Biochemistry (1971).

He joined the Madhya Pradesh State Educational Service in 1951, and served various Government Colleges in various capacities till his retirement in 1984 as Principal of the Govt. P.G. College, Chhindwara. Since then he is the Honorary Director of the Acharya Shri Vidyasagara Research Institute, Vijay Nagar, Jabalpur.

Prof. Jain is a well-known scholar, especially, in the field of Jaina mathematics. He has carried out deep studies of Sanskrit and Prakrit texts of the Jaina School. He is very proficient in mathematical systems theory.

He is proliferous writer both in Hindi and English. His writings are full of variety, covering publications in unified field theory, history of Indian mathematics, and popular articles which are related to general topics as well as to history of science. Special mention may be made of his recently completed huge INSA project on the Labdhisara about 1000 A.D. which is on advanced theory of Karma System. He has also completed an INSA project on the "Prastara Ratnavali", as well as third project from INSA on the Mathematical Contents of the Digambara Jaina Texts on Karananuyoga Group.

The work of Professor L.C. Jain, Dr. R.C. Gupta (Unesco representative in India) and Professor J. Needham shall go a long way in filling up the gaps in the history of science in India.

For more than three decades, Prof. L.C.Jain has been dedicated to ancient mathematics. His vast knowledge of Jaina sources and long experience has made him a great authority of Jaina exact sciences. He has a good knowledge not only of ancient languages (including Sanskrit and Prakrit) and of ancient exact sciences but also of several modern languages and modern mathematical sciences.

Recently, he has been awarded the Prakrit Jnana Bharti Education Trust, Bangalore Award for his meritorious services in scientific studies of Prakrit Literature. His work, The Tao of Jain Sciences, has also been awarded by the Kundkund Gyan

THE EXACT SCIENCES IN THE KARMA ANTIQUITY

BY

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VOLUME - II

MATHEMATICAL CONTENTS OF THE TRILOKASĀRA

(THE ESSENTIAL INFORMATION ABOUT THE THREE UNIVERSES)

PUBLISHED BY

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THE EXACT SCIENCES IN THE KARMA ANTIQUITY

Compiled from the project Mathematical Contents of Digambara Jaina Texts of the Karaṇānuyoga Group, financially supported by the Indian National Science Academy, New Delhi, vide sanction No. HS/442/1001/ dated 2-06-1992, conducted by professor L.C. Jain at the N.E.S. Science College, affiliated to the Rani Durgavati University, Jabalpur. Printed under INSA permission vide No. HS/4912/dated 22-03-2001.

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DEDICATED TO

HIS HOLINESS

THE GREAT AND LEARNED ASCETIC

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THE ADORED SUPREME

AT WHOSE WORSHIPPED LOTUS-FEET

THE AUTHORS

HAVE FOUND PEACE AND EQUINIMITY

Cover page

The cover design gives the modern and the ancient scenirio of the three universes, what we eall today as the cosmos. The images of the great scientists appear at the centre, with the very known figures of Newton, Einstein, Raman and other Indian scientists, with that of Kalpana who sacrified her life for the cause of space research. The background boundaries are those of the ancient Jaina Universe explored explicitly by Vīrasenācārya (ninth century, A.D.) who is noted for his well known commentaries, the Dhavalā and the Jayadhavalā Prakrit texts of the Ṣaṭkhaṇḍāgama and the Kaṣāyaprābhṛta texts compiled by the preceptors Puṣpadanta and Bhūtabali (c. 2nd century A.D.), the disciples of Dharasenācārya, and by Guṇadharācārya (c.1st century B.C.), respectively. The image of Dr. A.P.J. Abdul Kalām, a missile-scientist, par excellence, rising to the supreme post of the Hon. President of India, will be able to inspire the little children to accomplish his dream of INDIA 2020. Mention may also be made of the third slogan, JAI VIJÑĀNA, given by the Hon. Indian Prime Minister, Shri Atal Behari Bajpai, which goes a long way to awaken the scientific spirit of ancient India, once again.

ACKNOWLEDGEMENT

THE AUTHORS EXPRESS THEIR THANKS TO THE INDIAN NATIONAL SCIENCEACADEMY, NEW-DELHI, FOR FINANCIAL GRANT. THEY ALSO ACKNOWLEDGE THEIR OBLIGATION TO SHRI DEV KUMAR SINGH KASLIWAL AND SHRI AJIT KUMAR SINGH KASLIWAL FOR THEIR FINANCIAL SUPPORT IN COMPOSING THE MATTER.

THE FORMER AUTHOR WOULD LIKE TO EXPRESS HIS SOLEMN AND CHERISHED GRATITUDE TO HIS BELOVED LATE WIFE SMT. GULAB RANI WHO COOPERATED HIM FOR MORE THAN HALF A CENTURY IN HIS RESEARCH, TEACHING AND ADMINISTRATIVE WORKS.

INDEBTEDNESS IS DUE TO THE FOLLOWING ACADEMICIANS FOR THEIR TIMELY HELP:

PROFESSOR Kazuo Kondo (Yotsukaido, Japan)

PROFESSOR Alexander Volodarsky (Moscow, Russia)

PROFESSOR Rogers Billard (Paris, France)

PROFESSOR R.E. Kalman (Gainesville, Florida, U.S.A.)

PROFESSOR Shun- ichi Amari (Saitama, Japan)

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PROFESSOR G. Sahasrabudhe (Nagpur, India)

PROFESSOR Lakhmi C. Jain (Adelaide, Australia)

SOME REMARKS ON THE WORKS OF PROF. L. C. JAIN

I have been able only briefly to glance over pages of your remarkable book, The Tao of Jaina Sciences you kindly sent me. I was impressed by the profound back ground of your presentation. I have to confess that I had to be stuck at every term I met technical terms in languages of Indian origin........

Your way of attributing the differentiation of bio-creature classes to different kinds of karmas restricting them reminds me of the fundamental groups in defining different kinds of geometry according to the Erlangen Programme

Kazuo Kondo
Prof. Emeritus, Tikyo University

I'm very happy to hear of your progress in your most important historical research....... please do replace the book and keep me informed (Via abstracts of summaries) of your progress so that I may give further work and thought to this area.

R.E.Kalman
Research Professor, University of Florida

The Tao of Jaina Sciences is a veritable mine of information on the history and philosophy of the Jaina sciences. It is indeed a mile-stone in the history of world on Indian Philosophy as it discusses at length the Jaina sciences in the context of the complex of old and new philosophies spread across the globe.

C.K. Jain Secretary-General
Loka Sabha, New Delhi

During recent times a vast number of research and investigation work has been carried out in lokottara mathematics of the Jaina School. The foremost credit of this goes to Professor Laxmi Chandra Jain, who has greatly contributed in bringing to light these achievements of the Jainas and also in correlating them with corresponding results of modern mathematics. Indeed, it is important and immeasurable.

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Jhansi,
July 14, 2003

PREFACE

The Jaina School of Mathematics was one of the most remarkable institutions of ancient India. Its contribution in the development of scientific thought, especially as part of philosophico-mathematical thinking, may be regarded as quite significant and is a known fact to some extent. But the paradoxical situation is that it is yet to find due place in the historical expositions of the development of mathematics in India, what to say of that in the world. Nevertheless, in the pursuit of scientific thinking, the depth of Jaina Philosopher-Mathematicians, is comparable to that of Greece. For example, they were the earliest to transcend the simplistic thesis that all infinities are equal.

Historical studies in science and philosophy are an important component in acquiring a correct knowledge of the development of any civilization. Since mathematics has always played a prominent role in the progress of science and technology, and also in the analytical philosophical thinking (via logical and deductive processes), the study of history of mathematics needs a special attention.

The historical researches in the field of mathematics of the Jaina School can be divided broadly into two categories: laukika gaṇita or worldly or practical mathematics and alaukika or lokottara gaṇita i.e. mathematics which concerns other or post-worldly issues. The lokottara type of Jaina mathematics is somewhat of abstract and its higher level surpasses that of laukika mathematics.

The laukika Jaina mathematics is mostly mensurational and is related to simpler problems of the type which we come across in ordinary life. It is covered by what we call elementary arithmetc, algebra and geometry. However, it must be noted that techniques followed in the past in these fields were different from those which are currently used. It requires special attention to know as to how the various results, found in the canonical texts, were obtained by the methods applied and followed in those days.

For instance, the length of the circumference of the Jambūdvīpa as given in the ancient Prakrit work, the Tiloyapaṇṇattī, was computed by a peculiar method which is unusual in modern times. The author's short 'Bibliography of Research Work in Jaina Mathematics' (see Jinamañjarī, Vol. II, No. 2, pp. 63-65, April' 91) confines to the laukika mathematics.

It is in the category of alaukika mathematics that the work of the Jaina School is unique. In fact, the remarkable achievements in this area clearly distinguishes the Jaina School of Mathematics from other ancient schools whether it is in India, or outside India. One is often surprised to find parallels of several modern mathematical concepts and notions in ancient Jaina texts.

During recent times, a vast number of research and investigation work has been carried out in lokottara mathematics of the Jaina School. The foremost credit of this goes to Professor Laxmi Chandra Jain who has published a large number of papers in the field and is still busy in translating the relevant texts.

Professor Laxmi Chandra Jain was born on July 1, 1926 at Sagar in the Indian State of Madhya Pradesh. He was the third son of Chameli Bai and Damru Lal Jain, a school teacher.

Laxmi Chandra obtained his Master of Science degree in Applied Mathematics from University of Saugar in 1949, and in 1951, he joined the State Educational Service. From then, onwards up until his retirement in 1984 as Principal of the Government P.G. College at Chhindwara in Madhya Pradesh, Professor Laxmi Chandra Jain served about a dozen of State Colleges at different places, in the state, in various capacities.

Currently, Prof. Jain is the Honorary Director of the Acharya shri Vidyasagar Research Institute, Jabalpur. Also, he is the Secretary of the Shri Brahmi Sundari Prasthashram, Jabalpur.

Prof. Jains's new researches are the result of his long and deep studies of the original Prakrit and Sanskrit works, especially those related to Jaina Karma Theory. The subtle exposition of the Jaina religious and philosophical discussions in this connection is quiet mathematical. The credit belongs to Prof. Jain for bringing to light the highly mathematical techniques and results of the Jaina texts, and presenting them in modern language. His effort in carrying out the difficult task of explaining the ancient material by employing modern mathematical symbols and terminology, is to be greatly appreciated and credited.

Mathematicians and historians of mathematics are surprisingly refreshed to find several current mathematical topics which are brought to light from ancient lokottara gaṇita of the Jaina School. A brief mention of these may be made as follows:

Closed and open number systems both finite and transfinite were developed. The Jainas has realized the notion of actual infinity in the realm of numbers, formulated the idea of cardinality, and thus made first attempts towards the calculus of transfinite numbers. Logarithms (especially to base two) were applied and their laws of combinations were made known. Mathematics of transfinite class (called ananta) was dealt. In fact, the mathematical operations developed to handle transfinite numbers was one of the greatest achievements of the Jainas.

The Jaina Karma system has been developed, like modern system theory, on the basis of several postulates and hypothesis, and utilizing such notions as that of one-to-one correspondence. Ideas of structuralism and functionalism of system theory have been developed. System-theoretic knowledge of maxima and minima was evolved.

Several set-theoretic relations are found quoted in Prakrit texts. Fourteen special divergent sequences have been discussed. Units and measures of extremely small and large magnitudes have been defined. Ten types of infinities are mentioned in canonical texts.

No doubt that to discuss the achievements of the Jaina School of Mathematics in detail, it will require a separate paper.

Professor Laxmi Chandra Jain has greatly contributed in bringing to light these achievements of the Jainas and also in correlating them with corresponding results of modern mathematics. Indeed, it is important and immeasurable.

Jhansi,
July 14, 2003

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FOREWORD

"The Exact Sciences in the Karma Antiquity" constituted a series of the Indian National Science Academy Projects (1984-1995), operated at this University by Professor L.C. Jain, with the assistance of Dr. Prabha Jain. The series of publications also included several other research works pursued by the authors for the History of Science in India.

This series of works forms the foundation for research into the mysterious, symbolic and mathematical theory of Karma, in the ancient Prakrit Texts. During the last century, there has been an increasing interest in the ancient Indian scientific awakening and achievements. This publication, I am confident, will be welcomed into the world of historical learning where problems about the scripts, place value notation, comparability of transfinite sets, as well as the biological phenomena still persist.

I appreciate the hard labour of the authors and hope that this would go a long way to serve the cause of the humanity.

My best wishes,

(Justice Gulab Gupta)

LIST OF ABBREVIATIONS

WORK

ABT	Āryabhaṭīya of Āryabhaṭācārya
AGS	Āṅgasuttāṇi
APN	Ādipurāṇa of Ācārya Jinasena
ASG	Artha Saṁdṛṣṭi of Ṭoḍaramala
BBS	Bhadrabāhu Saṁhitā of Ācārya Bhadrabāhu
BJK	Bṛhajjātakaṁ of Varāhamihira Ācārya
BKS	Bṛhatkṣetrasamāsa of Ācārya Jinabhadra
BSG	Bṛhatsaṅgrahaṇī sūtra of Ācārya Candrasūri
BTS	Bhāṣikā Ṭīkā of Ṭoḍaramala
CPJ	Candraprajñapti Sūtram
DVL	Dhavalā Commentary of Vīrasenācārya
DVS	Dravyasaṁgraha of Muni Nemicandra
GJK	Gommaṭasāra Jīvakāṇḍa of Ācārya Nemicandra Siddhānta Cakravartī
GKK	Gommaṭasāra Karmakāṇḍa of Ācārya Nemicandra Siddhānta Cakravartī
GNG	Gaṇitānuyoga (Collection) by Muni K.L. 'Kamal'
GSS	Gaṇitasārasaṅgraha of Mahāvīrācārya
GTK	GaṇitaTilaka of Ācārya Śrīpati
JDL	Jayadhavalā Commentary of Vīrasenācārya and Jinasenācārya
JGD	Jaina Gem Dictionary. by J. L. Jaini
JKP	Jyotiṣa Karaṇḍakam Prakīrṇakam
JLV	Jaina Lakṣaṇāvalī by B. C.Siddhānta śāstrī
JPS	Jaṁbūdīvapaṇṇattī Saṁgaho of Ācārya Paumnandi (Sholapur)
JPT	Jaṁbūdīva-paṇṇattī Saṁgaho (Bombay)
KJP	Kevala Jñāna Praśna Cūḍāmaṇi of Ācārya Samantabhadra
KPS	Kasāya Pāhuḍa Sutta of Ācārya Guṇadhara
LKS	Laghukṣetrasamāsa of Ācārya Ratnaśekhara

LVG	Loka Vibhāga of Ācārya Siṁhasūri
LVV	LaghuVidyānuvāda by Ācārya Kunthusāgara
LVY	Loka Vijaya Yantra (of Ācārya Bhadrabāhu ?)
MBD	Mahābandha of Bhagavanta Ācārya Bhūtabali
MBK	Mahābhāskarīya of Bhāskarācārya
MHP	Mahāpurāṇa of Puṣpadanta
PGT	Pāṭīgaṇita of Śrīdharācārya
PJP	Praśna Jñāna Pradīpikā
PSD	Pañca-Siddhāntikā of Varāhamihira Ācārya
PSK	Pañcāstikāya of Ācārya Kundakunda
SKG	Ṣaṭkhaṇḍāgama of Bhagavanta Ācārya Puṣpadanta and Bhagavanta Ācārya Bhūtabali
SPJ	Sūrya-Prajñapti Sūtram
SSD	Sūrya-Siddhānta
SVS	Sarvārthasiddhi of PūjyaPāda
TLS	Trilokasāra of Ācārya Nemicandra Siddhāntacakravartī
TPT	Tiloyapaṇṇattī of Ācārya Yativṛṣabha
TVT	Tattvārthavārtika of Bhaṭṭācārya Akalaṅkadeva
UPN	Uttarapurāṇa of Ācārya Guṇabhadra
VDJ	Vedāṇga Jyotiṣa of Lagadha Ācārya
VTN	Vrata Tithi Nirṇaya (by N.C. Śastrī)
YTR	Yantrarāja of Mahendra Guru
YTS	Yantraśiromaṇi of Śrīviśrāma

JOURNALS

AHEI	Archives of History of Exact Sciences
AORS	Annals of Bhaṇḍārkara Oriental and Research Society
ARAS	Archaeo-Astronomy
ARVC	Arhat Vacana (Indore)
ASCN	Āsthā Aura Cintana (Felicitation Volume)

ASRE	Asiatic Research
BAMT	Bibliothica Mathematica
BCMS	Bulletin of Calcutta Mathematical Society
CNTR	Centaurus
EPGI	Epigraphica Indica
GNBT	Gaṇita Bhāratī
HRST	Historia Scientiarum
IDIR	Indo-Iranian Journal
IDST	Indological Studies
IJHS	Indian Journal of History of Science
HRMT	Historia Mathematica
ISJM	Proc. International Seminar on Jaina Maths and Cosmology (DJICR, Hastināpura)
JAOS	Journal of American Oriental Society
JASC	Journal of Asiatic Society, Calcutta
JASI	Journal of Astronomical Society of India
JBRS	Journal of Bihar-Orissa Research Society
JGKV	Journal of Gaṅgānātha Jhā Kendrīya Sanskrit Vidyapīṭth (Allahabad)
JNAQ	Jaina Antiquary (Arrah)
JNSB	Jaina Siddhānta Bhāskara (Arrah)
JRAS	Journal of Royal Asiatic Society of Great Britain and Ireland
JRHA	Journal of History of Astronomy
MASI	Memoirs of Archaeological Survey of India
MTED	Mathematics Education
NISI	National Institute of Science in India
SCMT	Scripta Mathematica
TSPJ	Tulsī Prajñā (J.V.B.I. - Ladnun)

Roman Transliteration of Devanāgarī

VOWELS

Short:	अ	इ	उ	ऋ	ऌ	and	ळ	
	a	i	u	ṛ			ḷ	
Long:	आ	ई	ऊ	ए	ओ	ऐ	औ	
	ā	ī	ū	e	o	ai	au	
Anusvāra:	.	=	ṁ					
Visarga:	:	=	ḥ					
Non-aspirant	ऽ	=	ऽ					

CONSONANTS

Classified:	क्	ख्	ग्	घ्	ङ्			
	k	kh	g	gh	ṅ			
	च्	छ्	ज्	झ्	ञ्			
	c	ch	j	Jh	ñ			
	ट्	ठ्	ड्	ढ्	ण्			
	ṭ	ṭh	ḍ	ḍh	ṇ			
	त्	थ्	द्	ध्	न्			
	t	th	d	dh	n			
	प्	फ्	ब्	भ्	म्			
	p	ph	b	bh	m			
Unclassified:	य्	र्	ल्	व्	श्	ष्	स्	ह्
	y	r	l	v	ś	ṣ	s	h
Compound:	क्ष	त्र	ज्ञ					
	kṣ	tr	jñ					

श्रीमन्नेमिचन्द्राचार्यविरचितः

त्रिलोकसार

* १ * लोकसामान्याधिकार

बलगोविंदसिहामणिकिरणकलावरुणचरणणहकिरणं । विमलयरणेमिचंदं तिहुवणचंदं णमंसामि ।।१।।

भवणव्विंतरजोइसविमाणणरतिरियलोयजिणभवणे । सव्वामरिंदणरवइसंपूजियवंदिए वंदे ।।२।।

सव्वागासमणंतं तस्स य बहुमज्झदिसभागम्हि । लोगोसंखपदेसो जगसेढिघणप्पमाणो हु ।।३।।

The whole space (ākāśa) has infinite points (pradeśas) and in its centralmost part there is the universe having innumerate points which is equal to the cube of the universe line.//1.3//

सर्वाकाश अनन्तप्रदेशी है, और उसके बहुमध्य भागमें असंख्यातप्रदेशी लोक है जो जगच्छ्रेणीके घनप्रमाण है।।३।।

लोगो अकिट्टिमो खलु अणाइणिहणो सहावणिव्वत्तो । जीवाजीवेहिं फुडो सव्वागासवयवो णिच्चो ।।४।।

Decisively, the universe (loka) is non-artificial, ab-aeterno existent, rationale by nature, alongwith the bios and non-bios fluents, a constituent of the whole space and aeternal. //1.4//

निश्चयसे लोक अकृत्रिम, अनादिनिधन, स्वभावसे निष्पन्न, जीवाजीवादि द्रव्योंसे सहित, सर्वाकाशके अवयव स्वरूप और नित्य है।।४।।

धम्माधम्मागासा गदिरागदि जीवपोग्गलाणं च । जावत्तावल्लोगो आयासमदो परमणंतं ।।५।।

The space (ākāśa) occupied by the aether fluent (dharma dravya), non-aether fluent (adharma dravya), space fluent (ākāśa dravya), bios (jīva) and matter (pudgala) fluents having transmigratory movements, and time fluent (kāla dravya), is called universe (loka), and beyond this is the non-universe (alokākāśa) which is infinite. //1.5//

धर्मद्रव्य, अधर्मद्रव्य, आकाशद्रव्य और गति आगति करने आले जीव एवं पुद्गल द्रव्य तथा (च शब्दसे) काल द्रव्य जितने आकाशको अभिव्याप्त करते हैं उतने आकाशको लोक कहते हैं, इसके आगे अलोकाकाश है जो अनन्त है।।५।।

उब्भियदलेक्कमुरवद्धयसंचयसण्णिहो हवे लोगो । अद्धदयो मुरवसमो चोद्दसरज्जूदओ सव्वो ।।६।।

The shape of the universe is like a one and a half drum (mṛdaṅga), and in the middle it is as if full like the collection of flags, and is not vacuus. The lower universe is like a half drum, and the upper universe is like a full drum, and combining both, the whole universe is fourteen rājus high. //1.6//

लोकका आकार खड़ी (ऊभी) डेढ़ मृदंगके सदृश है, तथा मध्यमें भी ध्वजाओंके समूह सदृश भरितावस्था स्वरूप है, शून्य नहीं है। अर्धमृदंग के समान अधोलोक और एक मृदंग के समान ऊर्ध्वलोक है, तथा दोनोंको मिलाकर सर्व लोक चौदह राजू ऊँचा है।।६।।

जगसेढिसत्तभागो रज्जू सेढीवि पल्लछेदाणं । होदि असंखेज्जदिमप्पमाणविंदंगुलाण हदी ।।७।।

The universe line is produced on dividing the logarithm to base two of the palya by innumerate, and on mutual multiplication of as many cubic-fingers (ghanāṅgulas) as is the quotient obtained above. The rāju is the seventh part of a world-line (jagachhreṇī). //1.7//

पल्यके अर्धच्छेदोंमें असंख्यातका भाग देने पर जो एक भाग प्राप्त हो उतनी बार घनांगुलोंका परस्परमें गुणा करनेपर जगच्छ्रेणी होती है, और जगच्छ्रेणीके सातवें भाग प्रमाण राजू होता है।।७।।

पल्लछिदिमेत्तपल्लाणण्णोण्णहदीए अंगुलं सूई । तव्वग्गघणा कमसो पदरघणंगुल समक्खादो ।।८।।

When the palya is multiplied mutually as many times as are the logarithm of a palya to the base two, then the linear finger (sūcyaṅgula) is obtained. The square of this linear finger is called finger squared (prataräṅgula) and its cube is called finger cubed (ghanāṅgula) //1.8//

पल्यके जितने अर्धच्छेद होते हैं, उतनी बार पल्यका परस्परमें गुणा करनेसे सूच्यंगुलका प्रमााण प्राप्त होता है। इस सूच्यंगुलके वर्गको प्रतरांगुल और इसीके घनको घनांगुल कहते हैं।।८।।

माणं दुविहं लोगिग लोगुत्तरमेत्थ लोगिगं छद्धा । माणुम्माणोमाणं गणिपडितप्पडिपमाणमिदि ।।९।।

The measure is of two kinds, the universal and the post universal (lokottara). The universal measure is of six types- scale (māna), fine-scale (unmāna), sub-scale (avamānā), reckoning-scale (gaṇimāna), counter-scale (pratimāna), and very-counter-scale (tatpratimāna). //1.9//

मान दो प्रकार का है १. लौकिक मान २. अलौकिक मान। लौकिक मान छह प्रकारका है- मान, उन्मान, अवमान, गणिमान, प्रतिमान, और तत्प्रतिमान।।९।।

पत्थतुलचुलुयएगप्पहुदी गुंजातुरंगमोल्लादी । दव्वं खित्तं कालो भावो लोगुत्तरं चदुधा ।।१०।।

The generation of these six scales is illustrated thus- The universal measure are the prastha, the balance (tulā), the hollowed palm (cullu), one etc., seed of abrus precotorious (guñjā phala), and the cost of the horse etc. The post-universal measures are four- the fluent measure, the quarter measure, the time measure and the phase measure. //1.10//

प्रस्थ, तुला, चुल्लू, एकादि, गुंजाफल और घोड़े आदिका मूल्य ये क्रमशः लौकिक मान है, और द्रव्य, क्षेत्र, काल एवं भाव ये चार लोकोत्तर मान हैं।।१०।।

परमाणु सयलदव्वं एगपदेसो य सव्वमागासं । इगिसमय सव्वकालो सुहुमणिगोदेसु पुण्णेसु ।।११।।

णाणं जिणेसु य कमा अवर वरं मज्झिमं अणेयविहं । दव्वं दुविहं संखा उवमपमा उवम अट्ठविहं ।।१२।।

Among the fluent-measure, the minimal is an ultimate particle (parmāṇu) and the maximal is total fluents collection. In quarter measure, the minimal is a point (pradaśa) and the maximal is the whole space. In time measure, the minimal is an instant (samaya) and the maximal is the total time (sarva kāla). In phase-measure (bhāva māna), the minimal is the event-knowledge (paryāya-jñāna) of the fine-vegetable attainment undeveloped (sūkṣma nigodiyā labdhi aparyāptaka), and the maximal is the omniscience of the Lord Jina. These are respectively the minimal and maximal measures. The intermediate measure is of various kinds. The fluent measure is of two types: the number measure (saṁkhyā-pramāṇa) and the simile measure (upamā pramāṇa). The simile measure is of eight types. //1.11-12//

द्रव्यमानमें जघन्य एक परमाणु और उत्कृष्ट सम्पूर्ण द्रव्य समूह, क्षेत्रमानमें जघन्य एक प्रदेश और उत्कृष्ट सर्वाकाश, कालमानमें जघन्य एक समय और उत्कृष्ट सर्वकाल, भावमानमें जघन्य सूक्ष्मनिगोदिया लब्ध्यपर्याप्तकका पर्याय नामका ज्ञान और उत्कृष्ट जिनेन्द्र भगवानमें केवलज्ञान- इस प्रकार क्रमसे जघन्य और उत्कृष्ट मान हैं। मध्यम मान अनेक प्रकारका है। द्रव्यमान दो प्रकारका है। संख्या प्रमाण और उपमा प्रमाण। उपमा प्रमाण आठ प्रकारका है।।११-१२।।

तं उवरि भणिस्सामो संखेज्जमसंखमणंतमिदि तिविहं । संखंतिल्लदु तिविहं परित्तजुत्तंति दुगवारं ।।१३।।

That simile measure will be related later. The number measure is of three types: numerate (saṁkhyāta), innumerate (asaṁkhyāta) and infinite (ananta). The numerate is of one type alone, but the innumerate and infinite are each of three types, the peripheral (parṬta), the yoked (yukta) and the double-times. //1.13//

उस उपमा प्रमाणको आगे कहेंगे। संख्यात, असंख्यात और अनन्तके भेदसे संख्या प्रमाण तीन प्रकारका है। इसमें संख्यात एक ही प्रकार का है किन्तु असंख्यात और अनन्त परीत, युक्त और द्विकवार के भेदसे तीन तीन प्रकार हैं।।१३।।

ते अवर मज्झ जेट्ठं तिविहा संखेज्जजाणणणिमित्तं । अणवत्थ सलागा पडिमहासला चारि कुंडाणि ।।१४।।

All these seven stations (sthāna) are each of three types. In order to give the knowledge of the numerate, four kinds of pits, the unstable (anavasthā), the logos (śalākā), the counter-logos (pratiśalākā) and the great-logos (mahā-śalākā) are imagined. //1.14//

ये सातों ही स्थान जघन्य, मध्यम और उत्कृष्टके भेदसे तीन प्रकार के हैं। यहाँ संख्यातका ज्ञान करने के लिये अनवस्था शलाका, प्रतिशलाका और महाशलाका ऐसे चार कुण्डोंकी कल्पना करना चाहिये।।१४।।

जोयण लक्खं वासो सहस्समुस्सेहमेत्थ सव्वेसिं । दुप्पहुदिसरिसवेहिं अणवत्था पूरयेदव्वा ।।१५।।

The diameter of every one of the pits is one lac yojana and height is one thousand yojanas. Out of these, the unstable pit is filled with many mustard-seeds, starting with two. //1.15//

चारों कुण्डोंका व्यास एक लाख योजन और उत्सेध एक हजार योजन प्रमाण है। इनमें से जिसके आदिमें दो हैं ऐसे अनेकों सरसोंसे अनवस्था कुण्डको भरना चाहिये।।१५।।

एयादीया गणणा बीयादीया हवंति संखेज्जा । तीयादीणं णियमा कदित्ति सण्णा मुणेदव्वा ।।१६।।

Counting is initiated from one, and the numerate starts from two, and as per rule the denomination of production (kṛti) starts from three. //1.16//

एक को आदि लेकर गणना और दो को आदि लेकर संख्यात होता है, तथा नियम से तीन को आदि लेकर कृति संज्ञा होती है।।१६।।

वासो तिगुणो परिही वासचउत्थाहदो दु खेत्तफलं । खेत्तफलं वेहगुणं खादफलं होइ सव्वत्थ ।।१७।।

The circumference is obtained by multiplying diameter by three. On multiplying the circumference by one fourth of the diameter, the area is obtained. On multiplying the area by the height, the volume is universally obtained. // 1.17//

व्यासके प्रमाणको तिगुणा करनेसे परिधिका प्रमाण होता है। व्यासके चतुर्थांशसे परिधिको गुणित करनेपर क्षेत्रफल तथा क्षेत्रफलको वेधसे गुणित करनेपर सर्वत्र खात (घन) फल प्राप्त होता है।।१७।।

थूलफलं ववहारं जोयणमवि सरिसवं च कादव्वं । चउरस्ससरिसवा ते णवसोडस भाजिदा वट्टं ।।१८।।

The gross area should be converted into practical (vyavahāra) yojanas and the practical yojanas be converted into mustard-seeds. Then the measure of the round mustard be calculaated on dividing the rectangular quadrilateral mustard by nine divided by sixteen. //1.18//

स्थूल क्षेत्रफलके व्यवहार योजन और व्यवहार योजनके सरसों बनाना चाहिये। तथा चौकोर सरसोंमें $\frac{९}{१६}$ का भाग देकर गोल सरसोंका प्रमाण निकलना चाहिये।।१८।।

वासद्धघणं दलियं णवगुणियं गोलयस्स घणगणियं । सव्वेसिं पि घणाणं फलत्तिभागप्पिया सूई ।।१६।।

Half part of the diameter should be cubed. That cube is again halved and multiplied by nine. The product is the volume of that round (spherical) object. The linear of top volume (the right circular cone formed above the top of the right circular cylinder of pit) is obtained on dividing the whole or top result is obtained as one third part of the whole volume. //1.19//

व्यासके अर्धभागका घन करना चाहिये। उस घनका पुनः अर्ध भागकर ६ का गुणा कर देना चाहिये। जो लब्ध प्राप्त हो वही गोलवस्तुका घनफल है। समस्त घनरूप क्षेत्रफलके तीसरे भाग प्रमाण सूचीफल अर्थात् शिखाफल होता है।।१६।।

बादालं सोलसकदिसंगुणिदं दुगुणणवसमब्भत्थं । इगितीससुण्णसहियं सरिसवमाणं हवे पढमे ।।२०।।

When bādāla or 2^{25} or $(65536)^2$ is multiplied by the square of 16, and also by twice of nine and then thirty one zero one placed in decimal value on its right, then the measure of the mustard seeds of the first unstable pit is obtained. //1.20//

बादाल (४२=) को सोलहकी कृति (२५६) से गुणा करने से जो लब्ध प्राप्त हो उसमें दूने नव (१८) का गुणाकर ३१ शून्योंसे सहित करने पर प्रथम अनवस्था कुण्डके सरसोंका प्रमाण प्राप्त होता है।।२०।।

विधुणिधिणगणवरविणभणिधिणयणबलद्धिणिधिखराहत्थी । इगितीससुण्णसहिया जंबूए लद्ध सिद्धत्था ।।२१।।

The numerals denoted by moon (vidhu), treasure (ridhi), mountain (naga), nine, sun (ravi), sky (nabha), treasure (nidhi), eyes (nayana), balabhadra (bala), spiritual attainment (ṛddhi), treasure (nidhi), mule (khara) and elephant (hāthī) are joined with thirty-one zeros to give the number of mustard seeds contained in the first unstable pit like the Jambū island. //1.21//

19791209299968000 000 000 000 000 000 000 000 000 000 0

विधु, निधि, नग, नव, रवि, नभ, निधि, नयन, बल, ऋद्धि, निधि, खर और हाथी इनकी संख्याओंको ३१ शून्योंसे सहित करनेपर जम्बूद्वीपसदृश प्रथम अनवस्था कुण्डके सरसों प्राप्त होते हैं।।२१।।

परिणाहेक्कारसमं भागं परिणाहछट्ठभागस्स । वग्गेण गुणं णियमा सिहाफलं सव्वकुंडाणं ।।२२।।

The volume of the cone (śikhāphala) above all the pits is obtained on multiplying the eleventh part of the cirumference by the square of the sixth part of the circumference. //1.22//

परिधिके ग्यारहवें भागको परिधि के छठवें भागके वर्गसे गुणित करने पर समस्त कुण्डोंका शिखाफल प्राप्त होता है।।२२।।

तिलसरिसवबल्लाढइचणयतसिकुलत्थ रायमासादि । परिणाहेक्कारसमो बेहो जदि गयणगो रासी ।।२३।।

The (height of) set of seeds of the sesamum mustard creeper (valla), arhara pulse, gram. linseed horse bean and horse bean udada pulse etc. form a cone above the circle pervading the space-sky, is eleventh part of the circumference. //1.23//

आकाशको व्याप्त करने वाली तिल, सरसों, वल्ल, अरहड़ चना, अलसी, कुलत्थ और उड़द आदिकी शिखाऊ राशि परिधि के ग्यारहवें भाग प्रमाण होती है।।२३।।

बेरूवतदियपंचमवग्गं अट्ठारसेहिं संगुणियं । तेत्तीससुण्णजुत्तं हरभजिदं जंबुदीवसिहा ।।२४।।

Whaterver is obtained on mutual multiplication of the third square place and the fourth square place of the dyadic square sequence (dvirūpa varga dhārā), is multiplied by eighteen and joined ahead with thirty one zeros. The number so obtained is divided by eleven, resulting in the set of the seeds collected in form of cone above the pit like the jambū island, the seeds being spherical and of mustard. //1.24//

द्विरूपवर्गधारा के तीसरे (२५६) और पाँचवें वर्गस्थान (बादाल) का परस्परमें गुणा करनेसे जो लब्ध प्राप्त हो उसको १८ से गुणित कर तेतीस शून्योंसे सहित करना चाहिये। इन्हीं लब्धांकोंमें ११ का भाग देनेसे जम्बूद्वीप सदृश कुण्डके ऊपरकी हुई राशिके शिखाफलके गोल सरसोंका प्रमाण प्राप्त होता है।।२४।।

इगिसगणवणवदुगणभणभट्ठचउपणचउक्कपणसोलं । सोलसछत्तीसजुदं हरहिदचउरो य पढमसिहा ।।२५।।

The measure of the mustard seeds contained in the cone over the first pit is given by the numerals in decimal notation (from left to right) as one, seven, nine, nine, two, zero, zero, eight, four, five, four, five, sixteen and thirty-six written sixteen times as well as four divided by eleven. //1.25//

$$17992008454516363636363636363636363636363636\frac{4}{11}.$$

एक, सात, नव, नव, दो, शून्य, शून्य, आठ, चार, पाँच, चार, पाँच, सोलह और इसके आगे सोलह बार छत्तीस एवं चारका ग्यारहवाँ भाग प्रथम कुण्डकी शिखाके सरसोंका प्रमाण है।।२५।।

वासद्धकदी तिगुणा वेहगुणेक्कारसहिदवासगुणा । एयारस पविभत्ता इच्छिदकुण्डाणमुभयफलम् ।।२६।।

Half of the diameter is squared and multiplied by three, again the height is multiplied by eleven and added then by diameter. The two quantities, so obtained, are mutually mutiplied and the product is divided by eleven, giving the combined area of the arbitrarily chosen pit and its cone. //1.26//

व्यासके अर्धभागका वर्ग कर उसको तिगुणा करना चाहिये, पुनः वेधको ११ से गुणित कर उसमें व्यास जोड़ना चाहिये। इस प्रकार प्राप्त हुई दोनों संख्याओंका परस्परमें गुणा करनेसे जो लब्ध प्राप्त हो उसको ११ से भाजित करने पर विवक्षित कुण्ड और उसकी शिखा दोनोंका सम्मिलित क्षेत्रफल प्राप्त होता है।।२६।।

बादालमट्ठघण इगिहीण सहस्साहदं एगारहिदं । इगितीससुण्णसहियं जंबूदीबुभयसिद्धत्था ।।२७।।

When bādāla or 2^{25}, or 42 =, or $(65536)^2$ is multiplied by the cube of eight and by a thousand as reduced by unity, the product is divided by eleven and the quotient is joined with thirty one zeros, the decimal measure gives the total volume of both the pit like the jambū island and its cone conteuts of mustard-seeds. //1.27//

बादाल (४२=) को आठके घन (५१२) एवं एक कम एक हजार (९९९) से गुणित कर ११ का भाग देने से जो लब्ध प्राप्त हो उसे ३१ शून्योंसे सहित करने पर जम्बूद्वीप सदृश कुण्ड और उसकी शिखा, दोनोंके क्षेत्रफल स्वरूप सरसों का प्रमाण प्राप्त होता है।।२७।।

इगिणवणवसगिगिगिदुगणवतिण्णडचउपणेक्कतिगिछक्कं । पण्णरछत्तीसजुदं हरहिदचउरो य पढमुभयं ।।२८।।

The measure of the both volumes corresponding to the first pit is given through the decimally placed numerals one, nine, nine, seven, one, one, tow, nine, three, eight, four, five, one, three, one, six, thity-six, at fifteen places (from left to right) and four parts as diveded by eleven parts. //1.28//

$$१९९७११२९३८४५१३१६३६३६३६३६३६३६३६३६३६३६३६३६३६३६३६\frac{4}{11}$$

एक, नव, नव, सात, एक, एक, दो, नव, तीन, आठ, चार, पाँच, एक, तीन, एक, छह, पन्द्रह जगह छत्तीस और चारका ग्यारहवाँ भाग यह प्रथम कुण्डके उभय क्षेत्रफलके अंकोंका प्रमाण है।।२८।।

पुण्णा सइमणवत्था इदि एगं रिवव सलागकुंडम्हि । तं मज्झिमसिद्धत्थे मदिए देवो व घित्तूणं ।।२९।।

दीवसमुद्दे दिण्णे एक्केक्के परिसमप्पदे जत्थ । तो हिट्ठिमदी उवही कयगत्तो तेहिं भरिदव्वो ।।३०।।

After the unstable pit is completly filled once, then one mustard be placed in the logos pit and whatever is the number of mustards eveny one of them be taken up by a deity or a though intellect and continure to give one seed to each island and sea. At whatever island or sea the seeds be exhausted, a new pit is to be dug having the diameter equal to the total of the widths of all the preceding islands and seas, and filled up by spherical mustard-seads. //1.29-30//

एक बार अनवस्था कुण्ड पूर्ण भर जाय तब एक सरसों शलाका कुण्डमें डालना चाहिये, तथा अनवस्था कुण्डके जितने सरसों हैं, उन्हें बुद्धि द्वारा या देवों द्वारा ग्रहण करें फिर प्रत्येक एक एक द्वीप समुद्रमें एक एक दाना डालते हुये जिस द्वीप या समुद्र पर दाने समाप्त हो जायें वहाँसे नीचेके अर्थात् जम्बूद्वीप पर्यन्त पहिलेके सभी द्वीप समुद्रोंके (प्रमाण) बराबर एक कुण्ड बनाकर गोल सरसोंसे भरना चाहिये।।२९-३०।।

बिदिये पढमं कुंडं गच्छो तदिए दु पढमविदियदुगं । इदि सव्वपुव्वगच्छा तहिं तहिं सरिसवा सज्झा ।।३१।।

For the second unstable pit, the mustard seeds of the first pit form the number of terms (gaccha). For the third unstable pit, the mustard seeds of the first and the second pits form the number of terms, similarly whatever are the preceding number of terms, the measure of the mustard seeds of the successive unstable pits is calculated through them. //1.31//

दूसरे अनवस्था कुण्ड के लिये प्रथम कुण्डके सरसों गच्छ हैं। तीसरे अनवस्था कुण्ड के लिये प्रथम और द्वितीय कुण्डके सरसों गच्छ हैं। इसी प्रकार जो पूर्व पूर्वके गच्छ हैं, उन उन के द्वारा उत्तरोत्तर अनवस्था कुण्डोंकी सरसोंका प्रमाण साधा जाता है।।३१।।

बिदिए वारे पुण्णं अणवट्ठिदमिदि सलागकुंडम्हि । पुणरपि णिक्खिविदव्वा अवरेगा सरिसवाण सला ।।३२।।

After having completely filled up the second time built up unstable pit, one more or second logos in form of mustard-seed logos (śalākā) be dropped in the logos pit (śalākā kuṇḍa) //1.32//

दूसरी बार बनाये हुए अनवस्थित कुंडको पूर्ण भरकर पुनः एक दूसरी शलाका स्वरूप सरसों शलाका कुंडमें डालना चाहिए।।३२।।

एवं सलागभरणे रूवं णिक्खिवदु पडिसलागम्हि । रित्तीकदेवि भरिदे अवरेगं पडिसलागम्हि ।।३३।।

Proceeding in this way, when the logos pit be completely filled up, then one seed be dropped in the counter-logos-pit, and when the logos-pit is exhausted, then as mentioned earlier, it may again be filled up and a second seed by dropped into the counter-logos-pit. //1.33//

इसी क्रमसे बढ़ते हुये जब शलाकाकुण्ड भर जाय तब एक दाना प्रतिशलाका कुण्डमें डालना और शलाकाकुण्डको खाली करके पूर्वोक्त प्रकार ही पुनः उसे भर कर प्रतिशलाका कुण्डमें दूसरा दाना डालना चाहिए।।३३।।

एवं सावि य पुण्णा एगं णिक्खिव महासलागम्हि । एसावि कमा भरिदा चत्तारि भरंति तक्काले ।।३४।।

चरिमणवट्ठिदकुंडे सिद्धत्था जेत्तिया पमाणं तं । अवरपरीतमसंखं रूऊणे जेट्ठ संखेज्जं ।।३५।।

In this way, when the counter-logos-pit has been filled up, then one seed will be dropped into the great-logos-pit. In what ever period these four pits are filled up respectively, then in the end whatever unstable pit is built up, its content measure of mustard-seeds, will be the measure of the minimal-peripheral-innumerate (jaghanya parīta asaṁkhyāta). On reducing it by unity, the measure of maximal numerate is obtained. //1.34-35//

इस प्रकार जब प्रतिशलाका कुण्ड भी भर चुकेगा तब एक दाना महाशलाका कुण्डमें डाला जायगा। क्रमसे भरते हुये जब (जितने कालमें) ये चारों कुण्ड भर जायेंगे तब अन्तमें जो अनवस्थित कुण्ड बनेगा उसमें जितने प्रमाण सरसों होंगे, वही जघन्य परीतासंख्यातका प्रमाण होगा, इसमें से एक कम करने पर उत्कृष्ट संख्यातका प्रमाण प्राप्त होता है।।३४-३५।।

अवरपरित्तस्सुवरिं एगादीवड्ढिदे हवे मज्झं । अवरपरित्तं विरलिय तमेव दादूण संगुणिदे ।।३६।।

अवरं जुत्तमसंखं आवलिसरिसं तमेव रूऊणं । परिमिदवरमावलिकिद्दि दुगवारवरं विरूव जुत्तवरं ।।३७।।

At the incrcase of one etc. numerals above minimal peripheral-innumerate, there ranges the intermediate-peripheral-innumerate. After spreading the minimal peripheral-innumerate, and on every digit the very minimal peripheral-innumerate is given and the row is mutually multiplied giving the minimal yoked-innumerate which is similar to the trail (āvalī).

On reducing this measure by unity. The measure of maximal-peripheral-innumerate is obtained, on squaring the minimal yoked-innumerate the measure of minimal-innumerate-innumerate is obtained, and on reducing it by unity, the measure of maximal-yoked-innumerate is obtained. //1.36-37//

जघन्य परीतासंख्यातके ऊपर एक आदि अंककी वृद्धि हो जाने पर मध्यम परीतासंख्यात होता है। जघन्य परीतासंख्यातका विरलन कर प्रत्येक एक अंक पर उसी जघन्य परीतासंख्यातको देय देकर परस्पर गुणा करनेसे जघन्य युक्तासंख्यात प्राप्त होता है। जो आवली सदृश है। अर्थात् आवलीके समय जघन्य युक्तासंख्यात प्रमाण हैं। इस प्रमाणमें से एक अंक कम कर देने पर उत्कृष्ट परीतासंख्यात प्राप्त होता है। आवली प्रमाण जघन्य युक्तासंख्यातका वर्ग करने से जघन्य असंख्यातासंख्यात का प्रमाण आता है, और इसमें से एक अंक कम कर देने पर उत्कृष्ट युक्तासंख्यात प्राप्त हो जाता है।।३६-३७।।

अवरे सलागविरलणदिज्जे बिदियं तु विरलिदूण तहिं । दिज्जं दाऊण हदे सलागदो रूवमवणिज्जं ।।३८।।

तत्थुप्पण्णं विरलिय तमेव दाऊण संगुणं किच्चा । अवणय पुणरवि रूवं पुव्विल्लसलागरासीदो ।।३९।।

एवं सलागरासिं णिट्ठाविय तत्थतणमहारासिं । किच्चा तिप्पडि विरलणदिज्जादी कुणदि पुव्वं व ।।४०।।

The minimal innumerate-innumerate is established as in set form of logos, spread and given. The second spread set is spread and to each one of it digits the given set is given and mutually muliplied. After this process one digit be reduced from the logos set (śalākā rāśi). The mutual product of the given set (deya rāśi) produces a great set which is spread and to each of it spread is given the great set and then mutually multiplied. To reckon this process, one digit is again reduced from the logos set. In this way, the logos set is exhausted completely, at the end of which the generated great set is again processed for being spread and the each of it digit the same set is given and mutually multiplied again and again till the exhaustion of the generated set as before. [This total process is also called logos-trio-exhaustion (śalākā-traya-niṣṭhāpana). //1.38-40//

जघन्य असंख्यातासंख्यातको शलाका, विरलन और देय रूपसे स्थापन कर दूसरी विरलन राशिका विरलन कर प्रत्येक एक एक अंकपर देय राशि देकर परस्पर गुणा करना, और शलाका राशिमें से एक अंक घटा देना चाहिये। उपर्युक्त देय राशिका परस्पर गुणा करनेसे उत्पन्न हुई महाराशिका विरलनकर प्रत्येक अंकपर उसीको देय देना, और परस्पर गुणाकर शलाका राशिमें से एक अंक घटा देना चाहिये। इस प्रकार शलाका राशिको समाप्त करने पर जो महाराशि उत्पन्न हो उसे पूर्वोक्त प्रकार विरलन, देय और शलाकाके रूपमें तीन प्रकार स्थापन करना चाहिये।।३८-४०।।

एवं बिदियसलागे तदियसलागे च णिट्ठिदे तत्थ । जं मज्झासंखेज्जं तहिमेदे पक्खिवेदव्वा ।।४१।।

धम्माधम्मिगिजीवमलोगागासप्पदेसपत्तेया । तत्तो असंखगुणिदा पदिट्ठिदा छप्पि रासीओ ।।४२।।

तं कयतिप्पडिरासिं विरलादिं करिय पढमबिदियसलं । तदियं च परिसमाणिय पुव्वं वा तत्थ दायव्वा ।।४३।।

कप्पठिदिबंधपच्चयरसबंधज्झवसिदा असंखगुणा । जोगुक्कस्सविभागप्पडिच्छिदा बिदियपक्खेवा ।।४४।।

तं रासिं पुव्वं वा तिप्पडि विरलादिकरणमेत्थ किदे । अवरपरित्तमणंतं रूऊणमसंखसंखवरं ।।४५।।

In this way, at the end of the logos-trio-exhaustion, intermediate innumerate-innumerate is producted in which the following four sets are united [each of which contains innumerate points (pradeśas)] the aether fluent, the non-aether fluent, one bios-fluent, universe-space, and then two more sets. They are the non-established-every-vegetable-bios set (apratiṣṭhita pratyeka vanaspati jīva rāśi) which is innumerate times the set of universe-space (lokākāśa) point set, and the established every-vegetable-bios set (pratiṣṭhita-pratyeka-vanaspati jīva-rāśi) which is innumerate times the preceding set. After projecting these six sets, the intermediate innumerate innumerate generates, as greater set which is again processed through the above mentioned logos spread give and multiply, and through the exhaustion of the first logos set, the second logos set and the third logos set, a greater set is produced. Into this greater intermediata innumerate-imnumerate set the following four sets are projected or united: 1. the set of instants in the kalpa period comprising the hyperserpentine (utsarpiṇī) and hyposerpentine (avasarpiṇī) periods of time (which is numerate palyas) 2. the see of life-time bonding-over assiduity stations (sthiti bandhādhyavasāya sthānas) [which is innumerate times the preceding set].

3. The set of impartation energy over-assiduity stations (anubhāga bandhādhyavasāya sthānas) [which is innumerate times the preceding set], and 4. the set of indivisible-corresponding-sections (utkṛṣṭa avibhāga praticchedas) of volition (yoga) which is innumerate times the preceding. These four sets form the second projection. This gives rise to a still greater intermediate innumerate innumerate set which is again processed through the logos-trio-exhaustion process of spread, give, multiply and exhaustion of the logos set. Whatever set is produced in this last process is called minimal peripheral-infinite. On reducing it by unity, the measure of maximal innumerate-innumerate is obtained. //1.41-45//

इस प्रकार द्वितीय शलाका और तृतीय शलाकाका निष्ठापन होने पर (शलाकात्रयकी परिसमाप्ति होनेपर) जो मध्यम असंख्यातासंख्यात स्वरूप राशि उत्पन्न हो उसमें (असंख्यात प्रदेशी) १. धर्मद्रव्य २. अधर्मद्रव्य ३. एक जीवद्रव्य और ४. लोकाकाश इन सबके प्रदेश तथा ५. अप्रतिष्ठित प्रत्येक वनस्पति जीवोंका प्रमाण जो कि लोकाकाशके प्रदेशोंसे असंख्यात गुणा है तथा ६. प्रतिष्ठित प्रत्येक वनस्पति जीवोंका प्रमाण जो कि अप्रतिष्ठित जीव राशिसे असंख्यात गुणा है ये छह राशियाँ मिला देना चाहिये। इस योगफल द्वारा मध्यम असंख्यातासंख्यात रूप जो महाराशि उत्पन्न हो उसको उपर्युक्त प्रकिया द्वारा शलाका, विरलन एवं देय रूपसे स्थापित कर पुनः पुनः विरलन देय, गुणन और ऋणरूप क्रियाके द्वारा प्रथम शलाकाराशि, द्वितीय शलाकाराशि और तृतीय शलाकाराशि की पूर्ववत् परिसमाप्ति होने के बाद जो महाराशि उत्पन्न हो उसमें १. उत्सर्पिणी अवसर्पिणी स्वरूप कल्पकाल (जो संख्यात पल्यमात्र है) के समयोंका प्रमाण २. स्थितिबंधाध्यवसाय स्थान जो कल्पकालके समयोंसे असंख्याततलोक गुणे हैं। ३. अनुभागबंधाध्यवसायस्थान जो स्थितिबंधाध्यवसायस्थानसे असंख्यातगुणे हैं। ४. योगके उत्कृष्ट अविभागप्रतिच्छेद जो अनुभागबंधाध्यवसाय स्थानसे असंख्यातगुणे हैं। ये चार राशियाँ दूसरा प्रक्षेप है। अर्थात् पहिले छह राशियाँ मिलाई थी पुनः ये चार राशियाँ मिलाई। इन चारों राशियोंको मिलाकर जो महाराशि प्राप्त हुई उसका पूर्वोक्त प्रकार शलाका, विरलन और देयरूपसे स्थापनकर पुनः पुनः विरलन, देय, गुणन और ऋणरूप क्रिया करके शलाकात्रय निष्ठापन (समाप्त) करना चाहिये। इस अन्तिम प्रक्रियासे जो राशि उत्पन्न हो वह जघन्य परीतानन्तका प्रमाण है। इसमेंसे एक अंक घटानेपर उत्कृष्ट असंख्यातासंख्यात का प्रमाण प्राप्त होता है।।४१-४५।।

अवरपरित्तं विरलिय दाऊणेदं परोपरं गुणिदे । अवरं जुत्तमणंतं अभव्वसममेत्थ रूऊणे ।।४६।।

जेट्ठपरित्ताणंतं वग्गे गहिदे जहण्णजुत्तस्स । अवरमणंताणंतं रूऊणे जुत्तणंतवरं ।।४७।।

The minimal peripheral-infinite is spread and given to every digit and mutually multiplied. Whatever is obtained is called minimal yoked infinite which is equal to unaccomplishable set (abhavya rāśi). On reducing this by a unit digit, the maximal peripheral-infinite is obtained. On squaring minimal yoked-innumerate, minimal infinite-infinite is produced which when reduced by a unit digit becomes maximal yoked-infinite. //1.46-47//

जघन्यपरीतानन्तका विरलन कर प्रत्येक अंकपर जघन्यपरीतानन्त ही देय देकर परस्पर गुणा करनेसे जो लब्ध प्राप्त हो उतनी संख्या प्रमाण (जघन्यपरीतानन्त) जघ. प. अनन्त = जघन्ययुक्तानन्त होता है जो अभव्य राशि के सदृश है। अर्थात् जघन्ययुक्तानन्त की जितनी संख्या होती है, उतनी संख्या प्रमाण अभव्य राशि है। इसमें से एक अंक घटाने पर उत्कृष्टपरीतानन्त होता है। तथा जघन्ययुक्तानन्तका वर्ग ग्रहण करने पर जघन्य अनन्तानन्त होता है और इसमें से एक अंक घटा देने पर उत्कृष्ट युक्तानन्त प्राप्त होता है।।४६-४७।।

अवराणंताणंतं तिप्पडि रासिं करित्तु विरलादिं । तिसलागं च समाणिय लद्धेदे पक्खिवेदव्वा ।।४८।।

सिद्धा णिगोदसाहियवणप्फदिपोग्गलपमा अणंतगुणा । काल अलोगागासं छच्चेदेणंतपक्खेवा ।।४९।।

तं तिण्णिवारवग्गिदसंवग्गं करिय तत्थ दायव्वा । धम्माधम्मागुरुलघुगुणाविभागप्पडिच्छेदा ।।५०।।

लद्धं तिवार वग्गिदसंवग्गं करिय केवले णाणे । अवणिय तं पुण खित्ते तमणंताणंतमुक्कस्सं ।।५१।।

The minimal infinite-infinite is processed three times as mentioned earlier through spread, give, multiply and exhaust, repeated again and again through first logos, secong logos and ended in third logos, resulting in the intermediate infinite-infinite. To this result is united or projected the following six sets:

1. The set of all living bios as divided by infinite, i.e. the set of accomplished bios (siddha jīva rāśi).

2. [The set of transmigrating bios (saṁsārī jīva rāśī) as reduced by four immoveable (sthāvara), every vegetable (pratyeka vanaspati) and the moveable (trasa) sets of bios, resulting in the measure of the vegetable-bodied (or nigoda kāya)] nigoda set which is infinite times of the preceding set of the accomplishable bios.

3. The nigoda vegetable set combined with the every vegetable (pratyeka vanaspati) set or the total vegetable bios set.

4. The set of all ultimate fission-fusion particles (pudgala rāśi) which is infinite times the set of all living beings.

5. The set of all instants of total time which is infinite times the preceding set of all ultimate particles.

6. The set of all points (pradeśas) in the non-universe space (alokākāśa) which is infinite times the preceding set. These are infinite six sets which are to be projected.

After having projected these six sets, the obtained grand set is again processed for being squared over squared (vargita saṁvargita) through the similar procedure for spread, give, multiply and exhaust operations of logos-trio-exhaustion (śalākā traya niṣṭhāpanā), to yield a grander set in which the indivisible-corresponding-sections of non-gravity-levity control (agurulaghu guṇa) of ether fluent and non-aether fluent are projected. Due to this projection a grander set is produced which is again subjected to three times square over squared process through spread, give, multiply and exhaustion. The still grander set so produced by logos-trio exhaustion, is also not equivalent to the set of indivisible-corresponding-sections of omniscience, hence this grander set is subtracted from the set of omniscience and the remainder is combined into that very grander set. This gives the set of indivisible-corresponding-sections of omniscience in form of the maximal infinite infinite. //1.48-51//

जघन्य अनन्तानन्तरूप राशिका तीन वार पूर्वोक्त प्रकार विरलन, देय, गुणन और ऋणादि क्रियाको पुनः पुनः करते हुये प्रथम शलाका, द्वितीय शलाका और तृतीय शलाकाको पूर्वोक्त प्रकारसे समाप्त करनेके बाद मध्यम अनन्तानन्तस्वरूप जो लब्ध प्रमाण प्राप्त हो उसमें १. जो सम्पूर्ण जीवराशिके अनन्तवें भाग प्रमाण है, ऐसी सिद्ध राशि। २. (पृथ्वीकायादि चार स्थावर, प्रत्येक वनस्पति और त्रस इन तीन राशियोंसे रहित संसारराशि प्रमाण, ऐसे निगोद जीवोंके प्रमाणरूप) निगोदराशि, जो कि सिद्धराशिसे अनन्तगुणी है। ३. प्रत्येकवनस्पति सहित निगोद वनस्पति राशि अर्थात् सम्पूर्ण वनस्पति। ४. जीवराशिसे अनन्तगुणी पुद्गलराशि ५. पुद्गलराशिसे अनन्तानन्तगुणी कालके समयों स्वरूप कालराशि ६. कालराशिसे अनन्तगुणे प्रमाण वाली अलोकाकाश राशि। अनन्तस्वरूप ये छह राशियाँ क्षेपण कर देना चाहिये। छह राशियोंको मिलाने के बाद जो लब्ध प्राप्त हो उस महाराशिको तीन वार वर्गित संवर्गित करना है स्वरूप जिसका ऐसे विरलन, देय गुणन और ऋणादि क्रियाओंकी पुनरावृत्ति द्वारा शलाकात्रय निष्ठापन कर जो विशद राशि उत्पन्न हो उसमें धर्मद्रव्य और अधर्मद्रव्यके अगुरुलघुगुणके अविभागी प्रतिच्छेदोंका प्रमाण मिला देना चाहिये। उपर्युक्त प्रक्षेपके योगसे जो लब्धराशि प्राप्त हो उसको पुनः तीन बार वर्गित संवर्गित करें, अर्थात पूर्वोक्त प्रकारसे विरलनादि क्रिया द्वारा शलाकात्रयकी समाप्ति कर जो महाराशिरूप लब्ध प्राप्त होगा वह भी केवलज्ञानके बराबर नहीं होगा, अतः केवलज्ञानके अविभाग प्रतिच्छेदोंमें से उक्त महाराशि घटा देनेपर जो लब्ध प्राप्त हो उसको वैसेका वैसा उसी महाराशिमें मिला देनेपर केवलज्ञानके अविभाग प्रतिच्छेदोंके प्रमाणस्वरूप उत्कृष्ट अनन्तानन्त प्राप्त हो जावेगा।।४८-५१।।

जावदियं पच्चक्खं जुगवं सुदओहिकेवलाण हवे । तावदियं संखेज्जमसंखमणंतं कमा जाणे ।।५२।।

Whatever subjects are simultaneous direct belonging to scriptural knowledge, clairvoyance knowledge and omniscience, are to be known respectively as numerate, innumerate and infinite. //1.52//

जितने विषय, युगपत् प्रत्यक्ष श्रुतज्ञान के हैं, अवधिज्ञानके हैं, और केवलज्ञानके हैं, उन्हें क्रमसे संख्यात, असंख्यात और अनन्त जानो।।५२।।

धारेत्थ सव्वसमकदिघणमाउगइदरबेकदीविंदं । तस्स घणाघणमादी अंतं ठाणं च सव्वत्थ ।।५३।।

Here, the description of sequences is given.

1. All sequence (sarva dhārā)
2. Even sequence (sama dhārā)
3. Odd sequence (viṣama dhārā)
4. Square sequence (kṛti dhārā)
5. Cube sequence (ghana dhārā)
6. Square generating sequence (kṛti mātṛka dhārā)
7. Cube generating sequence (ghana mātṛka dhārā)
8. Non-square sequence (akṛti dhārā)
9 Non-cube sequence (aghana dhārā)

10 Non-square generating sequence (akṛti mātṛka dhārā)

11. Non-cube generating sequence (aghana mātṛka dhārā) [The ten preceding sequences are such that second to sixth sequences have their counterparts given by seventh to eleventh sequences].

12. Dyadic square sequence (dvirūpa varga dhārā)

13. Dyadic cube sequence (dvirūpa ghana dhārā)

14. Dyadic cube-non-cube sequence (dvirūpa ghanāghana dhārā)

These are fourteen sequences and their initial or first term station, last term station and classes of stations is related every where. //1.53//

यहाँ धाराओंका वर्णन करते हैं। १. सर्वधारा २. समधारा ३. कृतिधारा ४. घनधारा ५. कृतिमातृकाधारा ६. घनमातृका धारा तथा इनकी प्रतिपक्षी ७. विषमधारा ८. अकृतिधारा ९. अघनधारा १०. अकृतिमातृकाधारा ११. अघनमातृकाधारा १२. द्विरूपवर्गधारा १३. द्विरूपघनधारा और १४. द्विरूपघनाघनधारा। ये चैदह धाराएँ हैं। इनके आदिस्थान, अन्तस्थान और स्थानभेद धाराओंमें सर्वत्र कहते हैं।।५३।।

उत्तेव सव्वधारा पुव्वं एगादिगा हवेज्ज जदि । सेसा समादिधारा तत्थुप्पण्णेति जाणाहि ।।५४।।

The sequence in which the initial term is one and the rest all numerals (natural numbers) are contained is called the all sequence (sarva dhārā). The remaining thirteen sequences, the even (sama) sequence etc., are all generated or produced from this all-sequence. //1.54//

जिसके पूर्वमें एकको आदि लेकर सर्व अंक होते हैं, उसे सर्वधारा कहते हैं। शेष सम आदि तेरह धाराएँ इस सर्वधारासे उत्पन्न जानो ।।५४।।

बेयादि बिउत्तरिया केवलपज्जंतया समा धारा । सव्वत्थ अवरमवरं रूऊणुक्कस्समुक्कस्सं ।।५५।।

The sequence which initiates with the two and goes on increasing with two (as common difference) upto the (set of indivisible-corresponding-section of) omniscience is called the even sequence (sama dhārā). //1.55//

दोके अंकसे प्रारम्भकर दो दोकी वृद्धिको प्राप्त होती हुई केवलज्ञान पर्यन्त समधारा होती है। सर्वत्र संख्यात आदिका जो जघन्य स्थान है, वही समधाराका जघन्य स्थान है, तथा संख्यात आदि का जो उत्कृष्ट स्थान है, उसमेंसे एक कम करनेपर समधाराका उत्कृष्ट स्थान बन जाता है।।५५।।

एगादि बिउत्तरिया विसमा रूऊणकेवलवसाणा । रूवजुदमवरमवरं वरं वरं होदि सव्वत्थ ।।५६।।

The odd sequence begins with the digit one, increasing with two (as common difference), and ends at the omniscience as reduced by unity. Whatever are the minimal of the innumerate and infinite of the all-sequence, on being added by unity, become the minimal of this sequence. Whatever are the maximal of the numerate, innumerate, peripheral infinite and yoked infinite in the all-sequence are also the maximal in the odd sequence. //1.56//

एकके अंकसे प्राप्त कर दो दोकी वृद्धिको प्राप्त होती हुई केवलज्ञानसे एक अंक हीन पर्यन्त विषमधारा होती है। सर्वधारामें असंख्यात और अनन्तके जो जघन्य स्थान हैं, उनमें एक एक अंक जोड़नेसे इस धाराके जघन्य स्थान बन जाते हैं, तथा सर्वधारामें संख्यात, असंख्यात परीतानन्त एवं युक्तानन्तके जो उत्कृष्ट स्थान हैं वही विषमधाराके उत्कृष्ट स्थान हैं।।५६।।

केवलणाणस्सद्धं ठाणं समविसमधारयाण हवे । आदी अंते सुद्धे वड्ढिहिदे इगिजुदे ठाणा ।।५७।।

The number of stations (sthānas) of both, the even and odd sequences is half of the omniscience, because on subtracting the term of the first station from that of the last station, and dividin g the remainder by the increasing common difference, and on adding unity to the quotient, gives the measure of the stations. //1.57//

सम और विषम दोनों धाराओंके स्थान केवलज्ञानके अर्ध प्रमाण (केवलज्ञानसे आधे) होते हैं, क्योंकि आदि और अन्त स्थानको शुद्ध करके (अधिक प्रमाणमें से हीन प्रमाणको घटाकर) वृद्धि चयका भाग देनेपर जो लब्ध आवे उसमें १ अंक मिलानेसे स्थानोंका प्रमाण प्राप्त हो जाता है।।५७।।

इगिचादि केवलंतं कदी पदं तप्पदं कदी अवरं । इगिहीण तप्पदकदी हेट्ठिममुक्कस्स सव्वत्थ ।।५८।।

The square sesquence is one, four etc., upto omniscience (Kevala jñāna).The terms of this sequence are obtained on squaring the square roots of the terms of the sequence upto the first square root of omniscience. Every where the minimal station-terms are in form of square (kṛti). When the minimal station-term is square rooted out and reduced by unity and then squared, then the maximal of the lower station-term is obtained. //1.58//

एक, चार आदि केवलज्ञान पर्यन्त कृतिधारा होती है। केवलज्ञान के प्रथम वर्गमूल पर्यन्त जो वर्गमूल हैं उनका वर्ग करनेसे जो राशियाँ उत्पन्न होती हैं वे ही इस धाराके स्थान हैं। सर्वत्र जघन्य स्थान तो कृतिरूप ही हैं। जघन्य स्थानके वर्गमूल में से एक घटाकर उसकी कृति करनेपर अपनेसे अधस्तन का उत्कृष्ट भेद प्राप्त हो जाता है।।५८।।

दुप्पहुदिरूववज्जिदकेवलणाणावसाणमकदीए । सेसविही विसमं वा सपदूणं केवलं ठाणं ।।५९।।

The non-square sequence initiates with two and goes on upto omniscience as reduced by unity. The remaining process of this sequence is like the odd sequence process. The stations of this sequence are less than the first square root of omniscience, because there are no numbers of which natural square root could be extracted in this sequence. //1.59//

दोको आदि लेकर एक कम केवलज्ञान पर्यन्त अकृतिधारा है इस धाराकी शेष विधि विषमधारा सदृश है। केवलज्ञानके प्रथम वर्गमूलसे कम इस धाराके स्थान हैं क्योंकि वर्गरूप संख्याएँ इस धारामें नहीं हैं।।५९।।

इगिअडपहुदिं केवलदलमूलस्सुवरि चडिदठाणजुदे । तग्घणमंतं बिंदे ठाणं आसण्णघणमूलम् ।।६०।।

Starting with one and eight etc., whatever cube-root form of stations are obtained above the cube root of the half of the omniscience, when added to the cube-root of the half of omniscience, form station term called the proximate (āsanna) cube root. The cube of t' is proximate cube root is the last station term of this cube-sequence. //1.60//

एक और आठको आदि करके केवलज्ञानके अर्धभागके घनमूलसे ऊपर ऊपर जो घनमूलरूप स्थान प्राप्त हों, उनको केवलज्ञानके अर्धभागके घनमूलमें मिलानेसे जो स्थान बनता है उसे आसन्नघनमूल कहते हैं। इस आसन्न घनमूलका घन ही इस घनधाराका अन्तिम स्थान है।।६०।।

समकदिसल विकदीए दलिदे घणमेत्थ विसमगे तुरिए । अघणस्स दु सव्वं वा विघणपदं केवलं ठाणं ।।६१।।

In the dyadic square sequence, whatever square logos (varga śalākā) or logarithm of logarithm to the base two of a chosen square-station (varga sthāna), half of that square station is in form of a cube as per rule. Further, whatever logarithm of logarithm to the base two (varga śalākā) set of a chosen square place is odd, the one fourth part of that set is in form a cube. When the station of cube sequence are removed from the all sequence upto the omniscience, the remaining all terms of the stations are in form of non-cube sequence (aghana dhārā).//1.61//

द्विरूपवर्गधारामें जिस वर्गस्थानकी वर्गशलाकाराशि सम होती है उस वर्गस्थानका अर्धभाग नियमसे घनरूप ही होता है तथा इसी द्विरूपवर्गधारामें जिस वर्गस्थानकी वर्गशलाकाएँ विषम होती हैं उस राशिका चौथाई भाग घनरूप होता है। सर्व धारामें से घनधाराके स्थानोंको कम कर देनेपर केवलज्ञान पर्यन्त समस्त स्थान अघनधारा स्वरूप ही होते हैं।।६१।।

इह वग्गमाउआए सव्वगधारव्व चरिमरासीदु । पढमं केवलमूलं तट्ठाणं चावि तच्चेव ।।६२।।

In the square-generating sequence (varga mātṛka dhārā), the process of the station etc. is equivalent to that of all-sequence. Its last term is first square root of omniscience. The number of stations of this sequence are upto the first square root of omniscience.//1.62//

इस वर्गमातृकधारामें स्थानादिकी प्रक्रिया सर्वधारा सदृश ही है। इसका अंतिम स्थान केवलज्ञानका प्रथमवर्गमूल है। केवलज्ञानके प्रथमवर्गमूल प्रमाण पर्यन्त ही इस धाराके स्थान होते हैं।।६२।।

अकदीमाउअ आदी केवलमूलं सरूवमंतं तु । केवलमणेय मज्झं मूलूणं केवलं ठाणं ।।६३।।

The first term of the non-square-generating sequence is a unity in excess of the first square-root of omniscience and the last station-lerm is the omniscience. The intermediate station terms are of various kinds. All the stations of this sequence are equal to the omniscience as reduced by the first square-root of omniscience. //1.63//

इस अवर्गमातृकधाराका प्रथम स्थान केवलज्ञानके प्रथमवर्गमूलसे एक अंक अधिक है, अन्तिम स्थान केवलज्ञान है और मध्यम स्थान अनेक प्रकारके हैं। इस धाराके समस्त स्थान केवलज्ञानके प्रथमवर्गमूलसे रहित केवलज्ञान प्रमाण हैं।।६३।।

घणमाउगस्स सव्वगधारं वा सव्वपच्छिमो रासी । आसण्णविंदमूलं तमेव ठाणं विजाणाहि ।।६४।।

The process relating to the stations etc. of the cube-generating sequence is equivalent to that of the all-sequence. The only speciality of this is that the last station of this sequence is equal to the cube root of the proximate-cube of ommiscience, hence the stations of this sequence are equal to the cube-root of the proximate-cube of ommiscience. //1.64//

घनमातृकाधाराकी स्थानादि सम्बन्धी प्रक्रिया सर्वधारा सदृश होती है। इसमें इतनी ही विशेषता है कि इस धाराका अन्तिम स्थान केवलज्ञानके आसन्न घनके घनमूल प्रमाण है, अतः इस धाराके स्थान भी केवलज्ञानके आसन्नघनके घनमूल प्रमाण ही हैं।।६४।।

तं रूवसहिदमादी केवलमवसाणमघणमाउस्स । आसण्णघणपदूणं केवलणाणं हवे ठाणं ।।६५।।

The first term of the non-cube sequence is obtained on adding unity to the last station-term of the cube generating sequence. Beginning from here, all station terms ıpto the omniscience, are in form of non-cube sequence. The stations of this sequence are equal to the omniscience as reduced by proximate cube-root. //1.65//

घनमातृकधाराके अन्तिम स्थानमें एक अंक मिलानेसे अघनधाराका प्रथम स्थान होता है, यहाँसे प्रारम्भ कर केवलज्ञानपर्यन्त समस्त स्थान अघनधारारूप ही हैं। इस धाराके स्थान आसन्नघनमूलरहित केवलज्ञानप्रमाण होते हैं।।६५।।

बेरूववग्गधारा चउ सोलसबेसदसहियछप्पण्णं । पण्णट्ठी बादालं एकट्ठं पुव्वपुव्वकदी ।।६६।।

In the dyadic square sequence, starting with the square of two squaring the station-terms of successive preceding terms, the succeeding terms are obtained. The first station of this sequence is four. Its square is sixteen, that of sixteen is two hundred fifty-six, then sixty-five thousand five hundred thirty-six, bādāla (2^{2^5}) and ekaṭṭhṬ (2^{2^6}) etc. are the terms, square of the preceding (forming the terms of this sequence in succession). //1.66//

इस द्विरूपवर्गधारामें दोके वर्गसे प्रारम्भ कर पूर्व पूर्व स्थानोंका वर्ग करते हुए उत्तर उत्तर स्थान प्राप्त होते हैं। इस धाराका प्रथम स्थान ४ है। इसका वर्ग १६, फिर २५६, ६५५३६, बादाल (४२=) और एकट्ठी प्राप्त होती है जो पूर्व पूर्वका वर्ग है।।६६।।

तो संखठाणगमणे वग्गसलागद्धछेदपढमपदं । अवरपरित्तासंखं आवलि पदरावली य हवे ।।६७।।

In this way, squaring successively the preceding terms, on crossing the numerate stations (sthāna), or number of terms, the sets of logarithm of logarithm to the base two (varga śalākā), logarithm to the base two (ardhaccheda śalākā), first square-root of minimal peripheral-innumerate and then the minimal peripheral-innumerate, trail (āvalī) and square of trail (pratarāvalī) are obtained. //1.67//

इसी प्रकार पूर्व पूर्वका वर्ग करते हुए संख्यात स्थान आगे जाकर जघन्य परीतासंख्यातकी वर्गशलाका, अर्धच्छेद, प्रथमवर्गमूल, जघन्य परीतासंख्यातकी राशि, आवली और प्रतरावलीकी प्राप्ति होती है।।६७।।

गमिय असंखं ठाणं वग्गसलद्धच्छिदी य पढमपदं । पल्लं च सूइअंगुल पदरं जगसेढिघणमूलं ।।६८।।

Proceeding innumerate stations ahead of the station term square-trail (pratarāvalī), one obtains the logarithm of logarithm to the base two of the addhāpalya, logarithm to the base two of addhāpalya and the first square root of the addhāpalya. Still ahead of this are obtained the palya, the linear finger (sūcyaṅgula), the square finger (pratarāṅgula), and the first cube root of the universe-line. //1.68//

प्रतरावलीसे असंख्यात स्थान आगे जाकर अद्धापल्यकी वर्गशलाकाएँ, अर्धच्छेद और प्रथममूल प्राप्त होता है। इसके आगे पल्य, सूच्यंगुल प्रतरांगुल और जगच्छ्रेणीका प्रथम घनमूल प्राप्त होता है।।६८।।

तिविह जहण्णाणंतं वग्गसलादलछिदी सगादिपदं । जीवो पोग्गल काला सेढी आगाम तप्पदरम् ।।६९।।

Proceeding innumerate-inmumerate stations ahead of the station term cuberoot of the universe-line, there are generated out of the three minimal infinities, the logarithm of logarithm to the base two, logarithm to the base two, first square-root of as well as minimal peripheral-infinite, minimal yoked- infinite, minimal infinite-infinite, bios set, matter-particle set, time-set, space-line set and space-square set. //1.69//

जगच्छ्रेणीके घनमूलसे असंख्यातस्थान असंख्यातस्थान आगे जाकर तीनों जघन्य अनन्तोंमें से जघन्य परीतानन्तकी वर्गशलाकाएँ, अर्धच्छेद, प्रथम वर्गमूल, जघन्य परीतानन्त, जघन्य युक्तानन्त, जघन्य अनन्तानन्त, जीव, पुद्गल, काल, आकाशश्रेणी और आकाशप्रतर की उत्पत्ति होती है।।६९।।

धम्माधम्मागुरुलघु इगिजीवागुरुलघुस्स होंति तदो । सुहमणि अपुण्णणाणे अवरे अविभागपडिछेदा ।।७०।।

Proceeding ahead through successive infinite stations ahead of square-space set (pratarākāśa), the indivisible-corresponding-sections set of non-gravity-levity control of aether, non aether fluent and the indivisible corresponding section set of non gravity-levity control (agurulaghu guṇa) of a bios are obtained. Again going infinite stations ahead, there is produced the set, of indivisible-correspouding-sections of scriptural knowledge which is termed as the least event (jaghanya paryāya) of the fine-vegetable-attainment-undeveloped bios. //1.70//

प्रतराकाशसे उत्तरोत्तर अनन्त स्थान आगे आगे जाकर क्रमशः धर्म अधर्म द्रव्यके अगुरुलघुगुणके

अविभागप्रतिच्छेद और एकजीवके अगुरुलघुगुणके अविभाग प्रतिच्छेदोंकी प्राप्ति होती है। पुनः अनन्तस्थान आगे जाकर सूक्ष्मनिगोद लब्ध्यपर्याप्तक जीवके जघन्य पर्याय नामक श्रुतज्ञानके अविभागप्रतिच्छेदोंकी उत्पत्ति होती है।।७०।।

अवरा खाइयलद्धी वग्गसलागा तदो सगद्धछिदी । अडसगछप्पणतुरियं तदियं बिदियादि मूलं च ।।७१।।

And infinite stations ahead of it are obtained the logarithm of logarithm to the base two, logarithm to the base two, eighth, seventh, sixth, fifth, fourth, third, second and first square-root of the minimal annihilation attainment. //1.71//

तथा उससे अनन्तस्थान आगे जाकर जघन्य क्षायिकलब्धिकी वर्गशलाकाएँ, अर्धच्छेद, आठवाँ, सातवाँ, छठा, पाँचवाँ, चौथा, तीसरा, दूसरा और प्रथम वर्गमूल प्राप्त होता है।।७१।।

सइमादिमूलवग्गे केवलमंतं पमाणजेट्ठमिणं । वरखइयलद्धिणामं सगवग्गसला हवे टाणं ।।७२।।

On squaring the first square-root of the omniscience the set of indivisible corresponding-sections of omniscience is obtained. This alone is the last station of the dyadic square sequence. This is the maximal measure. The name of this is maximal annihilation attainment. Whatever is the measure of the logarithm of logarithm to the base two of the omniscience is the measure of all the stations of the dyadic square-sequence. // 1.72//

केवलज्ञानके प्रथमवर्गमूलका एक बार वर्ग करनेपर केवलज्ञानके अविभाग प्रतिच्छेदोंका प्रमाण प्राप्त होता है। इतना मात्र ही द्विरूपवर्गधाराका अन्तिमस्थान है। यही उत्कृष्ट प्रमाण है। इसीका नाम उत्कृष्ट क्षायिकलब्धि है। केवलज्ञानकी वर्गशलाकाओंका जितना प्रमाण है, उतना ही प्रमााण द्विरूपवर्गधाराके समस्त स्थानोंका है।।७२।।

उप्पज्जदि जो रासी विरलणदिज्जक्कमेण तस्सेत्थ । वग्गसलद्धच्छेदा धारातिदए ण जायंते ।।७३।।

Whatever set is produced in a chosen sequence through the spread, and give rule, in that sequence the set's logarithm to the base two and logarithm to the base two are not found. This rule is for the three sequences (the dyadic square sequence, the dyadic cube sequence, the dyadic cube-non-cube sequence).//1.73//

जो राशि विरलन और देयके विधानसे जिस धारामें उत्पन्न होती है उस धारामें उसकी वर्गशलाकायें और अर्धच्छेद नहीं पाये जाते। यह नियम तीनों धाराओंमें है।।७३।।

वग्गादुवरिमवग्गे दुगुण दुगुणा हवंति अद्धछिदी । धारातय सट्ठाणे तिगुणा तिगुणा परट्ठाणे ।।७४।।

In the own station of these three sequences, the logarithm to the base two and in other station the logarithm to the base two are respectively double and triple for the square over the square. //1.74//

तीनों धाराओंके स्वस्थानमें वर्गसे ऊपरके वर्गमें अर्धच्छेद दुगुने दुगुने और परस्थानमें तिगुने तिगुने होते हैं।।७४।।

वग्गसला रूवहिया सपदे परसम सवग्गसलमेत्तं । दुगमाहदमद्धछिदी तम्मेत्तदुगे गुणे रासी ।।७५।।

The logarithm of logarithm to the base two are one in excess relative to own-station and equal to itself relative to other station. Placing the two in each of the spread of the logarithm of logarithm to the base two and mutually multiplying them, logarithm to the base two is obtained. And placing two in each of the spread of the logarithm to the base two, and on mutually multiplying them the set itself is obtained. //1.75//

स्वस्थानापेक्षा वर्गशलाकाएँ एक अधिक और परस्थानापेक्षा अपने (स्वस्थान) सदृश ही होती हैं।।७५।।

वग्गिदवारा वग्गसलागा रासिस्स अद्धछेदस्स । अद्धिदवारा वा खलु दलवारा होंति अद्धछिदी ।।७६।।

Whaterver set is produced as by squaring another set as many times as may be called the square logos (vargaśalākās) or logarithm of logarithm to the base two. Alternatively the logarithm of logarithm to the base two of a set is also called the square logos (varga-śalākās).

That number of times (vāra) as many times of which bisecting a set reduces it to unity, is called the logarithm to the base two (ardhaccheda). //1.76//

राशिके वर्गितवार अर्थात जितने वार वर्ग करनेसे राशि उत्पन्न होती है, उतने वार वर्गशलाकाएँ कहलाती हैं अथवा अर्धच्छेदके अर्धच्छेद वर्गशलाकाएँ कहलाती हैं। राशिके जितनी वार अर्ध करते करते एक अंक रह जाए, वे वार अर्धच्छेद कहलाते हैं।।७६।।

बेरूवबिंदधारा अड चउसट्ठी चडित्तु संखपदे । आवलि घनमावलिया कदिबिंदं चापि जायेज्ज ।।७७।।

The first station of dyadic cube sequence is eight and the next (second) station is sixty-four, proceeding ahead for numerate station, the cube of trail (āvalī) and the cube of the square of trail (pratarāvatlī). //1.77//

द्विरूपघन धाराका प्रथम स्थान ८ तथा दूसरा स्थान ६४ है। इससे संख्यात स्थान आगे जाकर आवलीका घन और आवलीके वर्गस्वरूप प्रतरावलीका घन उत्पन्न होता है।।७७।।

पल्लघणं बिंदंगुलजगसेढीलोयपदरजीवघणं । तत्तो पढमं मूलं सव्वागासं च जाणेज्जो ।।७८।।

Ahead of the cube of square-trail are the cube of palya, cube finger, universe-line, universe-square, cube of set of all bios, first square-root of whole space (sarvākāśa), and the whole space. // 1.78//

प्रतरावलीके घनसे आगे आगे पल्यका घन, घनांगुल, जगच्छ्रेणी, जगत्प्रतर, जीवराशिका घन, सर्वाकाशका प्रथमवर्गमूल और सर्वाकाशकी प्राप्ति होती है।।७८।।

संखमसंखमणंतं वग्गट्ठाणं कमेण गंतूण । संखासंखाणंताणुप्पत्ती होदि सव्वत्थ ।।७६।।

In all the three sequences, proceeding ahead numerate, inmumerate and infnite square stations the numerate, the innumerate and the infinte are produced. //1.79//

तीनो धाराओंमें क्रमसे संख्यात, असंख्यात और अनन्त वर्गस्थान आगे जाकर संख्यात, असंख्यात और अनन्तकी उत्पत्ति होती है।।७६।।

जत्थुद्देसे जायदि जो जो रासी विरूपधाराए । घणरूवे तद्देसे उपज्जदि तस्स तस्स घणो ।।८०।।

एवमणंतं ठाणं णिरंतरं गमिय केवलस्सेव । बिदियपदबिंदमंतं बिदियादिममूलगुणिदसमं ।।८१।।

Whatever set is produced in a particular station in the dyadic square sequence, at the very station the cube form of that very set is produced in the dyadic cube-sequence. In this way, the cube of second square root of omniscience is produced after continually proceeding for infinite stations. This is the last station-term of the dyadic cube-squence. This is equal to the mutual product of second square-root and first square-root. //1.80-81//

द्विरूपवर्गधारामें जिस स्थानपर जो जो राशि उत्पन्न होती है द्विरूपघनधारामें उसी उसी स्थानपर उसीकी घनरूप राशिकी उत्पत्ति होती है। इस प्रकार निरन्तर अनन्त स्थान आगे जाकर केवलज्ञानके द्वितीय वर्गमूलका घन उत्पन्न होता है। यही द्विरूपघनधाराका अन्तिम स्थान है। यह द्वितीय वर्गमूल और प्रथम वर्गमूलका परस्पर गुणा करने से उत्पन्न हुई राशिके बराबर है।।८०-८१।।

चरिमस्स दुचरिमस्स य णेव घणं केवलव्वदिक्कमदो । तम्हा विरूवहीणा सगवग्गसला हवे ठाणं ।।८२।।

The cube of the last term of the dyadic square sequence and the cube of last but one term of the dyadic square sequence are not the last term of this sequence. The reason is that cube of these terms become greater than omniscience. The total number of stations of this sequence is logarithm of logarithm to the base two of ominscience as reduced by two. //1.82//

द्विरूपवर्गधाराकी चरम और द्विचरम राशिका घन, इस धाराका अन्तिम स्थान नहीं है। कारण कि इनका घन तो केवलज्ञानके प्रमाणसे अधिक हो जाएगा। इस धाराके समस्त स्थान, दो कम केवलज्ञानकी वर्गशलाका प्रमाण हैं।।८२।।

तं जाण विरूवगयं घणाघणं अट्ठबिंदतव्वग्गं । लोगो गुणगारसला वग्गसलद्धच्छदादिपदं ।।८३।।

तेउक्काइयजीवा वग्गसलागत्तयं च कायठिदी । वग्गसलादित्तिदयं ओहिणिबद्धं वरं खेत्तं ।।८४।।

Whatever sets are in form of square in the dyadic square sequence, the cube of cube of that every set is obtained in this sequence. The first station-term of this sequence is eight and the second station-term be known to be square of cube of eight. Proceeding ahead successively, the terms universe (loka); multiplier logos (guṇakāra śalākā), logarithm of logarithm to the base two, logarithm to the base two, and the first square-root are obtained. [On squaring this first square-root once, the fire-bodied bios set is produced.

Proceeding for innumerate square stations ahead of it, for the fire-bodied-life-time (tejaskāyika sthiti), its logarithm to the base two (vargaśalākā) logarithm to the base two (ardhaccheda) and first square-root are produced. When the first square-root is squared, the fire-bodied-life-time is produced. Again on proceeding innumerate, innumerate square stations ahead, the logarithm of logarithm to the base two, the logarithm to the base two, and the first square-root of the maximal range-field of the clairvoyance (avadhi jñāna) are obtained. On squaring the first square root, the maximal range-field of clairvoyance is obtained. //1.83-84//

द्विरूपवर्गधारामें जो जो राशि वर्गरूप हैं उस प्रत्येक राशिका घनाघन (घनका घन) इस धारामें प्राप्त होता है। इस धाराका प्रथमस्थान ८ का घन और द्वितीय स्थान आठके घनका वर्ग जानो। उत्तरोत्तर आगे आगे जाकर लोक, गुणाकारशलाका, वर्गशलाका, अर्धच्छेद और प्रथम वर्गमूलकी प्राप्ति होती है। (इस प्रथम वर्गमूलका एक वार वर्ग करनेपर) तेजस्कायिक जीवराशि उत्पन्न होती है। उससे आगे आगे असंख्यात वर्गस्थान जानेपर क्रमशः तेजस्काय-स्थितिकी वर्गशलाका, अर्धच्छेद व प्रथममूल उत्पन्न होते हैं। इस प्रथममूलका एक वार वर्ग करनेपर तेजस्कायस्थिति उत्पन्न होती है। पुनः असंख्यात-असंख्यात वर्गस्थान आगे जानेपर क्रमशः अवधिज्ञानके उत्कृष्ट क्षेत्रकी वर्गशलाका, अर्धच्छेद व प्रथमवर्गमूल प्राप्त होता है, जिसका एक वार वर्ग करनेपर अवधिज्ञानके उत्कृष्ट क्षेत्रका प्रमाण प्राप्त होता है।।८३-८४।।

वग्गसलागत्तिदयं तत्तो ठिदिबंधपच्चयट्ठाणा । वग्गसलादीरसबंधज्झवसाणाण ठाणाणि ।।८५।।

वग्गसलागप्पहुदी णिगोदजीवाण कायवरसंखा । वग्गसलागादितयं णिगोदकायट्ठिदी होदि ।।८६।।

तत्तो असंखलोगं कदिठाणं चडिय वग्गसलतिदयं । दिस्संति सव्वजेट्ठा जोगस्सविभागपडिछेदा ।।८७।।

On proceeding still innumerate-innumerate square stations ahead, the logarithm of logarithm to the base two, logarithm to the base two, first square root of the affection phases (kaṣāya pariṇāmas) causal for life-time bond are obtained, and on squaring this first square root, the set of affection phases is obtained. On proceeding still further, the logarithm of logarithm to the base two, logarithm to the base two, and the first square-root of the set of causal affection phases of impartation-energy bond (anubhāga bandha) stations are obtained. On squaring the first square-root, the latter is obtained. On proceeding innumerate and innumerate stations ahead respectively, the set of indivisible-corresponding-sections of the maximal volition (yoga) along with its square-logos-trio (varga śalākā-traya) is obtained. //1.85-87//

(सर्वावधिसे उत्कृष्ट क्षेत्रप्रमाण) से असंख्यात असंख्यात वर्गस्थान आगे आगे जाकर स्थितिबन्धमें कारणभूत कषायपरिणामोंके स्थानोंकी वर्गशलाकाएँ, अर्धच्छेद प्रथममूल और उसी प्रथमवर्गमूलका एक वार वर्ग करनेपर कषायपरिणामोंके स्थानोंका प्रमाण प्राप्त होता है। उसके आगे अनुभागबन्ध स्थानके कारण भूत परिणामोंकी वर्गशलाकाएँ, अर्धच्छेद, प्रथमवर्गमूल और प्रथममूलका एक बार वर्ग करनेपर अनुभागबन्ध योग्य बंधाध्यवसान स्थानोंका प्रमाण प्राप्त होता है। उससे असंख्यात वर्गस्थान आगे आगे जाकर वर्गशलाकादिकोंके साथ साथ निगोद जीवोंके शरीरोंकी उत्कृष्ट संख्याका प्रमाण प्राप्त होता है तथा उससे असंख्यात वर्गस्थान आगे आगे जाकर वर्गशलाकादि तीनोंके साथ साथ निगोदकाय स्थिति प्राप्त होती है। उससे असंख्यात लोकप्रमाण वर्गस्थान आगे आगे जाकर वर्गशलाकादित्रय के साथ साथ योगके सर्वोत्कृष्ट अविभाग प्रतिच्छेदोंका प्रमाण प्राप्त होता है।।८५-८७।।

जो जो रासी दिस्सदि बिरूववग्गे सगिट्ठठाणम्हि । तट्ठाणे तस्सरिसा घणाघणे णवणवुद्दिट्ठा ।।८८।।

Whatever sets appear in form of square at the chosen station of the dyadic square sequence, on the same stations of the dyadic cube-non-cube sequence, the sets of the dyadic square sequence have been related to be multiplied by nine times each. //1.88//

द्विरूपवर्गधारामें अपने इष्ट स्थानपर जो जो राशि वर्गरूप दिखाई देती है द्विरूपघनाघनधाराके उसी उसी स्थानपर द्विरूपवर्गधाराके स्थान सदृश अर्थात् द्विरूपवर्गधाराकी राशियों का ही नौ नौ बार परस्पर गुणा करनेको कहा गया है।।८८।।

चडिदूणेवमणंतं ठाणं केवलचउत्थपदबिंदं । सगवग्गगुणं चरिमं तुरियादिपदाहदेण समं ।।८९।।

Proceeding infinite stations ahead, the cube of the fourth squareroot of omniscience when multiplied by the square of the cube of the fourth square root, the last station term of this sequence is obtained. This is equivalent to the mutual product of the fourth and first squareroot of the omniscience. //1.89//

(सर्वोत्कृष्ट योगके उत्कृष्ट अविभागप्रतिच्छेदोंके प्रमाणसे) अनन्तस्थान ऊपर जाकर केवलज्ञानके चतुर्थ वर्गमूलके घनको इसी चौथे वर्गमूलके घनके वर्गसे गुणा करनेपर इस धाराका अन्तिमस्थान प्राप्त होता है जो केवलज्ञानके चतुर्थ और प्रथमवर्गमूलके परस्परके गुणनसे प्राप्त हुए लब्धके सदृश है।।८९।।

चरिमादिचउक्कस्स य घणाघणा एत्थ णेव संभवदि । हेदू भणिदो तम्हा ठाणं चउहीणवग्गसला ।।९०

The cube-non-cube of the last four stations of the omniscience are not possible in this cube-non-cube sequence. The reason for this has been already related. Hence the measure of all stations of the dyadic cube-non-cube sequence is equal to the logarithm of logarithm to the base two of omniscience as reduced by four. //1.90//

केवलज्ञानके अन्तिम चार स्थानोंका घनाघन इस घनाघन धारामें सम्भव नहीं है। इसका कारण पहले कहा जा चुका है। अतः द्विरूपघनाघन धाराके समस्त स्थानोंका प्रमाण चार कम केवलज्ञानकी वर्गशलाकाओंके बराबर है।।९०।।

ववहारुवजोग्गाणं धाराणं दरिसिदं दिसामेत्तं । वित्थरदो वित्थररुइसिस्सा जाणंतु परियम्मे ।।९१।।

In the treatment of number, the useful above mentioned fourteen sequences in their own form have been pointed out alone here. The disciples, interested in details should know the extensive details from the text, "Bṛhatdhārā parikarma" or the treatise on the operations on sequences. //1.91//

संख्या व्यवहारमें उपयोगी उपर्युक्त चौदह धाराओंके स्वरूपका यहाँ निर्देश मात्र किया गया है। विस्तारसे जाननेमें रुचि रखने वाले शिष्योंको इनका विस्तृत स्वरूप 'बृहद्धारापरिकर्म' शास्त्रसे जानना चाहिए।।९१।।

पल्लो सायर सूई पदरो य घणंगुलो य जगसेढी । लोयपदरो य लोगो उवमपमा एवमट्ठविहा ।।९२।।

The simile measure is of eight types: pit (palya), sea (sāgara), linear finger (sūcyaṅgula), square-finger (pratarāṅgula), cube-finger (ghanāṅgula), universe-line (jagacchreṇī), universe-square (jaga-pratara), and universe [cube] (loka). //1.92//

पल्य, सागर, सूच्यंगुल, प्रतरांगुल, जगच्छ्रेणी, जगत्प्रतर तथा लोक इस प्रकार उपमा प्रमाण आठ प्रकार का है।।९२।।

ववहारुद्धारद्धापल्ला तिण्णेव होंति णायव्वा । संखा दीवसमुद्दा कम्मट्ठिदि वण्णिदा जेहिं ।।९३।।

The palya is of three types: the vyavahāra palya, the uddhāra palya and the addhā palya. The number is measured through vyavahāra palya, the islands and seas are measured through uddhāra palya and the life-time of karma is measured through addhā palya. //1.93//

व्यवहारपल्य, उद्धारपल्य और अद्धापल्यके भेदसे पल्य तीन होते हैं। व्यवहार पल्यसे संख्याका, उद्धार पल्यसे द्वीप-समुद्रोंका और अद्धापल्यसे कर्मस्थितिका माप किया जाता है।।९३।।

सत्तमजम्मावीणं सत्तदिणब्भंतरम्हि गहिदेहिं । सण्णट्ठं सण्णिचिदं भरिदं वालग्गकोडीहिं ।।९४।।

[For knowing the measure of the palya or the pit] the pit or palya is to be filled up by collecting the hair of the lamb born in good-pleasure-land (uttama-bhoga-bhūmi) within seven days of its birth, cutting them each equal to their fore part, and through such collected crores of such soft hair. //1.94//

उत्तम भोगभूमिमें जन्म लेने वाले मेमने (भेड़-शावक) के जन्मसे सात दिनके भीतर तकके रोमोंको ग्रहणकर उनके अग्रभागके बराबर खण्डकर, संचित किए हुए करोड़ों रोमोंसे गड्ढा भरना चाहिए।।९४।।

जं जोयणवित्थिण्णं तत्तिउणं परिरयेण सविसेसं । तं जोयणमुव्विद्धं पल्लं परिदोवमं णाम ।।९५।।

This pit is of one yojana of diameter, its circumference is slightly greater than three times its diameter. Its depth is also one yojana. The measure of the hair parts filled up in such a great pit, is called a palya or palitopama. //1.95//

वह कुण्ड एक योजन विस्तीर्ण (व्यास वाला) है, उसकी परिधि विस्तारके तीन गुनेसे कुछ अधिक है, उसकी गहराई भी एक योजन है ऐसे विशाल कुण्डमें भरे हुए रोमखण्डोंका जितना प्रमाण है, उसे पल्य अथवा पलितोपम कहते हैं।।९५।।

विक्खंभवग्गदहगुणकरणी वट्टस्स परिरयो होदि । विक्खंभचउब्भागे परिरयगुणिदे हवे गणियं ।।९६।।

When the square of diameter is multiplied by ten, the square root of the product gives the fine circumference of the circular area. The area of the circular area is obtained by multiplying the circmference by one-fourth part of diameter. When the area is multiplied by the depth, the volume of the pit (palya) is obtained. //1.96//

व्यासके वर्गको १० से गुणा करनेपर जो प्रमाण प्राप्त होता है उसीका वर्गमूल वृत्ताकार क्षेत्रकी सूक्ष्म

परिधि होती है। परिधिको व्यासके चौथाई भागसे गुणा करनेपर गोलक्षेत्रका क्षेत्रफल होता है। इसी क्षेत्रफलमें गहराईका गुणा करनेसे कुण्डका घनफल प्राप्त होता है।।९६।।

एक्कट्ठी पण्णट्ठी उणवीसट्ठारसेहिं संगुणिदा । बिगुणणवसुण्णसहिया पल्लस्स दु रोमपरिसंखा ।।९७।।

The number of the hair of the palya is obtained by first multiplying mutually the ekaṭṭhī or 2^{2^6}, paṇṇaṭṭhī or 2^{2^4}, nineteen, and eighteen and then joining eighteen zeros. //1.97//

एकट्ठी, पण्णट्ठी, उन्नीस और अठारहका परस्पर गुणा करनेसे जो राशि उत्पन्न हो उसे १८ शून्योंसे सहित करनेपर पल्यके रोमोंकी संख्या प्राप्त हो जाती है।।९७।।

वटलवणरोचगोनगनजरनगंकाससससघधमपरकधरं । विगुणणवसुण्णसहिया पल्लस्स दु रोमपरिसंखा ।।९८।।

[The above set is expressed through kaṭapayapurastha...... etc. method as follows].

va (4), ṭa (1), la (3), va (4), ṇa (5), ra (2), ca (6), ga (3), na (0), ga (3), na (0), ja (8), ra (2), na (0), ga (3), ka (1), sa (7), sa (7), sa (7), gha (4), dha (9), ma (5), pa (1), ra (2), ka (1), dha (9), ra (2) denote the number 41345263030820317749512192. When this is joined with eighteen [or twice nine] zeros, the number of the hair in a palya is obtained. //1.98//

व (४), ट (१), ल (३), व (४), ण (५), र (२,) च (६), ग (३), न (०), ग (३), न (०), ज (८), र (२), न (०), ग (३), क (१), स (७), स (७), स (७), घ (४), ध (९), म (५), प (१), र (२), क (१), ध (९), र (२) अर्थात् ४१३४५२६३०३०८२०३१७७७४९५१२१९२ को द्विगुण नव अर्थात् १८ शून्योंसे सहित करने पर पल्यके रोमोंकी संख्या प्राप्त होती है।।९८।।

वस्ससदे वस्ससदे एक्केक्के अवहिदम्हि जो कालो । तक्कालसमयसंखा णेया ववहारपल्लस्स ।।९९।।

When after every one hundred year, one hair is taken out from the pit of hair, the total period taken in exhausting the whole pit gives the number of instants in a vyavahāra palya. //1.99//

प्रत्येक सौ वर्ष बाद एक एक रोम के निकाले जाने पर जितने काल में समस्त रोम समाप्त हों, उतने काल के समय ही व्यवहार पल्य के समयों की संख्या है।।९९।।

ववहारेयं रोमं छिण्णमसंखेज्जवाससमयेहिं । उद्धारे ते रोमा तक्कालो तत्तियो चेव ।।१००।।

When every hair of the hair of the vyavahāra palya is cut into as many pieces as is the number of instants in innumerate years, the set of all such pieces gives the measure of the hair in an uddhāra palya. The measure of the set of instants of an uddhāra palya is the same as the measure of the set of hairs of an uddhāra palya. //1.100//

व्यवहार पल्यके रोमोंमें से प्रत्येक रोमके उतने खण्ड करने चाहिए जितने कि असंख्यात वर्षोंके समयोंका प्रमाण है। इन समस्त रोमखण्डोंका समूह ही उद्धारपल्यके रोमोंका प्रमाण है, तथा जितना उद्धारपल्यके रोमोंका प्रमाण है, उतना ही उद्धारपल्यके समयोंका प्रमाण है।।१००।।

उद्धारेयं रोमं छिण्णमसंख्येज्जवाससमयेहिं । अद्धारे ते रोमा तत्तियमेत्तो य तक्कालो ।।१०१।।

Every hair of the hair of the uddhāra palya is cut into as many pieces as there are instants in innumerate years, the total number of pieces gives the measure of the hair of addhā palya. Whatever is the number of hair of addhāpalya is the measure of instants of addhāpalya. //1.101//

उद्धारपल्यके रोमोंमें से प्रत्येक रोमके उतने खण्ड करना जितने कि असंख्यात वर्षोंके समयोंका प्रमाण

है। इन समस्त रोमखण्डोंका समूह ही अद्धापल्यके रोमोंका प्रमाण है। जितना अद्धापल्यके रोमोंका प्रमाण है उतना ही अद्धापल्यके समयोंका प्रमाण है।।१०१।।

एदेसिं पल्लाणं कोडाकोडी हवेज्ज दसगुणिदा । तं सागरोवमस्स दु हवेज्ज एक्कस्स परिमाणम् ।।१०२।।

When each of these two types of palyas is multiplied by ten crore squared, then each type of sāgaras is produced. //1.102//

इन दोनों पल्योंमें से प्रत्येकको दश कोड़ाकोड़ीसे गुणा करनेपर विवक्षित (अपने अपने) एक एक सागरका प्रमाण प्राप्त होता है।।१०२।।

लवणंबुहिसुहुमफले चउरस्से एक्कजोयणस्सेव । सुहुमफलेणवहरिदे वट्टं मूलं सहस्सवेहगुणं ।।१०३।।

The fine area of the Lavaṇa sea is shaped as that of a quadrilateral. In that, division is effected by the round pit's fine area with one yojana. The quotient is multiplied by the depth which is one thousand yojanas. This gives the the volume of the wells with one yojana as diameter and one yojana deep. //1.103//

लवणसमुद्रके सूक्ष्म क्षेत्रफलको चतुर्भुजाकार करके (तथा उसका वर्ग करके) उसमें एक योजन वाले गोलकुण्डके सूक्ष्म क्षेत्रफल (के वर्ग) से भाग देनेपर जो लब्ध प्राप्त हो उसके वर्गमूलको गहराई अर्थात् १००० से गुणा करनेपर लवण समुद्रमें एक योजन व्यास वाले व एक योजन गहरे कुण्डोंका प्रमाण प्राप्त होता है।।१०३।।

रोमहदं छक्केसजलोस्सेगे पणुवीससमयात्ति । संपादं करिय हिदे केसेहिं सागरुप्पत्ती ।।१०४।।

[According to verse 103], the measure of palyas in the Lavaṇa sea is twenty-four into lac into lac into one thousand. When this measure is multiplied by the number of hair in a palya [as expressed in verse 98], this gives the number of hair in Lavaṇa sea. It takes twenty-five instants (samayas) to take out water equivalent to six hair, and at this rate, through trio set (trairāśika), the acquisition (labdha) when divided by the number of hair in a palya produces the number of palyas in a sea. //1.104//

गाथा १०३ के अनुसार लवण समुद्रमें पल्यों (कुण्डों) का प्रमाण २४ x ला. x ला. x १००० है। इस प्रमाणको (गाथा ९८ में कही गई १ पल्य की) रोम संख्या ४१= से गुणा करनेपर लवण समुद्रमें रोम सं. २४ x ला. x ला. x १००० x ४१= प्राप्त होती है। छह रोमके बराबर जल निकालनेमें यदि २५ समय लगते हैं तो लवण समुद्रकी रोम संख्या बराबर जल निकालनेमें कितना काल लगेगा? इस प्रकार त्रैराशिक करके जो लब्ध प्राप्त हो उसको पल्यकी रोम संख्यासे भाग देनेपर एक सागरमें पल्य संख्याकी उत्पत्ति होती है।।१०४।।

गुणयारद्धच्छेदा गुणिज्जमाणस्स अद्धछेदजुदा । लद्धस्सद्धच्छेदा अहियस्सच्छेदणा णत्थि ।।१०५।।

When the logarithms to the base two of the multiplier set is added to the logarithms to the base two the multiplicand set, the logarithms of the quotient set are obtained. There is no bisectioning of the excess. //1.105//

गुणकार राशिके अर्धच्छेदोंको गुण्यमान राशिके अर्धच्छेदोंमें मिला (जोड़) देनेसे लब्धराशिके अर्धच्छेदोंका प्रमाण प्राप्त हो जाता है। यहाँ अधिकको छेदना नहीं है।।१०५।।

भज्जस्सद्धच्छेधा हारद्धच्छेदणाहिं परिहीणा । अद्धच्छेदसलागा लद्धस्स हवंति सव्वत्थ ।।१०६।।

When the logarithms to the base two of the divisor are subtracted from the logarithms to the base two of the dividand, the logarithms to the base two of the quotient are obtained. //1.106//

भाज्यके अर्धच्छेदोंमें से भाजक (हर) के अर्धच्छेद घटानेपर लब्धराशि (भजनफल) के अर्धच्छेद प्राप्त हो जाते हैं।।१०६।।

विरलिज्जमाणरासिं दिण्णस्सद्धच्छिदीहि संगुणिदे । अद्धच्छेदा होंति हु सव्वत्थुप्पण्णरासिस्स ।।१०७।।

When the spread set is multiplied by the logarithm to the base two of the given set, the logarithms of the quotient set are obtained. //1.107//

विरलनराशिमें देयराशिके अर्धच्छेदोंका गुणाकरनेसे उत्पन्न (लब्ध) राशिके अर्धच्छेद प्राप्त हो जाते हैं।।१०७।।

विरलिदरासिच्छेदा दिण्णद्धच्छेदछेदसंमिलिदा । वग्गसलागपमाणं होंति समुप्पण्णरासिस्स ।।१०८।।

When the logarithm of spread set is added to the logarithm of logarithm to the base two of the spread set, the measure of the logarithm of logarithm to the base two of the spread and given sets. //1.108//

विरलनराशिके अर्धच्छेदोंको देयराशिके अर्धच्छेदोंके अर्धच्छेदोंमें मिलाने (जोड़ देने) से विरलन एवं देयके द्वारा उत्पन्न हुई राशिकी वर्गशलाकाओंका प्रमाण होता है।।१०८।।

दुगुणपरीतासंखेणवहरिदद्धारपल्लवग्गसला । बिदंगुलवग्गसलासहिया सेढिस्स वग्गसला ।।१०९।।

The logarithm of logarithm to the base two of addhāpalya is divided by twice the minimal peripheral-innumerate. When the quotient so obtained is added by the logarithm of logarithm to the base two of the cube-finger, then the logarithm of logarithm to the base two of the universe-line (jagacchreṇī) is obtained. //1.109//

अद्धापल्यकी वर्गशलाकाओंमें जघन्यपरीतासंख्यातके दुगुणेका भाग देनेपर जो लब्ध उपलब्ध हो उसमें घनांगुलकी वर्गशलाकाओंको जोड़ देनेसे जगच्छ्रेणीकी वर्गशलाकाएँ प्राप्त होती हैं।।१०९।।

विरलिदरासीदो पुण जेत्तियमेत्ताणि अहियरूवाणि । तेसिं अण्णोण्णहदी गुणगारो लद्धरासिस्स ।।११०।।

Whenever there are certain logarithm to the base two in excess of the spread set in form of logarithm to the base two, in those places of the excess units, two is placed and mutually multiplied, the product becomes the multiplier of the product set. //1.110//

अर्धच्छेदस्वरूप विरलनराशिसे जितने अर्धच्छेद अधिक हों उतनी जगह २ का अंक लिखकर परस्पर गुणा करनेसे जो लब्ध उत्पन्न हो वही लब्धराशिका गुणकार होता है।।११०।।

विरलिदरासीदो पुण जेत्तियमेत्ताणि हीणरूवाणि । तेसिं अण्णोण्णहदी हारो उप्पण्णरासिस्स ।।१११।।

Whenever there exist certain logarithms to the base two in want of the logarithm of the chosen spread set, two is placed in the spread of the want, and mutually multiplied, the product so obtained is the divisor of the product set. //1.111//

विवक्षित विरलनराशिके अर्धच्छेदोंसे जितने हीन अर्द्धच्छेद हैं उतनी जगह (२) के अंक रखकर परस्पर गुणा करनेसे जो लब्ध प्राप्त हो वह उत्पन्न (लब्ध) राशिका भागहार होता है।।१११।।

जगसेढीए वग्गो जगपदरं होदि तग्घणो लोगो । इदि बोहियसेखाणस्सेत्तो पगदं परूवेमो ।।११२।।

The square of universe-line is the universe-square, and the cube of the universe-line is the universe-cube. In this way, one who has the knowledge of the number, and for which the universe in context is described. //1.112//

जगच्छ्रेणीका वर्ग जगत्प्रतर और जगच्छ्रेणीका घन घनलोक होता है। इस प्रकार जिसे संख्याका ज्ञान हो गया है, उसके लिए प्रकरणभूत लोकका वर्णन करते हैं।।११२।।

उदयदलं आयामं वासं पुव्वावरेण भूमिमुहे । सत्तेकपंचएक्क य रज्जू मज्झम्हि हाणिचयं ।।११३।।

The height of the universe is fourteen rājus. Its length is half of the height. [The south-eastersn diameter is seven rājus]. East-west diameter, base and top are respectively, seven, one and five, one rāju, and is in form of reducing common difference in the centre. //1.113//

लोकका उदय (ऊँचाई) १४ राजू प्रमाण है, उसका आयाम उदयका अर्धभाग –७ राजू प्रमाण है। अर्थात् दक्षिणोत्तर व्यास ७ राजू है। पूर्व पश्चिम व्यास भूमि मुखमें सात, एक, पाँच और एक राजू है तथा मध्यमें हानिचय स्वरूप है।।११३।।

मुहभूमीण विसेसे उदयहिदे भूमुहादु हाणिचयं । जोगदले पदगुणिदे फलं घणो वेधगुणिदफलं ।।११४।।

When the difference between the top and base is divided by height, the decrease and the common difference is obtained. When the sum of the base and top is halved and multiplied by the height (pada) area is obtained, and when the area is multiplied by the depth (vedha), the volume is obtained. //1.114//

मुख और भूमिमें जिसका प्रमाण अधिक हो उसमेंसे हीन प्रमाणको घटाकर ऊँचाई (उदय) का भाग देनेसे भूमि और मुखकी हानि तथा चय प्राप्त होता है। भूमि और मुखके योगको आधाकर पद (ऊँचाई) से गुणा करनेपर क्षेत्रफलकी प्राप्ति होती है, तथा उसी क्षेत्रफलमें वेधका गुणा करनेसे घनफल होता है।।११४।।

सामण्णं दो आयद जवमुर जवमज्झ मंदरं दूसं । गिरिगडगेण विजाणह अट्ठवियप्पो अधो लोगो ।।११५।।

The lower universe (adholoka) should be known to be of eight types: the common (sāmānya), the vertical rectangle (ūrdhāyata), the horizontal rectangle (tiryagāyata), barley drum (yavamuraja), the tent-framed (dūṣya), the ridge-framed (girikaṭaka). //1.115//

१. सामान्य २. ऊर्द्धायत ३. तिर्यगायत ४. यवमुरज ५. यवमध्य ६. मन्दर ७. दूष्य और ८. गिरिकटक। इस प्रकार अधोलोकके आठ भेद जानना चाहिये।।११५।।

रज्जुतयस्सोसरणे सत्तुदओ जदि हवेज्ज एक्केसे । किमिदि कदे संपादे एक्कजउस्सेहमाणमिणं ।।११६।।

When, on reduction of three rājus one side, the height of seven rājus is obtained, then what height is obtained on reduction of one rāju ? Operating trio-set method, the height of one barley is found to be seven upon three rājus. //1.116//

जबकि एक ओर ३ राजूके घटने पर ७ राजूकी ऊँचाई प्राप्त होती है तब एक राजू घटनेपर कितनी ऊँचाई प्राप्त होगी? इस प्रकार त्रैराशिक करनेपर एक यवकी $\frac{७}{३}$ राजू ऊँचाई प्राप्त होगी।।११६।।

अद्धं चउत्थभागो सगबारसमं तिदालबारंसो । सगबारंस दिवड्ढं रज्जुदओ मंदरे खेत्ते ।।११७।।

In the lower universe, from below upwards, on adding one-fourth rāju in half of rāju, it gives three fourth rāju. The region framed through three fourth rājus, seven upon twelve rajus, forty-three upon twelve raju, and three upon two rajus over the preceding, gives rise to the mountainous-shaped (mandarākāra) region. //1.117//

अधोलोकमें नीचेसे ऊपर आधे राजूमें चौथाई राजू मिला देनेसे $(\frac{१}{२}+\frac{१}{४})$ पौन राजू होता है। $\frac{३}{४}$ राजूसे

$\frac{७}{१२}$ राजू, इससे $\frac{४३}{१२}$ राजू, इससे $\frac{७}{१२}$ राजू और इससे $\frac{३}{२}$ राजू ऊपर, ऊपर जाकर जिस आकारका निर्माण होता है, वही मन्दराकार क्षेत्र बन जाता है।।११७।।

सामण्णं पत्तेयं अद्धत्थंभं तहेव पिण्णट्ठी । एदे पंचपयारा लोयक्खेत्तम्हि णायव्वा ।।११८।।

Relative to regions, five types of upper universe should be known: the common (sāmānya), the every-one (pratyeka), the half-pillar (ardha-stambha), the pillor (stambha), and the cross-sectioned (pinaṣṭi), upper universe types. //1.118//

सामान्य ऊर्ध्वलोक, प्रत्येक ऊर्ध्वलोक, अर्धस्तम्भ ऊर्ध्वलोक, स्तम्भ ऊर्ध्वलाक और पिनष्टि ऊर्ध्वलोक, इस प्रकार क्षेत्रकी अपेक्षा ऊर्ध्वलोकके पाँच भेद जानना चाहिये।।११८।।

रज्जुदुगहाणिठाणे आहुट्ठदओ जदीह एक्किस्से । किमिदि तिरासियकरणे फलं दलूणं तिबाहुदओ ।।११९।।

The upper universe is five rājus broad in the middle, and one rāju at the base. Hence there is a decrease of two rājus on seven by two rājus, on one side. Similarly there is a decrease of one rāju on seven upon four rājus. On subtracting one upon two rāju, the height of the triangle is five upon four rajus. //1.119//

ऊर्ध्वलोक मध्यमें ५ राजू चौड़ा है, और नीचे १ राजू है अतः $\frac{७}{२}$ राजूपर एक ओर २ राजूकी हानि होती है, तब १ राजूकी हानि $(\frac{७}{२} x \frac{१}{२}) = \frac{७}{४}$ राजू पर होगी। इसमें से $\frac{१}{२}$ राजू घटाने पर $(\frac{७}{४} - \frac{१}{२}) = \frac{५}{४}$ राजू त्रिभुजकी ऊँचाई है।।११९।।

तिभुजुदयूणुहयुच्चं सूईखेत्तस्स भूमिमुह सेसे । भूमीतप्फलहीणं चउरस्सधराफलं सुद्धं ।।१२०।।

The height of the Sānat-kumāra pair is three upon two rājus. On subtracting five upon four rāju height, the height of the linear region is one upon four rājus. The remainder based is a triangle whose area is subtracted from the area of the outer-part of the mobile-bios-channel of next pair, getting the area of remainder quadrilateral region as eighty-three upon fifty-six square rājus. //1.120//

सानत्कुमार युगलकी ऊँचाई $\frac{३}{२}$ राजू है इसमेंसे त्रिभुज 'क' की $\frac{५}{४}$ राजू ऊँचाई घटानेसे सूची क्षेत्रकी ऊँचाई $(\frac{३}{२} - \frac{५}{४}) = \frac{१}{४}$ राजू हुई। भूमि मुखमें अवशेष भूमि त्रिकोन क' है, इसका क्षेत्रफल दूसरे युगलकी त्रसनाड़ीके बाह्य भागके क्षेत्रफलमें से घटानेपर शेष चतुरस्र क्षेत्रका क्षेत्रफल $\frac{८३}{५६}$ वर्ग राजू होता है।।१२०।।

पुव्वावरेण परिही उगुदालं साहियं तु रज्जूणं । दक्खिणउत्तरदो पुण बादालं होंति रज्जूणं ।।१२१।।

The perimeter (paridhi) of the universe, east-west is thirty-nine and forty-three upon one hundred twenty rājus. Relative to south-north, it is forty-two rājus. //1.121//

लोककी परिधि पूर्व पश्चिम अपेक्षा $३९\frac{४३}{१२०}$ राजू है तथा दक्षिणोत्तर ४२ राजू है।।१२१।।

भुजकोडिकदिसमासो कण्णकदी होदि वग्गरासिस्स । गुणयारभागहारा वग्गाणि होंति णियमेण ।।१२२।।

The sum of the squares of the base and perpendicular is equal to the square of hypotenuse (karaṇa). The multiplication and division of the square-set is in form of square as per rule. //1.122//

भुजा और कोटिके वर्गको परस्पर जोड़नेसे करणका वर्ग होता है। वर्गराशिका गुणकार व भागहार नियमसे वर्गरूप ही होता है।।१२२।।

गोमुत्तमुग्गणाणावण्णाण घणंबुघणतणूण हवे । बादाणं वलयतयं रुक्खस्स तयं व लोगस्स ।।१२३।।

Just as a tree is enveloped by skinbark, similarly, the universe is enveloped by three envelops of air (vātavalayas). Alike the three envelops, first of all is the dense-water-air envelop (ghanodadhi vātavalaya) of the colour of a cow-urine. After it is the dense-air-envelop of the kidney-bean colour (muṅga varṇa). After it, is the thin-air-envelop of several colours. //1.123//

जिस प्रकार वृक्ष त्वक् (छाल) से वेष्टित रहता है, उसी प्रकार लोक तीन वातवलयोंसे वेष्टित है। तीन तहोंके सदृश सर्वप्रथम गोमूत्रके वर्णवाला घनोदधि वातवलय है। उसके पश्चात् मूँगके वर्णवाला घनवातवलय है और उसके पश्चात् अनेक वर्णों वाला तनुवातवलय है।।१२३।।

जोयणवीससहस्सं बहलं वलयत्तयाण पत्तेयं । भूलोयतले पासे हेट्ठादो जाव रज्जुत्ति ।।१२४।।

In the lower part of the universe-space (lokākāśa), in the side portions from below upto a height of one rāju, and below the eight earths, the three envelops are each of twenty thousand yojanas. //1.124//

लोकाकाशके अधोभागमें, दोनों पार्श्वभागोंमें नीचेसे लगाकर एक राजूकी ऊँचाई पर्यन्त तथा आठों भूमियोंके नीचे तीनों वातवलय (प्रत्येक) बीस बीस हजार मोटाई वाले हैं।।१२४।।

सत्तमखिदिपणिधिम्हि य सग पणचत्तारिपणचउक्कतियं । तिरिये बम्हे उड्ढे सत्तमतिरिए च उत्तकमं ।।१२५।।

Along both the side portions, above one rāju, near the seventh earth, the dense-water-air-envelop is seven yojanas thick, the dense air-envelop is five yojanas thick, and thin-air-envelop is four yojanas thick. From this sevnth earth, reducing gradually upwards, near the horizontal-universe (tiryakloka), the three air-envelops are respectively five, four and three yojanas thick, and from here upto the Brahma-loka, gradually increasing alike, near the seventh earth, become seven, five, and four yojanas thick. Then gradually reducing from Brahma-loka, the three envelops become five, four and three yojanas thick similarly, to the horizontal-universe near the upper-universe. //1.125//

दोनों पार्श्वभागोंमें एक राजूके ऊपर सप्तम पृथ्वीके निकट घनोदधिवातवलय सातयोजन, घनवातवलय पाँच योजन और तनुवातवलय चार योजन मोटाई वाले हैं। इस सप्तम पृथ्वीके ऊपर क्रमसे घटते हुए तिर्यग्लोकके समीप तीनों वातवलय क्रमसे पाँच, चार और तीन योजन बाहल्य वाले तथा यहाँसे ब्रह्मलोक पर्यन्त क्रमसे बढ़ते हुए, सप्तम पृथ्वीके निकट सदृश सात, पाँच और चार योजन बाहल्य वाले हो जाते हैं तथा ब्रह्मलोकसे क्रमानुसार हीन होते हुए तीनों वातवलय ऊर्ध्वलोकके निकट तिर्यग्लोक सदृश पाँच, चार और तीन योजन बाहल्य वाले हो जाते हैं।।१२५।।

कोसाणं दुगमेक्कं देसूणेक्कं च लोयसिहरम्मि । ऊणधणूण पमाणं पणुवीसज्झहियचारिसयं ।।१२६।।

The thickness of the air envelops at the top of the universe is two kośa, one kośa, and slightly less than one kośa. Here the amount of slightly less is four hundred twenty-five dhanuṣas. //1.126//

लोक के शिखर पर पवनों का प्रमाण क्रमशः २ कोश, १ कोश और कुछ कम एक कोश है। यहाँ कुछ कम का प्रमाण ४२५ धनुष है।।१२६।।

लोयतले वादतये बाहल्लं सट्ठिजोयणसहस्सं । सेढिभुजकोडिगुणिदं किंचूणं वाउखेत्तफलं ।।१२७।।

The thichkness of the [covered region of] three air-envelops below the nuiverse is sixty thousand yojanas, length and breadth is of universe-line measure. On multiplying the length and breadth with thickness, the volume is found to be slightly less than universe-square as multiplied by sixty-thousand yojanas. //1.127//

लोकके नीचे तीनों पवनोंका बाहल्य ६०००० योजन तथा लम्बाई और चौड़ाई जगच्छ्रेणी प्रमाण है। पवनोंकी यही लम्बाई और चौड़ाई जगच्छ्रेणीकी भुजा एवं कोटि है अतः जगच्छ्रेणी प्रमाण भुजा और कोटिका परस्पर गुणा करनेसे कुछ कम जगत्प्रतर गुणित ६० हजार योजन क्षेत्रफल प्राप्त होता है।।१२७।।

किंचूणरज्जुवासो जगसेढीदीहरं हवे वेहो । जोयणसट्ठिसहस्सं सत्तमखिदिपुव्वअवरे य ।।१२८।।

The total width of the three air-envelops is one rāju as reduced [by sixty thousand yojanas]. Their length is a universe-line (jagacchreṇī), and upto the seventh earth, east-west the thickness (vedha) is sixty thousand yojanas. //1.128//

तीनों पवनोंका व्यास (चौड़ाई) कुछ म (६० हजार योजन) एक राजू है। उनकी लम्बाई जगच्छ्रेणी (७ राजू) प्रमाण है तथा सप्तम पृथ्वी पर्यन्त पूर्व पश्चिम ६० हजार योजन वेध (मोटाई) है।।१२८।।

जगपदरसत्तभागं सट्ठिसहस्सेहि जोयणेहि गुणं । बिगगुणिदमुभयपासे वादफलं पुव्वअवरे य ।।१२९।।

The volume of east-west both side portions is obtained by multiplying the seventh part of universe-square (jagapratara) by sixty thousand yojanas, and multiplying it by two. //1.129//

जगत्प्रतरके सातवें भाग $\left(\frac{४९}{७}\right)$ को ६० हजार योजनसे गुणा करनेपर जो लब्ध प्राप्त हो, उसमें दोका गुणा करनेसे पूर्व पश्चिम दोनों पार्श्व भागोंका क्षेत्रफल प्राप्त हो जाता है।।१२९।।

उदयमुहभूमिवेहो रज्जुससत्तमछरज्जुसेढी य । जोयणसट्ठिसहस्सं सत्तमखिदिदक्खिणुत्तरदो ।।१३०।।

Relative to south-north the height of the air-envelops upto the seventh earth from below, is one rāju, it is six and one out of seven rāju in the top near the seventh earth, the base is [seven rājus] universe-line and the thickness (vedha) is sixty thousand yojanas. //1.130//

दक्षिणोत्तर अपेक्षा लोकके नीचेसे सप्तम पृथ्वीपर्यन्त पवनोंका उदय (ऊँचाई) १ राजू, सप्तम पृथ्वीके समीप मुख (चौड़ाई) ६$\frac{१}{७}$ राजू, भूमि जगच्छ्रेणी प्रमाण अर्थात् ७ राजू तथा वेध (मोटाई) ६० हजार योजन है।।१३०।।

तस्स फलं जगपदरो सट्ठिसहस्सेहि जोयणेहि हदो । बाणउदिगुणो सगघणसंभजिदो उभयपासम्हि ।।१३१।।

When universe-square is multiplied by sixty thousand yojanas as also by ninety-two, and on dividing the product by cube of seven [three hundred forty-three cubic rājus], the volume of both the side parts is obtained. //1.131//

जगत्प्रतरको ६०००० योजनसे एवं ९२ से गुणाकर ७ के घन (३४३ राजू) का भाग देनेपर दोनों पार्श्व भागोंका क्षेत्रफल प्राप्त होता है।।१३१।।

सेढी छरज्जु चोद्दसजोयणमायामवासमुस्सेहं । पुव्ववरपासजुगले सत्तमदो तिरियलोगोत्ति ।।१३२।।

From the seventh earth, upto the horizontal-universe (tiryakloka), east-west both side pairs, the length of the air-envelops is a universe-line, diameter six rājus, and height (utsedha) or thikness is fourteen yojanas. //1.132//

सप्तम पृथ्वीसे तिर्यग्लोकपर्यन्त पूर्व पश्चिम पार्श्वयुगलोंमें पवनोंका आयाम श्रेणी (७ राजू), व्यास (चौड़ाई) ६ राजू और उत्सेध (मोटाई) १४ योजन प्रमाण है।।१३२।।

तव्वादरुद्धखेत्तं जोयणचउवीसगुणिदजगपदरं । उभयदिसासंजणिदं णादव्वं गणिदकुसलेहिं ।।१३३।।

The region surrounded by air-envelops in both the directions mentioned above, is of volume given by universe-square as multiplied by twenty-four. This has been known by specialists in mathematics. //1.133//

उपर्युक्त दोनों दिशाओंके वायुरुद्ध क्षेत्रका क्षेत्रफल जगत्प्रतर x २४ है। ऐसा गणित-विशेषज्ञों द्वारा जाना गया है।।१३३।।

उदयं भुमुह वेहो छरज्जु सत्तमछरज्जु रज्जू य । जोयण चोद्दस सत्तमतिरियोत्ति हु दक्खिणुत्तरदो ।।१३४।।

Relative to south-north, from the seventh earth upto the middle universe, the height (udaya) of the air-envelops is six rājus, base six and one by seven rājus, and thickness (vedha) is fourteen yojanas. //1.134//

दक्षिणोत्तर अपेक्षा सप्तम पृथ्वीसे मध्यलोक पर्यन्त पवनोंका उदय (ऊँचाई) ६ राजू, भूमि $६\frac{१}{७}$ राजू, मुख १ राजू और वेध (मोटाई) १४ योजन प्रमाण हैं।।१३४।।

तत्थाणिलखेत्तफलं उभये पासम्हि होइ जगपदरं । छस्सयजोयणगुणिदं पविभत्तं सत्तवग्गेण ।।१३५।।

There the volume of the both lateral portions is obtained on multiplying universe-square by six hundred yojanas, and on dividing by square of seven. //1.135//

वहाँ (दक्षिणोत्तरमें सप्तम पृथ्वीसे मध्यलोक पर्यन्त) दोनों पार्श्व भागोंका क्षेत्रफल जगत्प्रतरको ६०० योजनोंसे गुणितकर ७ के वर्ग (४६) से भाग देनेपर प्राप्त हो जाता है।।१३५।।

आउड्ढरज्जुसेढी जोयणचोद्दस य वासभुजवेहो । बम्होत्ति पुव्वअवरे फलमेदं चदुगुणं सव्वं ।।१३६।।

The height of the air envelops from the horizontal-universe upto the Brahmaloka is three and a half rājus. This is called diameter (vyāsa or koṭi). The side is a universe-line, and the thickness of the air-envelops is fourteen yojanas. On mutual multiplication of the above three measures, and multiplying by four, the volume of the region occupied by the air-envelops of east-west in the upper-universe is obtained. //1.136//

तिर्यग्लोकसे ब्रह्मलोकपर्यन्त पवनोंकी ऊँचाई $३\frac{१}{२}$ राजू है। इसीका नाम व्यास है। यहाँ इसे कोटि भी कहा है। श्रेणी अर्थात् ७ राजूकी भुजा है और पवनोंकी मोटाई १४ योजन प्रमाण है। इन तीनोंका परस्पर गुणा कर, फिर ४ से गुणाकर देनेपर (चारक्षेत्र) ऊर्ध्वलोकमें पूर्व व पश्चिम वातवलयोंसे रुद्धक्षेत्रका क्षेत्रफल प्राप्त हो जाता है।।१३६।।

पंचाहुट्ठिगिरज्जू भूतुंगमुहं बिसत्तजोयणयं । वेहो तं चउगुणिदं खेत्तफलं दक्खिणुत्तरदो ।।१३७।।

The upper-universe is five rājus broad on Brahma paradise, this is the base. The Brahma paradise is three and a half rājus high from the horizontal-universe. On the horizontal universe, the upper universe is one rāju broad. This is the top (mukha). The thickness of the air envelops is two times seven yojanas. When these four qualities are mutually multiplied, and then multiplied by four, the volume of the four portions of south-north both directions of upper-universe is obtained. //1.137//

ब्रह्मस्वर्गपर ऊर्ध्वलोक ५ राजू चौड़ा है यही भूमि है। तिर्यग्लोकसे ब्रह्मस्वर्ग ३$\frac{१}{२}$ राजू ऊँचा है। तिर्यग्लोकपर ऊर्ध्वलोक १ राजू चौड़ा है। यही मुख है। द्विसप्त अर्थात १४ योजन वेध अर्थात् वातवलयोंकी मोटाई १४ योजन है। इन चारोंका परस्पर गुणा करनेसे जो लब्ध प्राप्त हो, उसे पुनः ४ से गुणित करनेपर ऊर्ध्वलोककी दक्षिणोत्तर दोनों दिशओंके चारों भागोंका क्षेत्रफल प्राप्त होता है।।१३७।।

वासुदयभुजं रज्जू इगिजोयणवीसतिसदखंडेसु । सतितिसदं सेढी फलमीसिपभारुवरि दंडवाऊणं ।।१३८।।

[Relative to east-west, similar to diameter of universe] the breadth of the air-envelop is one rāju, height is three hundred upon three hundred twenty yojanas and the length is a universe-line. On multiplying these three, the volume of the region occupied by air above the Īṣat prāgbhāra earth is obtained. //1.138//

(पूर्व पश्चिम अपेक्षा लोकके व्यास सदृश) वातवलयका व्यास १ राजू, उदय (ऊँचाई) $\frac{३०३}{३२०}$ योजन और श्रेणी (दक्षिणोत्तर ७ राजू चौड़ाई = श्रेणी) प्रमाण भुजा है। इन तीनों ($\frac{१}{१}$ x $\frac{३०३}{३२०}$ x $\frac{७}{१}$) का परस्पर गुणा करनेसे ईषत् प्रागभार पृथ्वीके ऊपर वायुरुद्ध क्षेत्रका क्षेत्रफल प्राप्त होता है।।१३८।।

सत्तासीदिचदुस्सदसहस्सतेसीदिलक्ख उणवीसं । चउवीसहियं कोडिसहस्सगुणियं तु जगपदरं ।।१३९।।
सट्ठीसत्तसएहि णवयसहस्सेगलक्खभजियं तु । सव्वं वादारुद्धं गणियं भणियं समासेण ।।१४०।।

On adding the total volume of the regions occupied by all the air envelops, universe-square as multiplied by one thousand twenty-four crore nineteen lac eighty-three thousand four hundred eighty-seven. This mathematics has been related in brief. //1.139-140//

सम्पूर्ण वातवलयोंसे रोके हुए क्षेत्रोंके क्षेत्रफलोंको जोड़नेपर, एक लाख नौ हजार सात सौ साठसे भाजित जगत्प्रतर गुणित एक हजार चौबीस करोड़ उन्नीस लाख तेरासी हजार चार सौ सत्तासी प्राप्त होता है। यह गणित संक्षेपसे कहा गया है।।१३९-१४०।।

णवपण्णारसलक्खा सयाण खंडाणमेयखंडम्हि । सिद्धाणं तणुवादे जहण्णमुक्कस्सयं ठाणं ।।१४१।।

Nine lac pieces are made of the thikness of the thin-air-envelop. In one piece, there are the accomplished beloved-supreme (siddha parameṣṭhī) with minimal immersion (avagāhanā). When the same thickness is cut-into fifteen hundred pieces, in one such piece the accomplished beloved supreme with maximal immersion. //1.141//

तनुवातवलयके बाहल्यके नव लाख खण्ड करनेपर एक खण्डमें जघन्य अवगाहना वाले सिद्ध परमेष्ठी हैं और उसी बाहल्यके पन्द्रह सौ खण्ड करनेपर उसके एक खण्डमें उत्कृष्ट अवगाहना वाले सिद्ध परमेष्ठी विराजमान हैं।।१४१।।

पणसयगुणतणुवादं इच्छियउग्गाहणेण पविभत्तं । हारो तणुवादस्स य सिद्धाणोगाहणाणयणे ।।१४२।।

The thickness of thin-air-envelop is multiplied by five hundred and divided by chosen immersion. The thickness when divided by the quotinet gives the chosen immersion of the accomplished. //1.142//

तनुवातवलयके बाहल्यको ५०० से गुणाकर इच्छित (जघन्योत्कृष्ट) अवगाहनाका भाग देनेपर जो लब्ध प्राप्त हो उसका तनुवातवलयके बाहल्यमें भाग देनेपर सिद्धों की इच्छित अवगाहना प्राप्त हो जाती है।१४२।।

लोयबहुमज्झदेसे रुक्खे सारव्व रज्जुपदरजुदा । चोद्दसरज्जुत्तुंगा तसणाली होदि गुणणामा ।।१४३।।

There is a meaningful mobile bios-channel (trasa-nālī), with one square rāju [cross section] area and fourteen rājus height. Similar to essential part existent in the interior of a tree, there exists the mobile-bios-channel in the central most portion of the universe space (lokākāśa). //1.143//

लोकाकाशके बहुमध्य प्रदेशोंमें (बीचमें) वृक्षके मध्यमें रहने वाले सार भागके सदृश, तथा एक राजू प्रतरसे सहित चौदह राजू ऊँची और सार्थक नाम वाली त्रस नाली है।।१४३।।

मुरवदले सत्तमही उवरीदो रयणसक्करावालू । पंका धूमतमोमहतमप्पहा रज्जुअंतरिया ।।१४४।।

There are seven earths in the half drum shaped lower-universe: the Ratnaprabhā at the top, the Śarkarā prabhā, the Bālukāprabhā, the Paṅkaprabhā, the Dhūmaprabhā, the Tamaḥprabhā and the Mahātamaḥprabhā. Every earth is at an interval of one rāju. //1.144//

अर्धमृदंगाकारमें सात पृथ्वियाँ सबसे ऊपर १. रत्नप्रभा फिर २. शर्कराप्रभा ३. बालुकप्रभा ४. पंकप्रभा ५. धूमप्रभा ६. तमःप्रभा और ७. महातमःप्रभा हैं। प्रत्येक पृथ्वी एक एक राजूके अन्तरसे है।।१४४।।

घम्मा वंसा मेघा अंजणरिट्ठा य होंति अणिउज्झा । छट्ठी मघवी पुढवी सत्तमिया माघवी णामा ।।१४५।।

The alternative names of the earths are, the Gharmā, the Vaṁsā, the Meghā, the Anjanā, the Ariṣṭā, The Maghavī, The Māghavī, these being of no meaningful names. //1.145//

१. घर्मा २. वंशा ३. मेघा ४. अंजना ५. अरिष्टा ६. मघवी, ७. माघवी ये सात पृथ्वियाँ अनियोध्या अर्थात् अर्थरहित नाम वाली हैं।।१४५।।

रयणप्पहा तिहा खरभागा पंकापबहुलभागात्ति । सोलस चउरासीदी सीदी जोयणसहस्सबाहल्ला ।।१४६।।

There are three parts of the Ratnaprabhā : the hard part, the mud part and the water-excess part. There are sixteen thousand, eighty four thousand, and eight thousand yojanas, respectively. //1.146//

रत्नप्रभा पृथ्वीके तीन भाग हैं- खरभाग, पंकभाग और अब्बहुल भाग। इन तीनोंका बाहल्य क्रमशः सोलह हजार, चौरासी हजार और अस्सी हजार योजन है।।१४६।।

चित्ता वज्जा वेलुरियलोहिदक्खा मसारगल्लवणी । गोमेदा य पवाला जोदिरसा अंजणा णवमी ।।१४७।।

अंजणमूलिय अंका फलिहा चंदण सवत्थगा वकुला । सेलक्खा य सहस्सा एगेगा लोगचरिमगया ।।१४८।।

There are sixteen earths, each one thousand yojana thick, extending to the end of the universe: The Citrā, the Vajrā, the Vaiḍūrya, the Lohita, the Maśārakalpā, the Gomedā, the Pravālā, the Jyotirasā, the Añjanā mūlikā, the Aṅkā, the Sphaṭikā, the Candanā, the Sarvārthakā, the Bakulā, the Śailā. //1.147-148//

१. चित्रा २. वज्रा ३. वैडूर्या ४. लोहिता ५. मसारकल्पा ६. गोमेदा ७. प्रवाला ८. ज्योतिरसा ६. अंजना १०. अंजनमूलिका ११. अंका १२. स्फटिका १३. चन्दना १४. सर्वार्थका १५. बकुला और १६. शैला ये एक एक हजार योजन प्रमाण बाहल्य वाली सोलह पृथ्वियाँ हैं जो लोकके अन्त तक गई हैं।।१४७-१४८।।

बत्तीसमट्ठवीसं चउवीसं वीस सोलसट्ठाणि । हेट्ठिमछप्पुढवीणं सहस्समाणेहिं बाहुलियं ।।१४६।।

Initiating with the Śarkarā earth, the thickness of the six earths below are respectively, thirty-two thousand, twenty-eight thousand, twenty-four thousand, twenty thousand, sixteen thousand, and thousand yojanas. //1.149//

शर्करा पृथ्वीको आदि लेकर नीचेकी छह पृथ्वियोंकी मोटाई क्रमशः बत्तीस हजार (३२०००) अट्ठाईस हजार (२८०००), चौबीस हजार (२४०००) बीसहजार (२००००), सोलह हजार (१६०००) और आठ हजार (८०००) योजन प्रमाण हैं।।१४६।।

सप्तमखिदिबहुमज्झे बिलाणि सेसासु अप्पबहुलोत्ति । हेट्ठुवरिं च सहस्सं वज्जिय पडलक्कमे होंति ।।१५०।।

In the central most part of the seventh earth, there are holes, and in the remaining five earths and the water-excess portion of the first earth extension, leaving below and above, one thousand yojanas of thickness, there are holes in successive-order in the laminas. //1.150//

सप्तम पृथ्वीके बहुमध्य भागमें बिल हैं तथा अवशेष पाँच पृथ्वियों एवं प्रथम पृथ्वीके अब्बहुल भाग पर्यन्त नीचे व ऊपर एक एक हजार योजन छोड़कर पटलोंके क्रमसे बिल पाए जाते हैं।।१५०।।

तीसं पणुवीसं पण्णरसं दस तिण्णि पंचहीणेक्कं । लक्खं सुद्धं पंच य पुढवीसु कमेण णिरयाणि ।।१५१।।

In the six earths there are thirty lac, twenty-five lac, fifteen lac, ten lac, three lac and one lac as reduced by five holes. In the seventh earth there are absolutaly five holes, without any lac title.//1.151//

छह पृथ्वियों में क्रमशः तीस लाख, पच्चीस लाख, पन्द्रह लाख, दश लाख, तीन लाख और पाँच कम एक लाख बिल हैं तथा सातवीं पृथ्वी में शुद्ध अर्थात् लक्ष विशेषण रहित केवल पाँच बिल ही हैं।।१५१।।

रयणप्पहपुढवीदो पंचमतिचउत्थओत्ति अदिउण्हं । पंचमतुरिए छट्ठे सत्तमिए होदि अदिसीदं ।।१५२।।

Upto the three fourth part of the fifth earth from the Ratnaprabhā earth, there is extremely hot suffering. In the remaining one part of the fifth earth, and in the sixth and seventh earth, there is extreme cold suffering. //1.152//

रत्नप्रभा पृथ्वीसे पाँचवीं पृथ्वीके तीन चौथाई भाग पर्यन्त अतिउष्ण वेदना और पाँचवीं पृथ्वीके शेष एक चौथाई भागमें तथा छठी और सातवीं पृथ्वीमें अतिशय शीतवेदना है।।१५२।।

तेरादि दुहीणिंदय सेढीबद्धा दिसासु विदिसासु । उणवण्णडदालादी एक्केक्केणूणया कमसो ।।१५३।।

Beginning with thirteen, there are central holes (indraka bilas) successively reducing by two in every earth. The sequence-bound holes (śreṇī-baddha bilas) begin with forty-nine and forty-eight in directions and sub-directions, reducing by unity successively in every lamina. //1.153//

तेरहको आदि करके प्रत्येक पृथ्वीमें उत्तरोत्तर दो दो हीन इन्द्रक बिल हैं तथा श्रेणीबद्ध बिल दिशा और विदिशामें क्रमशः ४६ और ४८ से प्रारम्भ होकर प्रत्येक पटल प्रति एक एक हीन होते गए हैं।।१५३।।

सीमंतणिरयरौरवभंतुब्भंतिंदया य संभंतो । तत्तोवि असंभंतो वीभंतो णवमओ तत्थो ।।१५४।।

तसिदो वक्कंतक्खो होदि अवक्कंतणाम विक्कंतो । पढमे तदगो थणगो वणगो मणगो खडा खडिगा ।।१५५।।

जिब्भा जिब्भिगसण्णातो लोलिगलोलवत्थथणलोलो । बिदिए तत्तो तविदो तवणो तावणणिदाहा य ।।१५६।।

उज्जलिदो पज्जलिदो संजलिदो संपजलिदणामा य । तदिए आरा मारा तारा चच्चा य तमगी य ।।१५७।।

घाडा घडा चउत्थे तमगा भमगा य झसग अंद्धिंदा । तिमिसा य पंचमे हिमवद्दललल्लगितयं छट्ठे ।।१५८।।

ओहिट्ठाणं चरिमे तो सीमंतादिसेढिबिलणामा । पुव्वादिदिसे कंखोपिवास महकंख अइपिवासा य ।।१५९।।

वंसतदगे अणिच्छा अविज्ज महणिच्छ महअविज्जा य । तत्ते दुक्खा वेदा महदुक्ख महादिवेदा य ।।१६०।।

आराए दु णिसिट्ठाणिरोहअणिसिट्ठमहणिरोहा य । तमग णिरुद्धविमद्दण अइपुव्वणिरुद्धमहविमद्दणया ।।१६१।

हिमगा णीला पंका महणील महादिपंक सत्तमये । पढमो कालो रउरवमहकालमहादिग्उरवया ।।१६२।।

वेगपदं चयगुणिदं भूमिम्हि मुहम्हि रिणधनं च कए । मुहभूमीजोगदले पदगुणिदे पदधणं होदि ।।१६३।।

The common difference is multiplied by number of terms (pada) as reduced by unity. The base is reduced by the quotient to give the top (mukha), and when it is added to the top it gives the base (bhūmi). When the sum of the top and base is halved and multiplied by the number of terms, giving the sum of the number of terms (pada-dhana). //1.163//

एक कम पदका चय में गुणाकर जो लब्ध प्राप्त हो उसे भूमिमें से घटा देनेपर मुखकी प्राप्ति होती है तथा मुखमें जोड़ देनेसे भूमिकी प्राप्ति होती है। मुख और भूमिको जोड़कर आधा करनेसे जो लब्ध प्राप्त हो उसमें पदका गुणा करनेसे पद धनकी प्राप्ति हो जाती है।।१६३।।

पदमेगेणबिहीणं दुभाजिदं उत्तरेण संगुणिदं । पभवजुदं पदगुणिदं पदगणिदं तं विजाणाहि ।।१६४।।

The number of terms is reduced by unity, divided by two. The quotient is multiplied by common difference (uttara), and the initial or top (mukha) is added to the product and multiplied by the number of terms resulting in the sum of the number of terms. //1.164//

पदमेंसे एक घटाकर दोका भाग देनेपर जो लब्ध प्राप्त हो उसमें उत्तर अर्थात् चयसे गुणाकर प्रभव अर्थात मुखमें जोड़कर पदसे गुणाकरने पर पद धन होता है।।१६४।।

पुढविंदयमेगूणं अद्धकयं वग्गियं च मूलजुदं । अट्ठगुणं चउसहितं पुटविंदयताडियं च पुढविधणं ।।१६५।।

The number of the central holes of the chosen earth is reduced by unity, then halved and squared, and to the result is added its own square-root. The sum is multiplied by eight and four is added to the product. The sum is then multiplied by the number of central holes resulting in the collected sum of the chosen earth. //1.165//

विवक्षित पृथिवीके इन्द्रक बिलोंकी संख्यामें से एक घटाकर आधा करनेपर जो लब्ध प्राप्त हो उसका वर्गकर उसमें उसीका वर्गमूल जोड़ देना चाहिये, तथा आठसे गुणाकर पुनः ४ जोड़नेपर जो लब्ध प्राप्त हो उसे इन्द्रक बिलोंकी संख्यासे गुणित कर देनेपर विवक्षित पृथ्वीका संकलित धन प्राप्त हो जाता है।।१६५।।

सेढीणं विच्चाले पुप्फपइण्णय इव ट्ठिया णिरया । होंति पइण्णयणामा सेढिंदयहीणरासिसमा ।।१६६।।

When the holes lie scattered here and there in between the sequence-bound holes, they are called scattered (prakīrṇaka). When from the total number of holes of the chosen earth are subtracted the numbers of the central and sequence-bound holes, the number of scattered holes is obtained. //1.166//

श्रेणीबद्ध बिलोंके बीचों बीच बिखरे हुए फूलोंके सदृश यत्र तत्र स्थित बिलोंको प्रकीर्णक कहते हैं। विवक्षित पृथ्वीके सम्पूर्ण बिलोंकी संख्यामें से इन्द्रक और श्रेणीबद्धोंकी संख्या घटा देनेपर प्रकीर्णक बिलोंकी संख्या प्राप्त होती है।।१६६।।

पंचमभागपमाणा णिरयाणं होंति संखवित्थारा । सेसचउपंचभागा असंखवित्थारया णिरया ।।१६७।।

One fifth part of the total holes of every earth are of finite yojanas of diameter, and the remaining four by fifth part are of innumerate yojanas of diameter. //1.167//

प्रत्येक पृथ्वीके सम्पूर्ण बिलोंके $\frac{१}{५}$ वें भाग प्रमाण बिल संख्यात योजन विस्तार वाले हैं। और शेष $\frac{४}{५}$ भाग प्रमाण असंख्यात योजन विस्तार वाले हैं।।१६७।।

इंदयसेढीबद्धा पइण्णयाणं कमेण वित्थारा । संखेज्जमसंखेज्जं उभयं च य जोयणाण हवे ।।१६८।।

The diameter of the central (indraka), sequence-bound (śreṇī-baddha) and scattered (prakīrṇaka) holes is respectively, numerate yojanas, innumerate yojanas, and numerate-cum-innumerate yojanas. //1.168//

इन्द्रक, श्रेणीबद्ध और प्रकीर्णक बिलोंका विस्तार क्रमसे संख्यात योजन, असंख्यात योजन और संख्यात एवं असंख्यात अर्थात् उभयरूप होता है।।१६८।।

माणुसखेत्तपमाणं पढमं चरिमं तु जंबुदीवसमं । उभयविसेसे रूऊणिंदयभजिदम्हि हाणिचयं ।।१६९।।

The diameter of the first central hole is equal to that of the human region, and the diameter of the last central is equal to that of Jambū island. When the difference of the both is divided by the number of the central holes as reduced by unity, the decreasing common difference is obtained. //1.169//

प्रथम इन्द्रक बिलका विस्तार मनुष्य क्षेत्र प्रमाण तथा अन्तिम इन्द्रकका विस्तार जम्बूद्वीप प्रमाण है। दोनोंका शोधनकर, एक कम इन्द्रकोंके प्रमाणका भाग देनेपर हानि चय प्राप्त होता है।।१६९।।

छक्कट्ठचोद्दसादिसु पडिपुढविमुखद्धसहियकोसेसु । छहिं भजिदेसु बहल्लं इंदयसेढीपइण्णाणं ।।१७०।।

The thickness or depth of the central etc. holes of every earth is calculated by adding half of the top [initial] (mukha, ādi), in the top itself which is given by six, eight, fourteen [whose half are three, four, seven] and dividing the sum by six. The quotient gives the thickness or depth of the central sequence-bound and scattered holes. //1.170//

प्रत्येक पृथ्वियोंके इन्द्रकादि बिलोंका बाहल्य निकालने के लिए आदि अर्थात मुख छह, आठ और चौदहमें मुख (६, ८, १४) का आधा (३, ४, ७) जोड़कर छहका भाग देनेसे क्रमशः इन्द्रक, श्रेणीबद्ध और प्रकीर्णक बिलोंका बाहल्य प्राप्त होता है।।१७०।।

रूवहियपुढविसंखं तियचउसत्तेहि गुणिय छब्भजिदे । कोसाणं बेहुलियं इंदयसेढीपइण्णाणं ।।१७१।।

The number of earths as increased by unity is multiplied by three, four and seven and is divided by six. The quotient is the thickness or depth (bāhalya) of the central, sequence-bound and scattered holes. //1.171//

एक अधिक पृथ्वी संख्याको तीन, चार और सातसे गुणितकर छहका भाग देनेपर जो लब्ध प्राप्त हो उतने

कोश प्रमाण क्रमशः इन्द्रक, श्रेणीबद्ध और प्रकीर्णक बिलों का बाहल्य होता है।।१७१।।

पदराहय बिलबहलं पदरद्विदभूमिदो विसोहित्ता । रूऊणपदहिदाए बिलंतरं उड्ढगं तीए ।।१७२।।

The depth of the holes in every earth is multiplied by the number of discs (paṭalas), the product is subtracted from the base lying in the surface. The remainder is divided by the number of discs as reduced by unity. The quotient gives, the difference or interval between the centrals etc. holes in height. //1.172//

प्रत्येक पृथ्वीमें बिलोंके बाहल्यको पटलोंके प्रमाणसे गुणितकर तथा प्रतर स्थित भूमिमें से घटाकर, एक कम प्रतरों (पटलों) के प्रमाणका भाग देनेपर ऊँचाईमें इन्द्रकादिक बिलोंका अन्तर प्राप्त होता है।।१७२।।

उवरिमपच्छिमपडला हिट्ठिमपढमिल्लपत्थरंतरयं । रज्जू तिहस्सूणिदघम्मा वंसुदयपरिहीणा ।।१७३।।

The interval from the last disc of upper Gharmā earth upto the first disc of the Vaṁsā earth which is lower, is one rāju as reduced by the difference of the thickness of the Gharmā and Vaṁsā earths and three thousand. //1.173//

ऊपरकी घर्मा पृथ्वीके अन्तिम पटलसे नीचेकी वंशा पृथ्वीके प्रथम पटल तकका अन्तर तीन हजार कम घर्मा और वंशा पृथ्वीके बाहल्यसे हीन एक राजू प्रमाण है।।१७३।।

कमसो बिसहस्सूणियमेघादीणं च वेहपरिहीणा । चरिमे बितिभागाहियजोयणतिसहस्सपरिवज्जा ।।१७४।।

Successively, the difference or interval between the initial and last discs of Meghā etc. earths is one rāju as reduced by the thickness of every earth as reduced by two thousand yojanas. The interval between the initial and last discs of the last earth is one rāju as reduced by three thousand and two upon three yojanas. //1.174//

अनुक्रमसे मेघादि पृथ्वियोंके आदि अन्त पटलोंका अन्तर २००० योजनसे हीन प्रत्येक पृथ्वीके बाहल्यसे कम एक राजू प्रमाण है, तथा अन्तिम पृथ्वीके आदि अन्त पटलोंका अन्तर ३००० $\frac{२}{३}$ योजन कम एक राजू प्रमाण है।।१७४।।

संखेज्जवासणिरए तेरिच्छं अंतरं जहण्णमिणं । इगिजोयणमद्धजुदं जोयणतिदयं हवे जेट्ठं ।।१७५।।

जोयणसत्तसहस्सं असंखवित्थारजुत्तणिरयाणं । अंतरमवरं णेयं जेट्ठमसंखेज्जजोयणयं ।।१७६।।

वज्जघणभित्तिभागा वट्टतिचउरंसबहुविहायारा । णिरया सयावि भरिया सव्विंदियदुक्खदाईहिं ।।१७७।।

मज्जारसाणसूयरखरवाणरकरहहत्थिपहुदीणं । कुहिदादइदुग्गंधा णिरया णिच्चंधयारचिदा ।।१७८।।

उप्पज्जंति तहिं बहुपरिग्गहारंभसंचिदाउस्सा । उट्टादिमुखायारेसुवरिल्लुववादठाणेसु ।।१७९।।

इगिबितिकोसो वासो जोयणमवि जोयणं सयं जेट्ठं । उट्टादीणं बहलं सगवित्थारेहिं पंचगुणं ।।१८०।।

अंतोमुहुत्तकाले तदो चुदा भूतलम्हि तिक्खाणं । सत्थाणमुपरि पडिदूणुट्ठीय पुणोवि णिवडंति ।।१८१।।

पणघणजोयणमाणं सोलहिदं उप्पडंति णेरइया । घम्माए वंसादिसु दुगुणं दुगुणंति णादव्वं ।।१८२।।

पौराणिया तदा ते दट्ठूणइणिट्ठुरारवागम्म । खीचंति णिसिंचंति य वणेसु बहुखारवारीणि ।।१८३।।

तेवि विहंगेण तदो जाणिद पुव्वावरारिसंबंधा । असुहापुहविक्किरिया हणंति हण्णंति वा तेहिं ।।१८४।।

वयवग्घघूगकागहि विच्छियभल्लूकगिद्धसुणयादिं । मूलग्गिकोंतमोग्गरपहुदी संगे विकुव्वंति ।।१८५।।
वेदालगिरी भीमा जंतसयुक्कडगुहा य पडिमाओ । लोहणिहग्गिकणड्ढा परसूछुरिगासिपत्तवणं ।।१८६।।
कूडा सामलिरुक्खा वयिदरणिणदीउ खारजलपुण्णा । पूयरुहिरा दुगंधा दहा य किमिकोडिकुलकलिदा ।।१८७।।
अग्गिभया धावंता मण्णंता सीयलंति पाणीयं । ते वइदरणिं पविसिय खारोदयदड्ढसव्वंगा ।।१८८।।
उट्ठिय वेगेण पुणो असिपत्तवणं पयांति छायेत्ति । कुंतासिसत्तिजट्ठिहिं छिज्जंते वादपडिदेहिं ।।१८९।।
लोहोदयभरिदाओ कुंभीओ तत्तबहुकडाहा य । संतत्तलोहफासा भू सूईसद्दुलाइण्णा ।।१९०।।
विच्छियसहस्सवेयणसमधियदुक्खं धरित्तिफासादो । कुक्खक्खिसीसरोगगछुधतिसभयवेयणा तिव्वा ।।१९१।।
सादिकुहिदातिगंधं सणिमप्पं मट्टियं विभुंजंति । घम्मभवा वंसादिसु असंखगुणिदासुहं तत्तो ।।१९२।।
पढमासणमिह खित्तं कोसद्धं गंधदो विमारेदि । कोसद्धद्धहियधराट्ठियजीवे पत्थरक्कमदो ।।१९३।।
ण मरंति ते अकाले सहस्सखुत्तोवि छिण्णसव्वंगा । गच्छंति तएुस्स लवा संघादं सूदगस्सेव ।।१९४।।
तित्थयरसंतकम्मुवसग्गं णिरए णिवारयंति सुरा । छम्मासाउगसेसे सग्गे अमलाणमालंको ।।१९५।।
अणवट्टसगाउस्से पुण्णे वादाहदब्भपडलं वा । णेरइयाणं काया सव्वे सिग्घं विलीयंते ।।१९६।।
खेत्तजणिदं असादं सारीरं माणसं च असुरकयं । भुंजंति जहावसरं भवट्ठिदीचरिमसमयोत्ति ।।१९७।।
पढमिंदे दसणउदीवाससहस्साउगं जहण्णिदरं । तो णउदिलक्ख जेट्ठं असंखपुव्वाण कोडी य ।।१९८।।
सायरदसमं तुरिये सगसगचरमिंदयम्हि इगि तिण्णि । सत्त दसं सत्तरसं उवही बावीस तेत्तीसं ।।१९९।।
आदी अंतविसेसे रूऊणद्धाहिदम्हि हाणिचयं । उवरिम जेट्ठं समयेणहियं हेट्ठिमजहण्णं तु ।।२००।।

The maximal longevity of the fourth Bhrānta disc is one tenth of a sāgara. The maximal longevity of the last central (indraka) for the own disc, is respectively, one sāgara, three sāgaras, seven sāgaras, ten sāgaras, seventeen sāgaras, twenty-two sāgaras, and thirty-three sāgaropamas. When the initial measure is subtracted from the last measure, the remainder is then divided by number of terms (gaccha) as reduced by unity. The quotient gives the decreasing common difference for every disc. The maximal longevity of the upper disc becomes the minimal longevity of the lower disc when an instant is added to it. //1.199-200//

चतुर्थ भ्रान्त पटलकी उत्कृष्टायु एक सागरके दसवें भाग प्रमाण है। अर्थात् $\frac{१}{१०}$ सागर है, तथा अपने अपने अन्तिम इन्द्रककी उत्कृष्टायु क्रमशः एक सागर, तीन सागर, सात सागर, दश सागर, सत्रह सागर, बाईस सागर और तैतीस सागरोपम प्रमाण है। आदि प्रमाणको अन्तप्रमाणमें से घटानेपर जो लब्ध प्राप्त हो उसमें एक कम गच्छका भाग देनेपर प्रति पटलका हानि चय प्राप्त होता है। ऊपरके पटलोंकी जो उत्कृष्ट आयु है, उसमें एक समय अधिक करनेपर वही नीचेके पटलोंकी जघन्यायु बन जाती है।।१९९-२००।।

पढमे सत्त ति छक्कं उदयं धणुरयणि अंगुलं सेसे । दुगुणकमं पढमिंदे रयणितियं जाण हाणिचयं ।।२०१।।

The height of bodies of the hellish beings of the last disc of the first earth is seven dhanuṣas, three hands, and six fingers. The height of the hellish, (residing in the last disc of the remaining second etc. earths, is) respectively, double of the preceding. The height of the hellish residing in the first central (indraka) of the first earth is three hands. This is to be known as the decreasing common difference. //1.201//

प्रथम पृथ्वीके अन्तिम पटलके नारकियोंके शरीरकी ऊँचाई ७ धनुष तीन हाथ और छह अंगुल प्रमाण है। शेष द्वितीयादि पृथ्वियोंके अन्तिम पटलमें रहने वाले नारकियोंका उत्सेध क्रमशः दूना दूना है। प्रथम पृथ्वीके प्रथम इन्द्रकमें रहने वाले नारकियोंका उत्सेध तीन हाथ प्रमाण है। इसे ही हानि चय जानो।।२०१।।

रयणप्पहपुढवीए चउरो कोसा य ओहिखेत्तं तु । तेण परं पडिपुढवी कोसद्ध विवज्जियं होदि ।।२०२।।

णिरयादो णिस्सरिदो णरतिरिए कम्मसण्णिपज्जत्ते । गब्भभवे उप्पज्जदि सत्तमपुढवीदु तिरिए व ।।२०३।।

णिरयचरो णत्थि हरी बलचक्की तुरियपहुदिणिस्सरिदो । तित्थचरमंगसंजद मिस्सतियं णत्थि णियमेण ।।२०४।।

अमणसरिसपविहंगम फणिसिंहित्थीण मच्छमणुवाणं । पढमादिसु उप्पत्ती अडवारादो दु दोण्णिवारोत्ति ।।२०५।।

चउवीसमुहुत्तं पुण सत्ताहं पक्खमेक्कमासं च । दुगचदुछम्मासं च य जम्मणमरणंतरं णिरये ।।२०६।।

अच्छिणिमीलणमेत्तं णत्थि सुहं दुक्खमेव अणुबद्धं । णिरए णेरइयाणं अहोणिसं पच्चमाणाणं ।।२०७।।

* २ * भवनाधिकार

भवणेसु सत्तकोडी बाहत्तरिलक्ख होंति जिणगेहा । भवणामरिंदमहिया भवणसमा ताणि वंदामि ।।२०८।।

असुराणागसुवण्णादीवोदहिविज्जुथणिददिसअग्गी । वादकुमारा पढमे चमरो वइरोइणो इंदो ।।२०९।।

भूदाणंदो धरणाणंदो वेणू य वेणुधारी य । पुण्णवसिट्ठ जलप्पह जलकंतो घोसमहघोसो ।।२१०।।

हरिसेणो हरिकंतो अमिदगदी अमिदवाहणग्गिसिही । अग्गीवाहणणामा बेलंबपभंजणा सेसे ।।२११।।

चमरो सोहम्मेण य भूदाणंदो य वेणुणा तेसिं । बिदिया बिदियेहिं समं ईसंति सहावदो णियमा ।।२१२।।

चूडामणिफणिगरुडं गजमयरं वड्ढमाणगं वज्जं । हरिकलसस्सं चिह्नं मउले चेत्तहुमाह धया ।।२१३।।

अस्सत्थसत्तसामलिजंबूवेतसकदंबकपियंगू । सिरिसं पलासरायद्दुमा य असुरादिचत्ततरू ।।२१४।।

चेत्ततरूणं मूले पत्तेयं पडिदिसम्हि पंचेव । पलियंकठिया पडिमा सुरच्चिया ताणि वंदामि ।।२१५।।

पडिदिसयं णियसीसे सगसगपडिमाजुदा विराजंति । तुंगा माणत्थंभा रयणमया पडिदिसं पंच ।।२१६।।

चोत्तीसं चउदालं अडतीसं छसुवि ताल पण्णासं । चउचउविहीण ताणि य इंदाणं भवणलक्खाणि ।।२१७।।

ससुगंधपुप्फसोहियरयणधरा रयणभित्ति णिच्चपहा । सव्विंदियसुहदाइहिं सिरिखंडादिहिं चिदा भवणा ।।२१८।।

अट्ठगुणिड्ढिविसिट्ठा णाणामणिभूसऐहि दित्तंगा । भुंजंति भोगमिट्ठं सगपुव्वतवेण तत्थ सुरा ।।२१९।।

जोयणसंखासंखाकोडी तव्वित्थडं तु चउरस्सा । तिसयं बहलं मज्झं पडि सयतुंगेक्ककूडं च ।।२२०।।

वेंतर अप्पमहड्ढियमज्झिमभवणामराण भवणाणि । भूमीदोधो इगिदुगबादालसहस्सइगिलक्खे ।।२२१।।

रयणप्पहपंकड्ढे भागे असुराण होंति आवासा । भौम्मेसु रक्खसाणं अवसेसाणं खरे भागे ।।२२२।।

इंदपडिंददिगिंदा तेत्तीससुरा समाणतणुरक्खा । परिसत्तयआणीया पइण्णगभियोगकिल्विसिया ।।२२३।।

रायजुवतंतराए पुत्तकलत्तंगरक्खवरमज्झे । अवरे तंडे सेणापुरपरिजणगायणेहि समा ।।२२४।।

वेंतरजोयिसियाणं तेत्तीससुरा ण लोयपाला य । भवणे कप्पे सव्वे हवंति अहमिंदया तत्तो ।।२२५।।

इंदसमा हु पडिंदा सोमो यम वरुण तह कुवेरा य । पुव्वादिलोयवाला तेत्तीससुरा हु तेत्तीसा ।।२२६।।

चमरतिये सामाणियतणुरक्खाणं पमाणमणुकमसो । अडसोलकदिसहस्सा चउसोलसहस्सहीणकमा ।।२२७।।

पण्णसहस्स बिलक्खा सेसे तट्ठाण परिसमादिल्लं । अडछव्वीसं छच्चउसहस्स दुसहस्सवड्ढिकमा ।।२२८।।

पढमा परिसा समिदा बिदिया चंदोत्ति णामदो होदि । तदिया जदुअहिधाणा एवं सव्वेसु देवेसु ।।२२९।।

सत्तेव य आणीया पत्तेयं सत्तसत्तकक्खजुदा । पढमं ससमाणसमं तद्दुगुणं चरिमकक्खेत्ति ।।२३०।।

पदमेत्ते गुणयारे अण्णोण्णं गुणिय रूवपरिहीणे । रूऊणगुणेणहिए मुहेण गुणियम्मि गुणगणियं ।।२३१।।

Whatever is the number of terms (pada), as many times the multiplier (common ratio) is given to the spread and mutually multiplied. The product is reduced by unity and divided by the multiplier (common ratio) as reduced by unity. The quotient is multiplied by the first term (mukha), resulting in the sum of the geometric series. // 2.231//

पदका जितना प्रमाण है, उतनी वार गुणकारका परस्परमें गुणाकर प्राप्त गुणनफलमें से एक घटाकर एक कम गुणकारसे भाजित करनेपर जो लब्ध प्राप्त हो उसका मुखमें गुणा करनेसे गुण संकलित धनका प्रमाण प्राप्त होता है।।२३१।।

असुरस्स महिसतुरगरथेमपदाती कमेण गंधव्वा । णिच्चाणीय महत्तर महत्तरी छक्क एक्का य ।।२३२।।

णावा गरुडिभमयरं करभं खग्गी मिगारिसिविगस्सं । पढमाणीयं सेसे सेसाणीया हु पुव्वं व ।।२३३।।

असुरतिए देवीओ छप्पण्णसहस्स तत्थ बल्लभिया । सोलसहस्सं छक्कसहस्सेणूणक्कमो होइ ।।२३४।।

बत्तीस वे सहस्सा सेसे पण पण सजेट्ठदेवीओ । तिसु अट्ठ छस्सहस्सं विगुव्वणामूलतणुसहियं ।।२३५।।

किण्ह सुमेघसुकड्ढा रयणि य जेट्ठित्थि पउम महपउमा । पउमसिरी कणयसिरी कणयादिममाल चमरदुगे ।।२३६।।

अड्ढाइज्जं तिसयं पण्णासूणं कमं तु चमरदुगे । पारिसदेवी णागे बिसयं तु ससट्ठितालसयं ।।२३७।।

गरुडे सेसे सोलस चउदस दससंगुणं तु वीसूणा । सयसयदेवी पेधामहत्तराणंगरक्खाणं ।।२३८।।

सेणादेवाणं पुण देवीयो तस्स अद्धपरिमाणं । सव्वणिगिट्ठसुराणं बत्तीसा होंति देवीओ ।।२३९।।

असुरादिचदुसु सेसे भौम्मे सायर तिपल्लमाउस्सं । दलहीणकमं जेट्ठं दसवाससहस्समवरं तु ।।२४०।।

असुरचउक्के सेसे उदही पल्लत्तियं दलूणकमं । उत्तरइंदाणहियं सरिसं इंदादिपंचण्हं ।।२४१।।

आऊपरिबारिड्ढीविक्किरियाहिं पडिंदयादि चऊ । सगसगइंदेहिं समा दहरच्छत्तादिसंजुत्ता ।।२४२।।

अड्ढाइज्जतिपल्लं चमरदुगे णागगरुडसेसाणं । देवीणमट्ठमं पुण पुव्वावस्साण कोडितयं ।।२४३।।

चमरंगरक्खसेणामहत्तराणाउगं हवे पल्लं । साणीकवाहणाणं दलं तु वइरोयणे अहियं ।।२४४।।

फणिगरुडसेसयाणं तट्ठाणे पुव्ववस्सकोडी य । वस्साण कोडि लक्खं लक्खं च तदद्धयं कमसो ।।२४५।।

चमरदुगे परिसाणं अड्ढाइज्जं तिपल्लमद्धूणं । णागे अट्ठमभागं सोलस बत्तीसभागं तु ।।२४६।।

गरुडे सेसे कमसो तिगदुगमेक्कं तु होदि पुव्वाणं । वस्साणं कोडीओ परिसाणब्भंतरादीणं ।।२४७।।

असुरे तित्तिसु सासाहारा पक्खं समासहस्सं तु । समुहुत्तदिणाणद्धं तेरस बारस दलूणट्ठं ।।२४८।।

Among the Asurkumaras, and the remaining three families ahead in each case, the food and respiration happens to be in one thousand years one fortnight, $12\frac{1}{2}$ days and $12\frac{1}{2}$ muhūrtas 12 days and 12 muhūrtas as well as $7\frac{1}{2}$ days and $7\frac{1}{2}$ muhūrtas respectively.

असुरकुमारों एवं आगे शेष तीन तीन कुलोंमें आहार एवं श्वासोच्छवास क्रमशः एक हजार वर्ष और एक पक्ष, $१२\frac{१}{२}$ दिन और $१२\frac{१}{२}$ मुहूर्त, १२ दिन और १२ मुहूर्त तथा $७\frac{१}{२}$ दिन और $७\frac{१}{२}$ मुहूर्त में होता है।

पणवीसं असुराणं सेसकुमाराण दसधणू चेव । विंतरजोइसियाणं दससत्त सरीरउदओ दु ।।२४९।।

* ३ * व्यन्तरलोकाधिकारः

तिण्णिसयजोयणाणं कदिहिदपदरस्स संखभागमिदे । भौमाणं जिणगेहे गणणातीदे णमंसामि ।।२५०।।

The universe square is divided by square of three hundred yojanas. The numerate part of this amount is the number innumerate of the Jina temples of Vyantara deities to whom I bow. //3.250//

तीन सौ योजनके वर्गका जगत्प्रतरमें भाग देनेपर जो लब्ध प्राप्त हो उसके संख्यात भाग प्रमाण व्यन्तर देवोंके असंख्यात जिन मन्दिरोंको मैं (नेमिचन्द्राचार्य) नमस्कार करता हूँ।।२५०।।

किंणरकिंपुरिसा य महोरगगंधव्व जक्खणामा य । रक्खसभूयपिसाया अट्ठविहा वेंतरा देवा ।।२५१।।

तेसिं कमसो वण्णो पियंगुफलधवलकालयसियामं । हेमं तिसुवि सियामं किण्हं बहुलेवभूसा य ।।२५२।।

तेसिं असोयचंपयणागा तुंवुरुवडो य कंटतरू । तुलसी कदंबणामा चेत्ततरू होंति हु कमेण ।।२५३।।

तम्मूले पलियंकगजिणपडिमा पडिदिसम्हि चत्तारि । चउतोरणजुत्ता ते भवणेसु च जंबुमाणद्धा ।।२५४।।

पडिपडिमं एक्केक्का माणत्थंभातिवीढसालजुदा । मोत्तियदामं सोहइ घंटाजालादियं दिव्वं ।।२५५।।

किंणरचउ दसदसधा सेसा बारसगसत्तचोदसधा । दो द्वो इंदा दो द्वो वल्लभिया पुह सहस्सदेविजुदा ।।२५६।।

किंपुरिसकिंणरावि य हिदयंगमगा य रूपपाली य । किंणरकिंणरऽणिंदित मणरम्मा किंणरुत्तमगा ।।२५७।।

रतिपियजेट्ठा इंदा किंपुरिसाकिंणरावतंसा हु । केतुमती रतिसेणा रतिप्पिया होंति वल्लमिया ।।२५८।।

पुरूसा पुरुसुत्तमसप्पुरुसमहापुरुसपुरुसपहणामा । अतिपुरुसा मरुओमरुदेवमरुप्पहजसोवंतोः ।।२५९।।

सप्पुरुसमहापुरुसा किंपुरिसिंदा कमेण वल्लभिया । रोहिणया णवमी हिरि पुप्फवदी य इयरस्स ।।२६०।।

भुजगा भुजंगसाली महकायतिकाय खंधसाली य । मणहर असणिजवक्खा महसरगंभीरपियदरिसा ।।२६१।।

महकायो अतिकाओ महोरगेंदा हु भोग भोगवदी । इदरस्स पुप्फगंधी अणिंदिता होंति वल्लभिया ।।२६२।।

हाहा हूहू णारयतुंबुरुककदंबवासवक्खा य । महसर गीतरतीवि य गीतयसा दइवता दसमा ।।२६३।।

गीतरती गीतजसो गंधव्विंदा हवंति वल्लभिया । सरसति सरसेणावि य णंदिणि पियदरिसिणादेवी ।।२६४।।

अह माणिपुण्णसैलमणोभद्दा भद्दगा सुभद्दा य । तह सव्वभद्द माणुस धणपाल सुरूवजक्खा य ।।२६५।।

जक्खुत्तमा मणोहरणामा तह माणिपुण्णभद्दिंदा । कुंद बहुपुत्त देवी तारा पुण उत्तमा देवी ।।२६६।।

भीममहभीमविग्घविणायक तह उदकरक्खसा य तहा । रक्खसरक्खस तह बम्हरक्खसा होंति सत्तमया ।।२६७।।

भीमो य महाभीमो रक्खसइंदा हवंति बल्लभिया । पउमा वसुमित्तावि य रयणड्ढा कणयपह देवी ।।२६८।।

भूदाणं तु सुरूपा पडिरूवा भूदउत्तमा तत्तो । पडिभूद महाभूदा पडिछण्णागासभूद इदि ।।२६९।।

इंदा य सुपडिरूवा बल्लभिया तह य होदि रूववदी । बहुरूवा य सुसीमा सुमुहा य हवंति देवीयो ।।२७०।।

कुम्भंड रक्ख जक्खा संमोहो तारका अचोक्खा य । काल महकाल चोक्खा सतालया देह महदेहा ।।२७१।।

तुण्हिय पवयणणामा इंदा तेसिं तु कालमहकाला । कमलकमलप्पहुप्पलसुदरिसणा होंति वल्लभिया ।।२७२।।

किंपुरुस किंणरा सप्पुरुसमहापुरुसणामया कमसो । महकायो अतिकायो गीतरती गीतयसणामा ।।२७३।।

तो माणिपुण्णभद्दा भीममहाभीमया सुरूवा य । पडिरूवो काल महाकालो भोम्मेसु जुगलिंदा ।।२७४।।

गणिकामहत्तरीयो इंदं पडि पल्लदलठिदी दो द्दो । मधुरा मधुरालावा सुस्सर मउभासिणी कमसो ।।२७५।।

पुरिसपिया पुंकंता सोमा पुंदरिसिणी य भोगक्खा । भोगवदी य भुजंगा भुजगपिया तो सुघोस विमलेत्ति ।।२७६।।

सुस्सर अणिंदिदक्खा भद्द सुभद्दा य मालिणी होंति । पउमादिमालिणीवि य तो सव्वरि सव्वसेणेत्ति ।।२७७।।

रुद्दक्ख रुद्ददरिसिण भूदादीकंद भूद भूदादी । दत्त महाभुज अंबा कराल सुलसा सुदरिसणया ।।२७८।।

इंदसमा हु पडिंदा समाणुतणुरक्खपरिसपरिमाणं । चउसोलसहस्सं पुण अट्ठसयं बिसदवड्ढिकमो ।।२७९।।

कुंजरतुरयपदादीरहगंधव्वा य णच्चवसहेत्ति । सत्तेवय आणीया पत्तेयं सत्त सत्त कक्खजुदा ।।२८०।।

सेणामहत्तरा सुज्जेट्ठा सुग्गीवविमलमरुदेवा । सिरिदामा दामसिरी सत्तमदेवो विसालक्खो ।।२८१।।

अट्ठावीससहस्सं पढमं दुगुणं कमेण चरिमोत्ति । सव्विंदाणं सरिसा पइण्णयादी असंखमिदा ।।२८२।।

The first class is twenty-eight thousand and upto the end, it goes on doubling, respectively. The measure of the arrays is equal to that of all Vyantara indras. The amount of the scattered etc. is innumerate. //3.282//

प्रथम कक्ष अट्ठाईस हजार प्रमाण है तथा अन्त तक क्रमशः दूना दूना प्रमाण प्राप्त होता है। अनीकोंका प्रमाण समस्त व्यन्तर इन्द्रोंके समान ही है। प्रकीर्णकादिकोंका प्रमाण असंख्यात है।।२८२।।

अंजणकवज्जधाउकसुवण्णमणोसिलकवज्जरजदेसु । हिंगुलिके हरिदाले दीवे भोम्मिंदणयराणि ।।२८३।।

भोमिंदकं मज्झे पहकंतावत्तमज्झ चरिमंका । पुव्वादिसु जंबुसमा पणपणणयराणि समभागे ।।२८४।।

तप्पायारुदयतियं पणहत्तरिपण्णवीसपंचदलं । दारुदओ वित्थारो पंचघणद्धं तदद्धं च ।।२८५।।

तस्सुवरिं पासादो पणहत्तरितुंगओ सुधम्मसहा । पणकदिदल तद्दल णव दीहरवासुदय कोस ओगाढा ।।२८६।।

तिस्से दारुदओ दुगइगि वासो दक्खिणुत्तरिंदाणं । सव्वेसिं णगराणं पायारादीणि सरिसाणि ।।२८७।।

पुरदो गंतूण बहिं चउद्दिसं जोयणाणि बिसहस्सं । इगिलक्खायद तद्दलवासजुदा रम्मवणसंडा ।।२८८।।

तत्थेव य गणिकाणं चुलसीदिसहस्सविउलणयराणि । सेसाणं भोम्माणं अणेयदीवे समुद्दे य ।।२८९।।

भूदाण रक्खसाणं चउदस सोलस सहस्स भवणाणि । सेसाण वाणवेंतरदेवाणं उवरि णिलयाणि ।।२९०।।

हत्थपमाणे णिच्चुववादा दिगुवासि अंतरणिवासी । कुंभंडा उप्पण्णाणुप्पण्ण पमाणया गंधा ।।२९१।।

महगंध भुजग पीदिक आगासुववण्णगा य उवरुवरिं । तिसु दसहत्थसहस्सं वीससहस्संतरं सेसे ।।२९२।।

दसवरिससहस्सादो सीदी चुलसीदिकं सहस्सं तु । पल्लट्ठमं तु पादं पल्लद्धं आउगं कमसो ।।२९३।।

विंतरणिलयतियाणि य भवणपुरावासभवणणामाणि । दीवसमुद्दे दहगिरितरुम्हि चित्तावणिम्हि कमे ।।२९४।।

उड्ढगया आवासा अधोगया विंतराण भवणाणि । भवणपुराणि य मज्झिमभागगया इदि तियं णिलयं ।।२६५।।

चित्तवइरादु जावय मेरुदयं तिरियलोयवित्थारं । भोम्मा हवंति भवणे भवणपुरावासगे जोग्गे ।।२६६।।

भवणं भवणपुराणि य भवणपुरावासयाणि केसिंपि । भवणामरेसु असुरे विहाय केसिं तियं णिलयं ।।२६७।।

जेट्ठावरभवणाणं बारसहस्सं तु सुद्धं पणुवीसं । बहलं तिसय तिपादं बहलतिभागुदयकूडं च ।।२६८।।

The length of the maximal and minimal buildings is twelve thousand and pure twenty-five yojanas, and their breadth is three hundred and three by four yojanas. In the centre, there are [hundred yojanas or] third part of the breadth, high peaks. //3.298//

उत्कृष्ट और जघन्य भवनोंका विस्तार क्रमशः बारह हजार (१२०००) योजन और शुद्ध पच्चीस योजन मात्र है तथा उनका बाहल्य तीनसौ और तिपाद अर्थात् पौन ($\frac{३}{४}$) योजन है। बाहल्यके तीसरे भाग प्रमाण ऊँचे कूट हैं।।२६८।।

जेट्ठभवणाण परिदो वेदी जोयणदलुच्छिया होदि । अवराणं भवणाणं दंडाणं पण्णुवीसुदया ।।२६६।।

There is half a yojana high altar all around the best buildings. There is twenty-five dhanuṣas high altar around the minimal type of buildings. //3.299//

उत्कृष्ट भवनोंके चारों ओर आधा योजन ऊँची वेदी है तथा जघन्य भवनोंके चारों ओर पच्चीस धनुष ऊँची वेदी है।।२६६।।

वट्टादीण पुराणं जोयणलक्खं कमेण एक्कं च । आवासाणं बिसयाहियबारसहस्स य तिपादं ।।३००।।

The maximal etc. length of spherical etc. shaped building-towns is one lac yojanas and the minimal length is one yojana. Similarly, the spherical etc. residences have maximal length as twelve thousand two hundred yojanas and minimal length is three fourth of a yojana. //3.300//

गोल आदि भवनपुरोंका उत्कृष्टादि विस्तार क्रमशः एक लाख योजन और एक योजन है। आवासोंका उत्कृष्टादि विस्तार क्रमशः बारह हजार दो सौ (१२२००) योजन और पौन योजन है।।३००।।

भवणावासादीणं गोउरपायारणच्चणादिघरा । भोम्माहारुस्सासा साहियपणदिणमुहुत्ता य ।।३०१।।

There are houses for door, rampart and dance etc. in the residences etc. and buildings of Vyantara deities. The food and respiration of Vyantara deities are respectively in slightly greater than five days and slightly greater than five muhūrtas. //3.301//

व्यन्तरदेवोंके भवनों एवं आवासादिकोंमें द्वार, कोट तथा नृत्य आदिके लिए घर भी होते हैं व्यन्तरदेवोंका आहार और उच्छ्वास क्रमशः कुछ अधिक पाँच दिनमें और कुछ अधिक पाँच मुहूर्तमें होता है।।३०१।।

* ४ * ज्योतिर्लोकाधिकारः

बेसदछप्पण्णंगुलकदिहिदपदरस्स संखभागमिदे । जोइसजिणिंदगेहे गणणातीदे णमंसामि ।।३०२।।

The number measure of the astral deities is obtained on dividing the universe-square (jagatpratara) by square of two hundred fifty-six fingers. Numerate part of the astral deities are the innumerate astral images and caitya temples whom I bow. //4.302//

जगत्प्रतरको दो सौ छप्पन (२५६) अंगुलोंके वर्ग (२५६ x २५६ = ६५५३६) का भाग देनेपर ज्योतिष

देवोंका प्रमाण प्राप्त होता है। ज्योतिष देवोंके संख्यात भाग प्रमाण ज्योतिर्बिम्ब एवं चैत्यालय हैं जो असंख्यात हैं। उन्हें मैं (नेमिचन्द्राचार्य) नमस्कार करता हूँ।।३०२।।

चंदा पुण आइच्चा गह णक्खत्ता पइण्णतारा य । पंचविहा जोइगणा लोयंतघणोदहिं पुट्ठा ।।३०३।।

जंबूधादकिपुक्खरवारुणिखीरघदखोदवरदीओ । णंदीसररुणअरुणब्भासा वर कुंडलो संखो ।।३०४।।

तो रुजगभुजगकुसगयकोंचवरादी मणस्सिला तत्तो । हरिदालदीवसिंदुरसियामगंजणयहिंगुलिया ।।३०५।।

रुप्पसुयण्णयवज्जयवेलुरियणागभूदजक्खवरा । तो देवाहिंदवरा सयंभुरमणो हवे चरिमो ।।३०६।।

लवणंबुहि कालोदयजलही तत्तो सदीवणामुवही । सव्वे अड्ढाइज्जुद्धारुवहिमेत्तया होंति ।।३०७।।

जंबू जोयणलक्खो वट्टो तद्दुगुणदुगुणवासेहिं । लवणादिहि परिखित्तो सयंभुरमणुवहियंतेहिं ।।३०८।।

The Jambū island is one lac yojana in diameter and circular. Whatever are the islands and seas from the Lavaṇa sea upto the Svayaṁbhūramaṇa sea, they all are [ring shaped with] diameters [widths] successively doubling and surrounding one another. //4.308//

जम्बूद्वीप एक लाख योजन प्रमाण तथा गोल है। लवणसमुद्रसे स्वयम्भूरमण समुद्र पर्यन्त जितने भी द्वीप समुद्र हैं वे सब जम्बूद्वीपसे दूने दूने व्यास वाले हैं और एक दूसरेको घेरे हुए हैं।।३०८।।

रूऊणाहियपदमिददुगसंवग्गे पुणोवि लक्खहदे । गयणतिलक्खविहीणे वासो बलयस्स सूइस्स ।।३०९।।

The measure of chosen number of terms (gaccha) is placed at a place as reduced by unity and at another place as increased by unity. On the first placing, spread and give to each unit the numeral two and multyply them mutually, as also multiplied by one lac. Similar process may be adopted for the second placing. Subtract zero from the product of the first placing and three lac from the placing of the second placing. This gives respectively the diameter (breadth) of the ring and the linear diameter (sūcīvyāsa). //4.309//

इष्ट गच्छके प्रमाणको एक जगह एक अंक (गच्छ-१) हीन और एक जगह एक अंक अधिक (गच्छ+१) कर स्थापित करनेपर जो प्राप्त हो उतनी वार दोका संवर्गनकर अर्थात् उतनी वार दोका अंक रखकर परस्पर गुणाकर उसे पुनः एक लाखसे गुणित करें, जो जो लब्ध प्राप्त हो उसमेंसे प्रथम स्थानके लब्धमें से शून्य और द्वितीय स्थानके लब्धमें से ३ लाख घटानेपर क्रमसे वलय व्यास और सूची व्यासका प्रमाण प्राप्त हो जाता है।।३०९।।

लवणादीणं वासं दुगतिगचदुसंगुणं तिलक्खूणं । आदिममज्झिमबाहिरसूइत्ति भणंति आइरिया ।।३१०।।

The widths of the rings of the Lavaṇa sea etc. islands seas, are multiplied by two, three and four, and the products are reduced by three lac. The results give the measures of the internal, middle and external diameters, such is related by preceptors. //4.310//

लवणसमुद्रादि द्वीप समुद्रोंके वलय व्यासको दो, तीन और चारसे गुणित करनेपर जो जो लब्ध प्राप्त हो उसमेंसे तीन तीन लाख घटा देनेपर जो जो अवशेष रहे वही क्रमसे अभ्यन्तर, मध्य और बाह्य सूचीके व्यासका प्रमाण होता है, ऐसा आचार्य कहते हैं।।३१०।।

तिगुणियवासं परिही दहगुणवित्थारवग्गमूलं च । परिहिहदवासतुरियं बादर सुहुमं च खेत्तफलं ।।३११।।

The gross value of circumference is thrice the diameter. The diameter is squared, multiplied by ten, and square-root of the product is found out. This gives fine value of the circumference. When the gross circumference is multiplied by one fourth of the external diameter, fine area is found out. //4.311//

बादर परिधि, व्यासकी तिगुनी होती है। व्यासका वर्गकर उसको दशसे गुणित करनेपर जो लब्ध प्राप्त हो उसका वर्गमूल निकालना चाहिए। वर्गमूल स्वरूप प्राप्त अंक ही सूक्ष्म परिधिका प्रमाण है। बादर परिधिको बाह्य सूची व्यासके चौथाई ($\frac{१}{४}$) भागसे गुणित करनेपर बादर क्षेत्रफल होता है, और सूक्ष्म परिधिको बाह्य सूची व्यासके चौथाई भागसे गुणित करनेपर सूक्ष्म क्षेत्रफल होता है।।३११।।

जोयणसगदुदु छक्किगि तिदयं तिक्कोसमट्ठदुगि दंडो । अहियद्दलंगुलतेरस जंबूए सुहुमपरिणाहो ।।३१२।।

The fine value of the Jambū island is given by yojanas through decimal numerals [left to right], seven, two, six, one, three, alongwith three kośa, one hundred twenty-eight dhanuṣas and thirteen and half finger in excess. //4.312//

(सप्त) ७ (द्वि) २ (द्वि) २ (षड्) ६ (एकं) १ (त्रयं) ३ अर्थात् ३१६२२७ योजन, ३ कोश, १२८ धनुष और साधिक १३$\frac{१}{२}$ अंगुल जम्बूद्वीपकी सूक्ष्मपरिधिका प्रमाण है।।३१२।।

पण्णासमेक्कदालं णव छप्पण्णाससुण्णणवसदरी । साहियकोसं च हवे जंबूदीवस्स सुहुमफलं ।।३१३।।

The fine area of the Jambū island is given by numerals in decimal notation (left to right), fifty, one hundred, four, nine, six, five, zero, nine, seven yojanas and a kośa in excess. //4.313//

७९०५६९४१५० योजन और साधिक एक कोश जम्बूद्वीप के सूक्ष्म क्षेत्रफल का प्रमाण है।।३१३।।

जंबूउभयं परिही इच्छियदीउवहिसूइ संगुणिय । जंबूवासविभत्ते इच्छियदीउवहिपरिही दु ।।३१४।।

The gross and fine circumference of Jambū island is multiplied by diameter of chosen island or sea. The product is divided by diameter of Jambū-island, resulting in the gross and fine circumference of the chosen island and sea. //4.314//

जम्बूद्वीपकी स्थूल एवं सूक्ष्म परिधिको विवक्षित द्वीप अथवा समुद्रके सूची व्याससे गुणितकर जम्बूद्वीपके व्यासका भाग देनेपर विवक्षित द्वीप एवं समुद्रकी स्थूल एवं सूक्ष्म परिधि होती है।।३१४।।

अंताइसूइजोगं रुंदद्ध गुणित्तु दुप्पडिं किच्चा । तिगुणं दसकरणिगुणं बादरसुहुमं फलं वलये ।।३१५।।

The last diameter and initial diameters are added and multiplied by half of width of the ring. The product is kept at two places. The first placing is multiplied by three giving gross area. The second placing is multiplied by ten after squaring it, and square-root of the product is taken out. The result gives the fine area. //4.315//

अन्त सूची और आदि सूचीको जोड़कर अर्धरुन्द्र व्याससे गुणित करनेपर जो लब्ध प्राप्त हो उसे दो जगह स्थापितकर एक स्थानके प्रमाणको तिगुना करनेसे बादर क्षेत्रफलका प्रमाण प्राप्त होता है, तथा दूसरे स्थानके प्रमाणका वर्गकर जो लब्ध प्राप्त हो उसको दशसे गुणितकर गुणनफलका वर्गमूल निकालनेपर जो लब्ध प्राप्त होता है वह सूक्ष्म क्षेत्रफलका प्रमाण है।।३१५।।

बाहिरसूईवग्गं अब्भंतरसूइवग्गपरिहीणं । जंबूवासविभत्ते तत्तियमेत्ताणि खण्डाणि ।।३१६।।

From the square of the external diameter, the square of the internal diameter is subtracted. The remainder is divided by the square of the diameter of Jambū island. This gives the number of pieces of the Lavaṇa sea, equivalent to the area of the Jambū island. //4.316//

बाह्य सूची व्यासके वर्गमें से अभ्यन्तर सूची व्यासका वर्ग घटानेपर जो लब्ध प्राप्त हो उसमें जम्बूद्वीपके व्यास (के वर्ग) का भाग देनेपर जो प्रमाण प्राप्त होता है, लवणसमुद्रके जम्बूद्वीप सदृश उतने ही खण्ड होते हैं।।३१६।।

रूऊणसलाबारससलागगुणिदे दुबलयखंडाणि । बाहिरसूइसलागा कदी तदंताखिला खंडा ।।३१७।।

The number of logos (śalākā) as reduced by unity is multiplied by twelve. The product when multiplied by the number of logos (śalākās), results in the number of round pieces like the Jambū island. The square of the external diameter logos gives the total number of pieces [initiating from the Jambū island upto the Lavaṇa sea]. //4.317//

एक कम शलाकाके प्रमाणको बारहसे गुणा करनेपर जो लब्ध प्राप्त हो उसको शलाकाके प्रमाणसे गुणित करनेपर जम्बूद्वीप सदृश गोल खण्ड प्राप्त होते हैं, तथा बाह्य सूची शलाकाका वर्ग करनेपर जो लब्ध प्राप्त होता है वही सम्पूर्ण (जम्बूद्वीपसे प्रारम्भकर लवणसमुद्र पर्यन्त) खण्डोंका प्रमाण होता है।।३१७।।

बाहिरसूई वलयव्वासूणा चउगुणिट्ठवासहदा । इगिलक्खवग्गभजिदा जंबूसमवलयखंडाणि ।।३१८।।

From the external diameter, the ring-diameter is subtracted, and the remainder is multiplied by four times the ring diameter [width]. The product is divided by the square of one lac, giving the round pieces equal to the Jambū island. //4.318//

बाह्यसूची व्यासके प्रमाणमें से वलयव्यासका प्रमाण घटाकर शेष प्रमाणको चौगुने वलयव्याससे गुणित करनेपर जो लब्ध प्राप्त हो उसमें एक लाखके वर्गका भाग देनेपर जम्बूद्वीपके प्रमाण बराबर गोल खण्डोंका प्रमाण प्राप्त हो जाता है।।३१८।।

लवणं वारुणितियमिदि कालदुगंतिमसयंभुरमणमिदि । पत्तेयजलसुवादा अवसेसा होंति इच्छुरसा ।।३१९।।

जलयरजीवा लवणे काले यंतिमसयंभुरमणे य । कम्ममहीपडिबद्धे ण हि सेसे जलयरा जीवा ।। ३२०।।

लवणदुगंतसमुद्दे णदीमुहुवहिम्हि दीह णव दुगुणं । दुगुणं पणसय दुगुणं मच्छे वासुदयमद्धकमं ।।३२१।।

The lengths of the body of the fish at the mouth and middle of the rivers of the Lavaṇa sea, Kālodaka sea, and the last Svayaṁbhūramaṇa sea are respectively, nine yojanas, two times [i.e. eighteen yojanas] and thirty-six yojanas, five hundred yojanas and one thousand yojanas. The breadth is half of the length and the height is half of the breadth. //4.321//

लवणसमुद्र, कालोदकसमुद्र और अन्तिम स्वयम्भूरमण समुद्रोंके नदी मुखपर और मध्यमें मत्स्योंके शरीरकी लम्बाई क्रमसे नव योजन और द्विगुण अर्थात् अठारह योजन है। अठारह योजन और छत्तीस योजन है, तथा ५०० योजन और हजार योजन है। लम्बाईका अर्ध प्रमाण चौड़ाई (व्यास) और चौड़ाईके अर्धप्रमाण उदय (ऊँचाई) है।।३२१।।

पुक्खरसयंभुरमणाणद्धे उत्तरसयंपहा सेला । कुंडलरुचगद्धं वा सव्वं पुव्वं परिक्खित्ता ।।३२२।।

Just as in the central portion of the Kuṇḍalavara island, there is Kuṇḍalagiri and in the central portion of the Rucakavara island there is Rucakagiri, similarly, in the centre of the ring width of the Puṣkaravara island there is the Mānuṣottara mountain, and in the central portion of the ring diameter (width) of the last Svayaṁbhūramaṇa island, there is Svayaṁprabha mountain. All these mountains are surrounding their own internal islands and seas. //4.322//

जिस प्रकार कुण्डलवर द्वीपके अर्धभाग (मध्य) में कुण्डलगिरि तथा रुचकवर द्वीपके मध्यमें रुचकगिरि है, उसी प्रकार पुष्करवरद्वीपके वलयव्यासके बीचमें मानुषोत्तर पर्वत है और अन्तिम स्वयम्भूरमण द्वीपके वलयव्यासके

अर्धभागमें स्वयम्प्रभ पर्वत है। ये सब पर्वत अपने अपने अभ्यन्तर द्वीप समुद्रोंको घेरे हुए हैं।।३२२।।

मणुसुत्तरोत्ति मणुसा मणुसुत्तरलंघसत्तिपरिहीणा । परदो सयंपहोत्ति य जहण्णभोगावणीतिरिया ।।३२३।।

The human beings are only upto the Mānuṣottara mountain, who are unable to cross it for want of energy.

Beyond the Mānuṣottara (post-human) mountain, upto the Svayaṁprabha mountain, only the subhuman of the low-graded pleasure land are found. //4.323//

मानुषोत्तर पर्वत पर्यन्त ही मनुष्य है, जो मानुषोत्तर पर्वतको उल्लंघन करनेकी शक्तिसे हीन है। मानुषोत्तर पर्वतसे आगे स्वयंप्रभ पर्वत पर्यन्त जघन्य भोगभूमिया तिर्यंच् रहते हैं।।३२३।।

कम्मावणिपडिबद्धो बाहिरभागो सयंपहगिरिस्स । वरओगाहणजुत्ता तसजीवा होंति तत्थेव ।।३२४।।

अधियसहस्सं वारस तिचउत्थेक्कं सहस्सयं पउमे । संखे गोम्ही भमरे मच्छे वरदेहदीहो दु ।।३२५।।

The maximal lengths of the bodies of the lotus, conch, ant, large black bee, and the great fish are slightly greater than a thousand yojanas, twelve yojanas, three fourth of a yojana, one yojana and a thousand yojanas respectively. //4.325//

साधिक हजार योजन, बारह योजन, पौन योजन, एक योजन और हजार योजन क्रमसे कमल, शंख, ग्रैष्म (चीटी)? भ्रमर और महामत्स्यके शरीरकी उत्कृष्ट लम्बाई है।।३२५।।

वासिगि कमले संख मुहुदओ चउपंचचरणमिह गोम्ही । वासुदओ दिग्घट्ठमतद्दलमलिए तिपाददलं ।।३२६।।

The lotus has diameter of one yojana, the diameter of the mouth of a conch is four yojanas and height is one and one fourth of a yojana, the diameter and height of an ant are respectively, eighth part of length and sixteenth part of the length, as well as the diameter and height of the black bee are three-fourth of a yojana and half a yojana, respectively. //4.326//

कमलका व्यास (चौड़ाई) एक योजन, शंखका मुख व्यास और ऊँचाई क्रमसे ४ योजन और सवा योजन, ग्रैष्म (चीटी) का व्यास और उदय क्रमसे लम्बाईके आठवें भाग और सोलहवें भाग प्रमाण, तथा भ्रमरका व्यास और उदय क्रमसे पौन योजन और अर्ध योजन प्रमाण है।।३२६।।

आयामकदी मुहदलहीणा मुहवास अद्धवग्गजुदा । बिगुणा वेहेण हदा संखावत्तस्स खेत्तफलं ।।३२७।।

The half part of diameter of the mouth is subtracted from the square of the length. Half of the mouth's diameter is squared and added to the remainder. The sum is made twice and multiplied by the height, resulting in the volume of the conch shell. //4.327//

लम्बाईके वर्गमें से मुख व्यासका अर्ध प्रमाण घटा देने पर जो अवशेष रहे उसमें अर्ध मुखव्यासके वर्गका प्रमाण मिला देना चाहिये, जो लब्ध प्राप्त हो उसे द्विगुणित कर वेधसे गुणित करने पर शंखावर्तक्षेत्रके क्षेत्रफलका प्रमाण प्राप्त होता है।।३२७।।

सुद्धखरभूजलाणं बारस बावीस सत्त य सहस्सा । तेउतिए दिवसतियं सहस्सतियं दस य जेट्ठाओ ।।३२८।।

The maximal longevity of the pure earth, hard earth, and water earth are, respectively, twelve thousand, twenty thousand and seven thousand years. The maximal longevity of the fire bodied bios etc. are respectively, three days, three thousand years and ten thousand years. //4.328//

शुद्ध पृथ्वी, खर पृथ्वी और जल इनकी उत्कृष्टायु क्रमसे बारह हजार, बावीस हजार और सात हजार वर्ष है, तथा तेजस्कायिक आदि तीन (तेज, वायु और वनस्पति) की उत्कृष्ट आयु क्रमसे तीन दिन, तीन हजार वर्ष और दश हजार वर्ष है।।३२८।।

वासदिणमास बारसमुगुवण्णं छक्क वियलजेट्ठाओ । मच्छाण पुव्वकोडी णव पुव्वंगा सरिसपाणं ।।३२६।।

The maximal longevity of two sensed, three sensed and four sensed bios is respectively, twelve years, forty-nine days, and six months. The maximal longevity of the fish is pūrvakoṭi and that of the crawling insect [serpent] is nine pūrvāṅga. //4.329//

द्वीन्द्रिय, त्रीन्द्रिय और चतुरिन्द्रिय जीवोंकी उत्कृष्टायु क्रमसे बारह वर्ष, ४६ दिन और छह मास प्रमाण है, तथा मत्स्यकी उत्कृष्टायु पूर्वकोटि प्रमाण और सरीसृपोंकी उत्कृष्टायु नवपूर्वांग प्रमाण होती है।।३२६।।

बावत्तरि बादालं सहस्समाणाहि पक्खिउरगाणं । अंतोमुहुत्तमवरं कम्महीणरतिरिक्खाऊ ।।३३०।।

The maximal longevity of the birds and snakes is seventy-two thousand years and forty-two thousand years, respectively. The minimal longevity of all subhuman and human of Karmaland is inter-muhūrta. //4.330//

पक्षियों और सर्पोंकी उत्कृष्टायु क्रमसे बारह हजार और बयालीस हजार वर्ष प्रमाण तथा कर्मभूमिके सर्व तिर्यंच और मनुष्योंकी जघन्य आयु अन्तर्मुहूर्त प्रमाण होती है।।३३०।।

णिरया इगिविगला संमूछणपंचक्खा होंति संढा हु । भोगसुरा संढूणा तिवेदगा गब्भणरतिरिया ।।३३१।।

णउदुत्तरसत्तसए दस सीदी चदुदुगे तियचउक्के । तारिणससिरिक्खबुहा सुक्कगुरुंगारमंदगदी ।।३३२।।

The stars, the sun, the moon, the constellations, Mercury, Venus, Jupiter, Mars and Saturn are situated above the Citrā earth given by seven hundred ninety yojanas, and successively over and over given by ten, eighty, four, four, three, three, three, three yojanas, respectively. //4.332//

(चित्रा पृथ्वीसे) सात सौ नब्बे योजन ऊपर, इससे दश, अस्सी दो वार चार अर्थात् चार, चार और चार वार तीन योजन अर्थात् तीन, तीन, तीन और तीन योजन ऊपर क्रमसे तारा, सूर्य चन्द्र, ऋक्ष (नक्षत्र) बुध, शुक्र, गुरु, अंगारक (मंगल) और मन्दगति (शनिश्चर) स्थित है।।३३२।।

अवसेसाण गहाणं णयरीओ उवरि चित्तभूमीदो । गंत्तूण बुहसणीणं विच्चाले होंति णिच्चाओ ।।३३३।।

Above the Citrā earth, in the interval of Mercury and Saturn, there are cities of the eighty-three planets, eternally established. //4.333//

चित्रा पृथ्वीसे ऊपर जाकर बुध और शनिश्चरके अन्तरालमें अवशिष्ट ८३ ग्रहोंकी नित्य नगरियाँ अवस्थित हैं।।३३३।।

अत्थइ सणी णवसये चित्तादो तारगावि तावदिए । जोइसपडलबहल्लं दससहियं जोयणाण सयं ।।३३४।।

Saturn is nine hundred yojanas above the Citrā earth, and the stars are also stationed [in kinematic motion] upto nine hundred yojanas. Hence the thickness of the discs of the deities is only one hundred and ten yojanas. //4.334//

चित्रा पृथ्वीसे शनिश्चर नौ सौ योजन ऊपर स्थित है और तारागण भी नौ सौ योजन पर्यन्त अवस्थित हैं, अतः ज्योतिषी देवोंके पटलोंका बाहल्य मात्र ११० योजन ही है।।३३४।।

तारंतरं जहण्णं तेरिच्छे कोससत्तभागो दु । पण्णासं मज्झिमयं सहस्समुक्कस्सयं होदि ।।३३५।।

The minimal oblique distance from a star to another star is one-seventh of a kośa, the intermediate is fifty yojanas and the maximal interval is one thousand yojanas. //4.335//

एक तारासे दूसरे ताराका तिर्यग् जघन्य अन्तर एक कोशका सातवाँ ($\frac{1}{7}$) भाग, मध्यम अन्तर ५० योजन और उत्कृष्ट अन्तर एक हजार योजन है।।३३५।।

उत्ताणट्ठियगोलकदलसरिसा सव्वजोइसविमाणा । उवरिं सुरनयराणि य जिणभवणजुदाणि रम्माणि ।।३३६।।

All the astral bodies, are stationed [vertical mouthed] like half sphere. Above these celestial planes there are pleasing cities with Jina temples for the astral deities. //4.336//

सर्वज्योतिर्विमान अर्धगोलेके सदृश ऊपरको अर्थात् ऊर्ध्वमुख रूपसे स्थित है, तथा इन विमानोंके ऊपर ज्योतिषीदेवोंकी जिन चैत्यालयोंसे युक्त रमणीक नगरियाँ हैं।।३३६।।

जोयणमेक्कट्ठिकए छप्पण्णडदालचंदरविवासं । सुक्कगुरिदरतियाणं कोसं किंचूणकोस कोसद्धं ।।३३७।।

कोसस्स तुरियमवरं तुरियहियकमेण जाव कोसोत्ति । ताराणं रिक्खाणं कोसं बहलं तु बासद्धं ।।३३८।।

The diameter of the celestial plane of the moon is fifty-six parts out of sixty-one parts of a yojana, and that of the sun is forty-eight parts out of the sixty-one parts. The diameters of Venus, Jupiter and other three planets are one kośa, slightly less than one kośa, half and half kośa. The minimal diameter of the stars is one fourth part of a kośa. The diameter of the constellations is also one kośa. The thickness of all the astral celestial planes is half of their own diameters. //4.337-338//

एक योजनके ६१ भाग करनेपर उनमेंसे छप्पन भागोंका जितना प्रमाण है उतना व्यास चन्द्रमाके विमानका है, और अड़तालीस भागोंका जितना प्रमाण है उतना व्यास सूर्यके विमानका है। शुक्र, गुरु और अन्य तीन ग्रहोंका व्यास क्रमसे एक कोश, कुछ कम एक कोश और अर्ध अर्ध कोश प्रमाण है। ताराओंका जघन्य व्यास एक कोशका चतुर्थ भाग अर्थात् पाव ($\frac{1}{4}$) कोश है। मध्यम व्यास $\frac{1}{4}$ कोशसे कुछ अधिक लेकर कुछ कम एक कोश तक है, तथा उत्कृष्ट व्यास (विस्तार) एक कोश प्रमाण है। नक्षत्रोंका व्यास भी एक कोश प्रमाण है। सर्वज्योतिर्विमानों का बाहल्य (मोटाई) अपने अपने व्यासके अर्ध प्रमाण है।।३३७-३३८।।

राहुअरिट्ठविमाणा किंचूणं जोयणं अधोगंता । छम्मासे पव्वंते चंदरवी छादयंति कमे ।।३३९।।

The diameters of the celestial planes of Rāhu and Ariṣṭā are slightly less than a yojana. Both the celestial planes move under those of the moon and the sun. Both of them cover the moon and the sun once every end of the solstice (parva) after six months, successively. //4.339//

राहु और अरिष्ट (केतु) के विमानोंका व्यास कुछ कम एक योजन प्रमाण है। इन दोनोंके विमान चन्द्र सूर्यके विमानोंके नीचे गमन करते हैं, और दोनों छह माह बाद पर्व के अन्त में क्रम से चन्द्र और सूर्य को आच्छादित करते हैं।।३३९।।

राहुअरिट्ठविमाणधयादुवरि पमाणअंगुलचउक्कं । गंतूण ससिविमाणा सूरविमाणा कमे होंति ।।३४०।।

The celestial plane of the moon and that of sun are successively four pramāṇa aṅgulas over the flag staff of the celestial planes of the Rāhu and the Ariṣṭa. //4.340//

राहु और केतु विमानोंकी ध्वजा दण्डसे चार प्रमाणांगुल ऊपर क्रमसे चन्द्रका विमान और सूर्यका विमान है।।३४०।।

चंदिण बारसहस्सा पादा सीयल खरा य सुक्के दु । अड्ढाइज्जसहस्सा तिव्वा सेसा हु मंदकरा ।।३४१।।

There are twelve thousand rays, cold of the moon and hot of the sun. The rays of Venus are sharp and two and a half thousand. The remaining astral bodies have rays with dim light. //4.341//

चन्द्रमा और सूर्यकी क्रमसे शीतल और तीक्ष्ण बारह बारह हजार किरणें है। शुक्रकी किरणें तीव्र हैं, तथा अढ़ाई हजार हैं। शेष ज्योतिषी मन्द प्रकाशवाली किरणों सहित हैं।।३४१।।

चंदो णियसोलसमं किण्हो सुक्को य पण्णरदिणोत्ति । हेट्ठिल्ल णिच्च राहूगमणविसेसेण वा होदि ।।३४२।।

The moon's disc automatically becomes black and white through its sixteen phases in fifteen days. According to other preceptors the Rāhu moves through a special motion below the moon, due to which the moon becomes dark and white every fortnight. //4.342//

चन्द्रमण्डल पन्द्रह दिनोंमें अपनी सोलह कलाओं द्वारा स्वयं कृष्ण और शुक्ल रूप होता है। अन्य आचार्योंके अभिप्रायसे राहु, चन्द्र विमानके नीचे विशेष प्रकारसे गमन करता है, जिस कारण चन्द्र प्रत्येक पन्द्रह दिनोंमें कृष्ण और शुक्ल होता है।।३४२।।

सिंहगयवसहजडिलस्सायारसुरा वहंति पुव्वादिं । इंदुरवीणं सोलससहस्समद्धद्धमिदरतिये ।।३४३।।

There are sixteen thousand deities of the moon and the sun adopting the forms of the lion, the elephant, the bull, and horses with matted hair, the remaining planets having half the number of deities. All these appropriate deities take their own celestial planes towards the eastern etc. directions. //4.343//

सिंह, हाथी, बैल और जटा युक्त घोड़ोंके रूपको धारण करने वाले सोलह सोलह हजार देव चन्द्र और सूर्यके हैं, तथा अन्य तीनके अर्ध अर्ध प्रमाण हैं। ये सभी आभियोग्य देव अपने अपने विमानोंको पूर्वादि दिशाओंमें ले जाते हैं।।३४३।।

उत्तरदक्खिणउड्ढाधोमज्झे अभिजिमूलसादी य । भरणी कित्तिय रिक्खा चरंति अवराणमेवं तु ।।३४४।।

The Abhijit, Mūla, Svāti, Bharaṇī and Kṛttikā constellations move towards the north, the south, the vertically upwards and downwards and in the middle, respectively. Such is the situation of these constellations reaching from a region to another region. //4.344//

उत्तर, दक्षिण, ऊर्ध्व, अधो और मध्यमें क्रमसे अभिजित्, मूल, स्वाति, भरणी और कृत्तिका नक्षत्र गमन करते हैं। क्षेत्रान्तरको प्राप्त होने वाले इन नक्षत्रोंकी ऐसी ही स्थिति है।।३४४।।

इगिवीसेयारसयं विहाय मेरुं चरंति जोइगणा । चंदतियं वज्जित्ता सेसा हु चरन्ति एक्कपहे ।।३४५।।

The astral bodies move leaving the Sudarśana Meru eleven hundred twenty-one yojanas apart. Except the moon-trio [the moon, the sun and the planets], remaining all the astral deities move along the same path alone. //4.345//

ज्योतिर्गण सुदर्शन मेरुको ग्यारह सौ इक्कीस योजन छोड़कर गमन करते हैं। चन्द्र त्रय (चन्द्र, सूर्य, ग्रह) को छोड़कर शेष सभी ज्योतिषी देव एक ही पथमें गमन करते हैं।।३४५।।

दो द्दोवग्गं बारस बादाल बहत्तरिदुइणसंखा । पुक्खरदलोत्ति परदो अवट्ठिया सव्वजोइगणा ।।३४६।।

In the Jambū-island etc., the numbers of the moons and the suns are two, four, twelve, forty-two and seventy-two respectively. In the region beyond the Puṣkarārdha, all the astral bodies are stationary, do not move. //4.346//

चन्द्र और सूर्यकी संख्या जम्बूद्वीपादिमें क्रमशः दो, चार, बारह, बयालिस और बहत्तर हैं। पुष्करार्धके पर भागमें सर्व ज्योतिर्गण अवस्थित हैं, गमन नहीं करते।।३४६।।

छक्कदि णवतीससयं दसयसहस्सं खबार इगिदालं । गयणतिदुगतेवण्णं थिरतारा पुक्खरदलोत्ति ।।३४७।।

The numbers of pole stars (dhruvatārās) upto Puṣkarārdha are thirty-six, one hundred thirty-nine, one thousand ten, forty-one thousand one hundred twenty, and fifty-three thousand two hundred thirty. //4.347//

पुष्करार्ध पर्यन्त ध्रुवतारा क्रमसे छत्तीस, एक सौ उनतालीस, एक हजार दश, इकतालीस हजार एक सौ बीस और त्रेपन हजार दो सौ तीस हैं।।३४७।।

सगसगजोइगणद्धं एक्के भागम्हि दीवउवहीणं । एक्के भागे अद्धं चरंति पंतिक्कमेणेव ।।३४८।।

Half of the set of astral deities of their own island, seas move in one part of their own island and the other half move in another part in row form. //4.348//

अपने अपने द्वीप समुद्रोंके ज्योतिषी देवोंके समूहका अर्धभाग अपने अपने द्वीप समुद्रके एक भागमें और दूसरा अर्ध भाग एक भागमें पंक्ति रूप गमन करता है।।३४८।।

मणुसुत्तरसेलादी वेदियमूलादु दीवउवहीणं । पण्णाससहस्सेहि य लक्खे लक्खे तदो वलयं ।।३४९।।

On moving ahead for fifty thousand yojanas from the Mānuṣottara mountain and from the base of the altar of the island-seas, there is the first ring, and from the first rings of both the places, on moving ahead one lac yojanas, successively there are the second etc. rings. //4.349//

मानुषोत्तर पर्वतसे और द्वीप समुद्रोंकी वेदिकाके मूलसे (५००००) पचास हजार योजन आगे जाकर प्रथम वलय है, तथा दोनों स्थानोंके प्रथम वलयोंसे एक एक लाख योजन आगे जाकर द्वितीयादि वलय है।।३४९।।

दीवद्धपढमवलये चउदालसयं दु वलयवलयेसु । चउचउवड्ढी आदी आदीदो दुगुणदुगुणकमा ।।३५०।।

In the first ring of the external Puṣkarārdha island, there are one hundred forty-four moons and one hundred forty-four suns, and in the second etc. rings, have the increase by four as common difference from the first etc. rings. Whatever is number of the moons or the suns in the beginning of the preceding islands-seas, the number of the moons or the suns in the beginning of the successive island-seas is double ~~respectively.~~ //4.350//

बाह्य पुष्करार्ध द्वीपके प्रथम वलयमें १४४ चन्द्र और १४४ सूर्य हैं, तथा द्वितीयादि वलयोंमें प्रथमादि वलयोंसे चार चारकी वृद्धिको लिए हुए हैं। पूर्व पूर्व द्वीप समुद्रोंके आदिमें चन्द्र, सूर्यकी जो संख्या है, उससे उत्तरोत्तर द्वीप समुद्रों आदिमें चन्द्र सूर्यकी संख्या दूनी दूनी है।।३५०।।

सगसगपरिधिं परिधिगरविंदुभजिदे दु अंतरं होदि । पुस्सम्हि सव्वसूरट्ठिया हु चंदा य अभिजिम्हि ।।३५१।।

The interval between one moon and the other and the interval between one sun and the other at the situation is obtained on dividing the measure of the own circumference by the number of the moons and the suns situated on their own circumference. All the suns are situated on the Puṣya constellation and all the moons are situated on the Abhijit constellation. //4.351//

अपनी अपनी परिधिमें अपनी अपनी परिधि (वलय) गत चन्द्र और सूर्योंकी संख्याका भाग देनेपर वहाँ स्थित एक चन्द्रसे दूसरे चन्द्रका और एक सूर्यसे दूसरे सूर्यका अन्तर ज्ञात होता है। सर्व सूर्य पुष्य नक्षत्रपर और सर्व चन्द्र अभिजित् नक्षत्र पर स्थित हैं।।३५१।।

रज्जूदलिदे मंदिरमज्झादो चरिमसायरंतोत्ति । पडदि तदद्धे तस्स दु अब्भंतरवेदिया परदो ।।३५२।।

दसगुणपण्णत्तरिसयजोयणमुवगम्म दिस्सदे जम्हा । इगिलक्खहिओ एक्को पुव्वगसव्वुवहिदीवेहिं ।।३५३।।

From the centre of the Sumeru mountain upto one side portion of the last Svayaṁbhūramaṇa sea, the distance is half of a rāju. Its half seems to be seventy-five hundred yojanas as multiplied by ten from the internal altar of the Svayaṁbhūramaṇa sea, because whatever is the total diameter of all the preceding islands and seas, the diameter of all the succeeding island and seas is one lac yojanas in excess. //4.352-353//

सुमेरु पर्वतके मध्यसे अन्तिम स्वयम्भूरमण समुद्रके एक पार्श्वभाग पर्यन्त राजूका दल अर्थात् अर्धराजू क्षेत्र होता है, तथा उसका आधा स्वयम्भूरमण समुद्रकी अभ्यन्तर वेदिकासे दश गुणित पचहत्तर सौ योजन आगे जाकर दिखाई देता है, क्योंकि पूर्वके सर्व द्वीप समुद्रोंका जितना व्यास होता है, उससे उत्तरवर्ती द्वीप समुद्रोंका व्यास एक लाख योजन अधिक होता है।।३५२-३५३।।

पुणरवि छिण्णे पच्छिमदीवब्भंतरिमवेदियापरदो । सगदलजुदपण्णत्तरिसहस्समोसरिय णिवडदि सा ।।३५४।।

Again the measure of halved rāju, alongwith its half part from the internal altar of the preceding island with seventy-five thousand yojanas, falls [75000 + 37500 = 112500 yojanas] over. //4.354//

पुनः आधा किया हुआ राजूका प्रमाण पिछले द्वीपकी अभ्यन्तर वेदीसे अपने अर्धभाग सहित ७५००० (पचहत्तर हजार) योजन अर्थात् (७५००० + ३७५०० यो.) = ११२५०० योजन दूर जाकर पड़ता है।।३५४।।

दलिदे पुण तदणंतरसायरमज्झंतरत्थवेदीदो । पडदि सदलचरणण्णिदपण्णत्तरिदससयं गत्ता ।।३५५।।

Again the measure of rāju bisected again, falls beyond seventy-five thousand yojanas alongwith its half and one fourth part ahead of the internal altar of the sea succeeding that island. //4.355//

पुनः आधा किया हुआ राजूका प्रमाण उस द्वीपके बाद वाले समुद्रकी अभ्यन्तर वेदीसे आगे अपने अर्ध और चतुर्थ भागसे सहित ७५००० योजन दूर जाकर पड़ता है।।३५५।।

इदि अब्भंतरतडदो सगदलतुरियट्ठमादिसंजुत्तं । पण्णत्तरिं सहस्सं गंतूण पडेदि सा ताव ।।३५६।।

In this way, when bisected again, the rājus bisected point falls seventy-five thousand yojanas ahead alongwith its half part, one fourth part, and one eighth part from the internal shore. This process is continued through bisections till a yojana is found to remain. //4.356//

इस प्रकार अभ्यन्तर तटसे अपने अर्धभाग, चौथाईभाग और आठवेंभाग आदि से सहित ७५०००० हजार योजन जाकर राजूका प्रमाण तब तक पड़ता है, जब तक अर्ध अर्ध करते हुए एक योजन रहता है।।३५६।।

संखेज्जरूवसंजुदसूईअंगुलछिदिप्पमा जाव । गच्छंति दीवजलही पडदि तदो साद्धलक्खेण ।।३५७।।

Till the logarithm of the linear finger (sūcyaṅgula) to the base two alongwith numerate digits is found, till then those islands-seas, in sequence as already mentioned are the regions for the fall of the bisection points of the rāju beyond the internal altar. After that the bisection points of rāju fall one and half lac yojanas beyond in all islands seas. //4.357//

जब तक संख्यातरूपों से सहित सूच्यंगुल के अर्धच्छेदों का प्रमाण प्राप्त होता है तभी तक वे द्वीप समुद्र पूर्वोक्त क्रमानुसार अभ्यन्तर वेदी से आगे जाकर राजू के पतन रूप क्षेत्र को प्राप्त होते हैं, उसके पीछे सर्वद्वीप समुद्रों में डेढ़ डेढ़ लाख (१५००००) योजन आगे आगे जाकर राजू पड़ता है।।३५७।।

लवणे दुप्पडिदेक्कं जंबूए देज्जमादिमा पंच । दीउवही मेरुसला पयंदुवजोगी ण छच्चेदे ।।३५८।।

Two bisection points fall in the Lavaṇa sea. Out of those two, one bisection point belongs to the Jambū island. The five bisection points of the initial five islands and seas and one Meru logos (śalākā), thus these six bisection points are not useful in relevance for finding out [the measure of the astral bodies]. //4.358//

लवण समुद्रमें दो अर्धच्छेद पड़ते हैं। उन दो में से एक अर्धच्छेद जम्बूद्वीपका (एक लवणसमुद्रका) है। आदिके पाँच द्वीपसमुद्रोंके पाँच अर्धच्छेद और मेरुशलाकाका एक, ऐसे ये छह अर्धच्छेद प्रकृतमें अर्थात् ज्योतिर्बिम्बोंका प्रमाण लानेमें उपयोगी नहीं हैं।।३५८।।

तियहीणसेढिछेदणमेत्तो रज्जुच्छिदी हवे पक्खो 1 जंबूदीवच्छिदिणा छरूपजुत्तेण परिहीणा ।।३५९।।

Logarithms of rāju to the base two are obtained on reducing the logarithm of universe-line to the base two by three. When the above six logarithms are added to the logarithms of the Jambū island, the sum then subtracted from the logarithm of the rāju to the base two, then the remainder becomes the number of terms (gaccha) in calculating the number of astral bodies. //4.359//

जगच्छ्रेणीके अर्धच्छेदोंमें से तीन कम करनेपर राजूके अर्धच्छेदोंका प्रमाण प्राप्त होता है। जम्बूद्वीपके अर्धच्छेदोंमें उपर्युक्त छह अर्धच्छेद मिलाने पर जो लब्ध प्राप्त हो उसे राजूके अर्धच्छेदोंमें से घटानेपर जो शेष रहे वही ज्योतिर्बिम्बोंकी संख्या प्राप्त करने के लिए गच्छका प्रमाण होता है।।३५९।।

पुक्खरसिंधुभयधणं चउघणगुणसयछहत्तरीपभओ । चउगुणपचओ रिणमवि अडकदिमुहमुवरि दुगुणकमं ।।३६०।।

When one hundred seventy-six is multiplied by the cube of four, the both (ubhaya) sum [first term plus common difference]. This very quantity becomes the first term here, and for every island and sea ahead, the common-difference is, successively four times. Further, for the negative as well, the square of the eight is the first term (mukh) and there is doubling of the common-difference, successively. //4.360//

चारके घन (६४) से गुणित १७६ पुष्कर समुद्रका उभय (आदि + उत्तर) धन है, यही यहाँ प्रभव (मुख) है, और आगे प्रत्येक द्वीप समुद्रमें चतुर्गुण अर्थात् चौगुणा चौगुणा प्रचय (वृद्धि क्रम) है, तथा ऋणमें भी आठकी कृति (६४) मुख है, और ऊपर ऊपर द्विगुण क्रम अर्थात् क्रमसे दुगुणा दुगुणा प्रचय (वृद्धि क्रम) है।।३६०।।

आणिय गुणसंकलिदं किंचूणं पंचठाणसंठविदं । चंदादिगुणं मिलिदे जोइसबिंबाणि सव्वाणि ।।३६१।।

After calculating the geometric progression sum, the sum reduced slightly is placed at five separate places and multipled by the number of the moons etc. The products so obtained when added mutually gives the total number of all astral bodies obtained. //4.361//

गुणसंकलन प्राप्त करके कुछ कम गुणसंकलन पाँच स्थानों पर पृथक पृथक् रखकर चन्द्रमादिकी संख्यासे गुणा करके जो प्राप्त हो उन्हें परस्पर जोड़ देनेसे सर्व ज्योतिषबिम्बोंका प्रमाण प्राप्त होता है।।३६१।।

अडसीदट्ठावीसा गहरिक्खा तार कोडकोडीणं । छावट्ठिसहस्साणि य णवसयपण्णत्तरिगि चंदे ।।३६२।।

The family of a moon consists of eighty-eight planets, twenty-eight constellations, and sixty-six thousand nine hundred seventy-five crore-squared stars-collection. //4.362//

एक चन्द्रमाके परिवारमें अठ्यासी ग्रह, अट्ठाईस नक्षत्र और छ्यासठ हजार नौ सौ पचहत्तर कोड़ा कोड़ी तारागण हैं।।३६२।।

कालविकालो लोहिदणामो कणयक्ख कणयसंटाणा । अंतरदो तो कवयव दुंदुभि रत्तणिहरूवणिब्भासो ।।३६३।।

णीलो णीलब्भासो अस्सस्सट्ठाण कोस कंसादि । वण्णा कंसो संखादिमपरिमाणो य संखवण्णोवि ।।३६४।।

तो उदय पंचवण्णा तिलो य तिलपुच्छ छाररासीओ । तो धूम धूमकेदिगिसंटाणण्णो कलेवरो वियडो ।।३६५।।

इह भिण्णसंधि गंठी माण चयुप्पाय विज्जुजिब्भणभा । तो सरिस णिलय कालय कालादीकेउ अणयक्खा ।।३६६।।

सिंहाउ विउल काला महकालो रुद्दणाम महरुद्दा । संताणसंभवक्खा सव्वट्ठि दिसाय संति वत्थूणो ।।३६७।।

णिच्चलपलंभणिम्मंतज्जोदिमंता सयंपहो होदि । भासुर विरजा तत्तो णिदुक्खो वीदसोगो य ।।३६८।।

सीमंकर खेमभयंकर विजयादिचउ विमलतत्था य । विजयिण्हु वीयसो करिकट्ठिगिजडिअग्गिजालजलकेदु ।।३६९।।

केदूखीरसऽघस्सवणा राहू महगहा य भावगहो । कुजसणि बुहसुक्कगुरू गहाण णामाणि अडसीदी ।।३७०।।

णउदिसयभजिदतारा सगदुगुण दुगुणसलसमभत्था । भरहादि विदेहोत्ति य तारा वस्से य वस्सधरे ।।३७१।।

From the Bharata region, upto the Videha, the number of logos (śalākās) have been doubling. When the number of stars relating to the Jambū island is divided by one hundred ninety, the quotient then multiplied by their own logos, then the number of star-collection in relation to those very regions and mountains are obtained. //4.371//

भरतक्षेत्रसे विजय पर्यन्तकी शलाकाएँ दुगुनी दुगुनी होती गई हैं। जम्बूद्वीप सम्बन्धी ताराओंकी संख्याको १९० से भाग देने पर जो लब्ध प्राप्त हो उसको अपनी अपनी शलाकाओंसे गुणा करनेपर तत् तत् क्षेत्र व पर्वत सम्बन्धी ताराओंकी संख्या प्राप्त हो जाती है।।३७१।।

पंचुत्तरसत्तसया कोडाकोडी य भरहताराओ । दुगुणा हु विदेहोत्ति य तेणपरं दलिददलिदकमा ।।३७२।।

The number of the stars of the Bharata region is seven hundred five crore square. After this, upto Videha this number goes on doubling and after Videha this number goes on halving successively upto Airāvata region. //4.372//

भरतक्षेत्रके ताराओंकी संख्या ७०५ कोड़ाकोड़ी है। इसके बाद विदेह पर्यन्त यह संख्या दूनी दूनी और विदेहके बाद ऐरावत क्षेत्र तककी संख्या क्रमसे आधी आधी होती गई है।।३७२।।

सगरविदलबिंबूणा लवणादी सगदिवायरद्धहिदा । सूरंतरं तु जगदीआसण्णपहंतरं तु तस्स दलं ।।३७३।।

Whatever is the number of suns for own places, their half portion is multiplied by the number of the images of the suns. The product so obtained is subtracted from the width of the Lavaṇa sea. The remainder is then divided by the relative half portion of own suns, resulting in the interval between the two suns. The interval between the altar to the nearer sun is half of the above interval. //4.373//

अपने अपने स्थानोंके जितने सूर्य हैं उनके अर्धभागसे सूर्यबिम्बके प्रमाणको गुणित करनेपर जो लब्ध प्राप्त हो उसे लवण समुद्रके व्यासमें से घटाकर अवशेषमें स्वकीय सूर्योंके अर्धभागका भाग देनेपर एक सूर्यसे दूसरे सूर्यका अन्तर प्राप्त होता है, तथा जगती (वेदी) से निकटवर्ती सूर्यका अन्तर, उपर्युक्त अन्तरका अर्ध प्रमाण होता है।।३७३।।

दो द्दो चंदरविं पडि एक्केक्कं होदि चारखेत्तं तु । पंचसयं दससहियं रविबिंबहियं च चारमही ।।३७४।।

Corresponding to the two moons and the two suns there is only one orbital region. These orbital regions are five hundred and ten yojanas as in excess of the diameter of the sun. //4.374//

दो चन्द्रों और दो सूर्योंके प्रति एक, एक ही चारक्षेत्र होता है ये चारक्षेत्र सूर्यबिम्बके (विस्तार) प्रमाणसे अधिक ५१० योजन (५१० $\frac{४८}{६१}$ यो.) प्रमाण वाले होते हैं।।३७४।।

जंबुरविंदू दीवे चरंति सीदिं सदं च अवसेसं । लवणे चरंति सेसा सगसगखेत्ते व य चरंति ।।३७५।।

The moon and the sun relating to the Jambū island move for a distance of 180 yojaṇas in the Jambū island and move for the remaining [three hundred thirty and forty-eight by sixty-one yojanas in the Lavaṇa sea]. The moons and the suns of the remaining upto the Puṣkarārdha move in their own regions. //4.375//

जम्बूद्वीप सम्बन्धी चन्द्र और सूर्य, जम्बूद्वीपमें तो १८० योजन ही विचरते हैं अवशेष ३३० $\frac{४८}{६१}$ लवणसमुद्रमें विचरते हैं। शेष पुष्करार्ध पर्यन्तके चन्द्र सूर्य अपने अपने क्षेत्रमें विचरते हैं।।३७५।।

पडिदिवसमेक्कवीथिं चंदाइच्चा चरंति हु कमेण । चंदस्स य पण्णरसा इणस्स चउसीदिसय वीथी ।।३७६।।

There are fifteen orbits of the moon and one hundred eighty-four orbits of the sun. The moon and the sun, move every day in one orbit alone. //4.376.//

चन्द्रमाकी पन्द्रह वीथियाँ और सूर्यकी १८४ वीथियाँ हैं। चन्द्र और सूर्य क्रमसे प्रतिदिन एक एक वीथीमें ही संचार करते हैं।।३७६।।

पथवासपिंडहीणे चारक्खेत्ते णिरेयपथभजिदे । वीथीणं विच्चालं सगबिम्बजुदो दु दिवसगदी ।।३७७।।

The interval between the orbits is obtained on dividing the path-orbital region as reduced by the path-width-colllection (patha vyāsa piṇḍa), by the number of orbits as reduced by unity. When in this interval so obtained, the width of the sun's image is added, the movement region of every day of the sun is obtained. ///4.377//

पथव्यास पिंडसे हीन चारक्षेत्रके प्रमाणको १ कम पथ (वीथियों) से भाजित करनेपर वीथियोंका अन्तर प्राप्त हो जाता है, तथा इसी अन्तरमें सूर्य बिम्बका प्रमाण जोड़ देनेसे सूर्यके प्रतिदिनके गमन क्षेत्रका प्रमाण प्राप्त हो जाता है।।३७७।।

सुरगिरिचंदरवीणं मग्गं पडि अंतरं च परिहिं च । दिणगदितप्परिहीणं खेवादो साहए कमसो ।।३७८।।

On operation with the diurnal motion and the circumference (orbit) of the diurnal motion, the distance between the Sumeru and the orbit of the sun, moon, the distance between the sun and the sun as well as that the moon and the moon, and the measure of circumference is obtained. //4.378//

दिनगति तथा दिनगतिकी परिधिको क्षेपण करनेपर क्रमशः सुमेरुसे सूर्य चन्द्रमाके मार्गका अन्तर, सूर्यसे सूर्यका तथा चन्द्रमासे चन्द्रमाका अन्तर और परिधिका प्रमाण सिद्ध होता है। अर्थात् दिनगतिका क्षेपण करनेपर सुमेरुसे सूर्य व चन्द्रका अन्तर तथा एक सूर्यसे दूसरे सूर्यका और एक चन्द्रसे दूसरे चन्द्रका अन्तर सिद्ध होता है। दिनगतिको परिधिमें क्षेपण करनेसे मार्गकी परिधि सिद्ध होती है।।३७८।।

सूरादो दिणरत्ती अट्ठारस बारसा मुहुत्ताणं । अब्भंतरम्हि एदं विवरीयं बाहिरम्हि हवे ।।३७९।।

On the internal orbital motion of the sun, the day is of eighteen muhūrtas and the night is of twelve muhūrtas. When the sun is on the outermost orbit or external orbit, the viceversa happens. //4.379//

अभ्यन्तर परिधिमें भ्रमण करते हुए सूर्यसे दिन अठारह मुहुर्तका और रात्रि बारह मुहूर्त की होती है, तथा बाह्य (अन्तिम) परिधिमें भ्रमण करते हुए सूर्यसे इससे विपरीत अर्थात् १८ मुहूर्तकी रात्रि और १२ मुहूर्तका दिन होता है।।३७६।।

कक्कडमयरे सव्वब्भंतरबाहिरपहट्ठिओ होदि । मुहभूमीण विसेसे वीथीणंतरहिदे य चयं ।।३८०।।

The sun situated on the Cancer zodiac (Karka rāśi) is said to be on the innnermost or internal orbit, whereas the sun situated on the Capricorn zodiac (Makara rāśi} is said to be on the outermost orbit or external orbit. When the top (mukha) is subtracted from the base and the remainder is divided by the number of orbits as reduced by unity, the decreasing common-difference is obtained. //4.380//

कर्कराशि स्थित सूर्य अभ्यन्तर परिधिमें और मकरराशि स्थित सूर्य बाह्य परिधिमें भ्रमण करता है। भूमिमें से मुख घटाकर जो शेष बचे उसमें वीथियोंके अन्तर (१८४-१ = १८३) का भाग देनेपर हानि चय प्राप्त होता है।।३८०।।

सावणमाघे सव्वब्भंतरबाहिरपहट्ठिओ होदि । सूरट्ठियमासस्स य तावतमा सव्वपरिहीसु ।।३८१।।

In the Śrāvaṇa month, the sun is in the innermost orbit and in the Māgha month it is on the outermost orbit. The warmth and the darkness of the month relative to the sun should be related for all the orbits. //4.381//

श्रावण मासमें सूर्य सबसे अभ्यन्तर परिधिमें तथा माघ मासमें सबसे बाह्य परिधिमें स्थित रहता है। सूर्य स्थित मासके ताप और तमको सर्व परिधियोंमें कहना चाहिये।।३८१।।

गिरिअब्भंतरमज्झिमबाहिरजलछट्ठभागपरिहिं तु । सट्ठिहिदे सूरट्ठियमुहुत्तगुणिदे दु तावतमा ।।३८२।।

When the circumference of the Sumeru mountain, intermediate orbit, external orbit, and in water the five orbits of the sixth part of the width of the Lavaṇa sea are each divided by six, the quotients so obtained are multiplied by the muhūrtas of sun-stationed month, then the measure of the warm and dark regions. //4.382//

सुमेरु पर्वतकी परिधि, अभ्यन्तर वीथीकी, मध्यम वीथीकी, बाह्य वीथीकी और जलमें लवणसमुद्रके व्यासके छठवें भागकी (पाँच) परिधियोंको साठसे भाजित करने पर जो जो लब्ध प्राप्त हो उसे सूर्यस्थित माहके (रात्रि और दिन के) मुहूर्तोंसे गुणित करनेपर ताप और तमका प्रमाण प्राप्त होता है।।३८२।।

परिधिम्हि जम्हि चिट्ठदि सूरो तस्सेव तावमाणदलं । बिंबपुरदो पसप्पदि पच्छाभागे य सेसद्धं ।।३८३।।

In whatsoever orbit the sun is stationed, in that orbit half the warmth remains behind and half of it remains ahead of the sun. //4.383//

जिस परिधिमें सूर्य स्थित होता है उसी परिधिमें आधा तापमान सूर्य बिम्बके पीछे और आधा सूर्यबिम्बके आगे फैलता है।।३८३।।

पणपरिधीयो भजिदे दसगुणसूरंतरेण जल्लद्धं । सा होदि हाणिवड्ढी दिवसे दिवसे च तावतमे ।।३८४।।

On dividing the five orbits by ten times the interval of the sun, the quotient becomes the measure of every day's decrease increase as also that of warmth and darkness. //4.384//

पाँचों परिधियोंको दशगुणे सूर्यके अन्तरालके प्रमाणसे भाजित करनेपर जो लब्ध प्राप्त हो वही प्रत्येक दिनमें हानि वृद्धिके ताप तमका प्रमाण है।।३८४।।

बावीस सोलतिण्णिय उणणउदी पण्णमेक्कतीसं च । दुखसत्तट्ठिगितीसं चोद्दस तेसीदि इगितीसं ।।३८५।।

छादालसुण्णसत्तयवावण्णं होंति मेरुपहुदीणं । पंचण्णं परिधीओ कमेण अंकक्कमेणेव ।।३८६।।

The respective proved measures of the five orbits, beginning with that of the Meru are given by thirty-one thousand six hundred twenty-two, three lac fifteen thousand eighty-nine, three lac sixteen thousand seven hundred two, three lac eighteen thousand three hundred fourteen and five lac twenty-seven thousand forty-six. //4.385-386//

इकतीस हजार छै सौ बाईस, तीन लाख पन्द्रह हजार नवासी, तीन लाख सोलह हजार सात सौ दो, तीन लाख अठारह हजार तीन सौ चौदह और पाँच लाख सत्ताईस हजार छ्यालीस मेरुगिरिकी परिधिको आदि करके क्रमसे पाँचों परिधियोंके सिद्ध हुए अंकोंका प्रमाण है।।३८५-३८६।।

णीयंता सिग्घगदी पविसंता रविससी दु मंदगदी । विसमाणि परिरयाणि दु साहंति समाणकालेण ।।३८७।।

The sun and the moon on their outward path, move with a greater velocity, but when they are in their inward path, they move with slower velocity. In this way, they complete the unequal orbits in equal times. //4.387//

सूर्य और चन्द्र निकलते समय अर्थात् प्रथमादि वीथीसे द्वितीयादि वीथियोंमें जाते समय शीघ्रगतिसे गमन करते हैं, किन्तु बाह्यादि वीथियोंसे ज्यों ज्यों पीछेकी वाथियोंमें आते हैं, त्यों त्यों मन्द गमन करते हैं इस प्रकार विषम वीथियोंको भी समान कालमें पूरा कर लेते हैं।।३८७।।

गयहयकेसरिगमणं पढमे मज्झन्तिमे य सूरस्स । पडिपरिहिं रविससिणो मुहुत्तगदिखेत्तमाणिज्जो ।।३८८।।

The sun and the moon move in the first (innermost) orbit as an elephant, in the middle orbit as horse, as in the last (outermost) orbit as lion. In their every orbit, the region moved in a muhūrta is calculated. //4.388//

सूर्य और चन्द्र प्रथम (अभ्यन्तर) वीथीमें हाथीवत्, मध्यम वीथीमें घोड़ेवत् और अन्तिम (बाह्य) वीथीमें सिहवत् गमन करते हैं। इनकी प्रत्येक परिधिमें एक मुहूर्तका गतिक्षेत्र निकालते हैं।।३८८।।

सट्ठिहिदपढमपरिहिं णवगुणिदे चक्खुपासअद्धाणं । तेणूणं णिसहाचलचावद्धं जं पमाणमिणं ।।३८९।।

इगिवीसछदालसयं साहियमागम्म णिसहउवरिमिणो । दिस्सदि अउज्झमज्झे तेणूणो णिसहपासभुजो ।।३९०।।

णिसहुवरिं गंतव्वं पणसगवण्णासपंच देसूणा । तेत्तियमेत्तं गत्ता णिसहे अत्थं च जादि रवी ।।३९१।।

The path of the eye-touch or the maximal range as subject of eye-sense is obtained on dividing the first orbit by sixty and on multiplication by nine. The dhanuṣa of the Niṣadhācala mountain is halved (and) the measure of eye-touch range is subtracted from the quotient, resulting in slightly greater than fourteen thousand six hundred twenty-one. This much is seen by the emperor (Cakravartī) stationed in the middle of Ayodhyā city when the sun is over the Niṣadha mountain. When this amount is subtracted from the side arm of Niṣadha mountain, the remainder is for the Niṣadhācala over which the sun is moving, and is five thousand five hundred seventy-five yojanas. Hence the sun passes five thousand five hundred seventy-five yojanas over the Niṣadhācala sets. //4.389-391//

प्रथम परिधिको ६० से भाजित करके प्राप्त लब्धको ६ से गुणित करनेपर चक्षुके स्पर्शनका मार्ग अर्थात् चक्षु इन्द्रियके विषयभूत उत्कृष्ट क्षेत्रका प्रमाण होता है। निषधाचल पर्वतके धनुषका जो (१२३७६८ $\frac{१८}{१९}$) प्रमाण

है, उसको आधा करनेपर जो (६१८८४ $\frac{६}{१६}$) लब्ध प्राप्त हो उसमेंसे चक्षु इन्द्रियके स्पर्श क्षेत्रके प्रमाण (४७२६३ $\frac{७}{२०}$) को कम कर देनेपर अवशेष जो कुछ अधिक १४६२१ योजन रहा उतना (१४६२१ $\frac{४७}{३८०}$ यो.) निषध पर्वतके ऊपर आकर सूर्य अयोध्या नगरीके मध्यमें स्थित चक्रवर्तीके द्वारा देखा जाता है। इसको (१४६२१ यो.) निषध पर्वतकी पार्श्व भुजामें से कम कर देनेपर जो अवशेष वचता है, वह निषधाचल के ऊपर जाते हुए ५५७५ योजन होता है, अतः निषधाचलके ऊपर ५५७५ योजन जाकर सूर्य अस्त होता है।।३८६-३९१।।

जंबूचारधरूणो हरिवस्ससरो य णिसहबाणो य । इह बाणावट्टं पुण अब्भंतरवीहिवित्थारो ।।३९२।।

Whatever are the arrow of Harivarṣa mountain and the arrow of the Niṣadha mountain without the orbital region of Jambū island, they become the arrows here for finding out the eye-touch passage region. Whatever is the circular-width, that is the width of the first orbit. //4.392//

जम्बूद्वीपके चारक्षेत्रसे रहित जो हरिवर्ष पर्वतके बाण और निषधपर्वतके बाण हैं, वे यहाँ चक्षुस्पर्शका अध्वान क्षेत्र लानेमें बाण होते हैं। इनका जो वृत्त विस्तार है, वह प्रथम वीथीका विस्तार होता है।।३९२।।

हरिगिरिधणुसेसद्धं पासभुजो सत्तसगतितेसीदी । हरिवस्से णिसहधणू अडछस्सगतीसबारं च ।।३९३।।

The measure of the arc of Niṣadhācala is given by eight, six, thirty-seven, twelve [123768 $\frac{18}{19}$] yojanas. From this the arc of Hari kṣetra given by seven, seven, three, eighty-three (83377 $\frac{9}{19}$) yojanas is subtracted and the remainder is halved, resulting in side arm of the Niṣadha mountain.//4.393//

निषधाचलके चाप (धनुष) का प्रमाण १२३७६८ $\frac{१८}{१६}$ योजन है। इसमेंसे हरिक्षेत्रके चाप (८३३७७ $\frac{६}{१६}$ योजन) को घटाकर आधा करने पर जो अवशेष रहता है वह निषधपर्वतकी पार्श्व भुजाका प्रमाण होता है।।३९३।।

माहवचंदुद्धरिया णवयकला णयपदप्पमाणगुणा । पासभुजो चोद्दसकदि वीससहस्सं च देसूणा ।।३९४।।

The remaining numerals of Hari kṣetra are given by mādhava (9), moon (1) or out of nineteen the nine parts (9) giving nine out of nineteen parts of a yojana. The nayapada (9) is multiplied by two i.e. eighteen parts out of nineteen parts of a yojana are the remaining numerels of the Niṣadhācala and the measure of the lateral arm of Niṣadhācala is slightly less than the square of fourteen in excess of twenty thousand yojanas. //4.394//

(माधव) ६, (चन्द्र) १ अर्थात् १६ से उद्धृत (नव कला) ६ भाग अर्थात् $\frac{६}{१६}$ योजन हरिक्षेत्र चापके शेषांक है। (नवपद) ६ से प्रमाण २ का गुणा अर्थात् $\frac{१८}{१६}$ योजन निषधाचलके शेषांक हैं तथा कुछ कम चौदहकी कृति (१९६) से अधिक बीस हजार योजन अर्थात् कुछ कम २०१९६ योजन निषधाचलकी पार्श्वभुजाका प्रमाण है।।३९४।।

दिणगदिमाणं उदयो ते णिसहे णीलगे य तेसट्ठी । हरिरम्मगेसु दो द्दो सूरे णवदससयं लवणे ।।३९५।।

The diurnal velocity measure or rising stations of the sun on the Niṣadha and Nīla are sixty-three, and on the Hari and Ramyaka regions are two and two, and on the Lavaṇa sea are one hundred and nineteen. //4.395//

सूर्यके दिनगतिमान अर्थात् उदय स्थान निषध और नील पर्वतपर ६३ है, हरि और रम्यक् क्षेत्रोंमें दो दो हैं, तथा लवण समुद्रमें १६६ हैं।।३६५।।

दीउवहिचारखित्ते वेदीए दिणगदीहिदे उदया । दीवे चउ चंदस्स य लवणसमुद्दम्हि दस उदया ।।३६६।।

The rising-stations of the sun are obtained on dividing the measure of orbital region in relation to island-sea and the measure of altar by the value of diurnal motion. The rising stations of the moon in relation to orbital region relative to islands are four and relative to Lavaṇa sea are ten, totalling to fourteen. //4.396//

द्वीपसमुद्र सम्बन्धी चारक्षेत्रके प्रमाणमें और वेदीके प्रमाणमें दिनगतिमानके प्रमाणका भाग देनेपर सूर्यके उदय स्थानोंका प्रमाण प्राप्त होता है। चन्द्रमाके द्वीप सम्बन्धी चारक्षेत्रके उदय स्थान ४ और लवण समुद्रके १० अर्थात् कुल १४ (उदय स्थान) हैं।।३६६।।

मंदरगिरिमज्झादो जावय लवणुवहिछट्ठभागो दु । हेट्ठा अट्ठरससया उवरिं सयजोयणा ताओ ।।३६७।।

The warmth of the sun extends from the central part of the Sudarśana Meru upto the sixth part of the Lavaṇa sea, and eighteen hundred yojanas below and one hundred yojanas above. //4.397//

सूर्यका ताप सुदर्शन मेरुके मध्यभागसे लेकर लवण समुद्रके छठवें भाग पर्यन्त फैलता है, तथा नीचे अठारह सौ (१८००) योजन और ऊपर सौ (१००) योजन पर्यन्त फैलता है।।३६७।।

अभिजिस्स गगणखंडा छस्सयतीसं च अवरमज्झवरे । छप्पण्णरसे छक्के इगिदुतिगुणपणबुतसहस्सा ।।३६८।।

There are six hundred thirty celestial parts of the Abhijit constellation, and those of the minimal, intermediate and maximal constellations, which are six, fifteen, and six, are one thousand five, two thousand ten and three thousand fifteen. //4.398//

अभिजित् नक्षत्रके छह सौ तीस गगन खण्ड हैं। तथा जघन्य मध्यम और उत्कृष्ट नक्षत्रोंकी संख्या क्रमसे छह, (१५) पन्द्रह और छह है, इनके गगन खण्ड भी क्रमशः एक हजार पाँच, दो हजार दश और तीन हजार पन्द्रह हैं।।३६८।।

सदभिस भरणी अद्दा सादि असिलेस्स जेट्ठमवर वरा । रोहिणि विसा पुणव्वसु तिउत्तरा मज्झिमा सेसा ।।३६६।।

Śatabhiṣak, Bharaṇī, Ārdrā, Svāti, Āśleṣā and Jyeṣṭhā are six minimal constellations, Rohinṇī, Viśākhā, Punarvasu, Uttarāphālgunī, Uttarāṣādhā and Uttarābhādrapada are six maximal constellations. The remaining fifteen constellations are intermediate. //4.399//

शतभिषक्, भरणी आर्द्रा, स्वाति, आश्लेषा, और ज्येष्ठा ये छह जघन्य नक्षत्र हैं। रोहिणी, विशाखा, पुनर्वसु, उत्तराफाल्गुनी, उत्तराषाढ़ा और उत्तराभाद्रपद ये ६ नक्षत्र उत्कृष्ट हैं तथा शेष १५ नक्षत्र मध्यम हैं।।३६६।।

अस्सिणिकित्तियमियसिर पुस्समहाहत्थ चित्त अणुराहा । पुव्वतिय मूल सवणासधणिट्ठा रेवदी य मज्झिमया ।।४००।।

Aśvinī, Kṛttikā, Mṛgaśirā, Puṣya, Maghā, Hasta, Citrā, Anurādhā, Pūrvatrika, [Pūrvāphālgunī, Pūrvāṣāḍhā, Pūrvabhādrapada], Mūla, Śravaṇa, Dhaniṣṭhā and Revatī are fifteen intermediate constellations. //4.400//

अश्विनी, कृत्तिका, मृगशीर्षा, पुष्य, मघा, हस्त, चित्रा, अनुराधा पूर्वत्रिक, पूर्वाफाल्गुनी, पूर्वाषाढ़ा, पूर्वाभाद्रपद, मूल, श्रवण, धनिष्टा औरा रेवती ये पन्द्रह मध्यम नक्षत्र हैं।।४००।।

दोचंदाणं मिलिदे अट्ठसयं णवसहस्समिगिलक्खं । सगसगमुहत्तगदिणभखंडहिदे परिधिगमुहुत्ता ।।४०१।।

The measure of the celestial parts of two moons is one lac nine thousand eight hundred. The period of revolution of the moon, the sun and the constallation is found on dividing one lac nine thousand eight-hundred celestial parts by the number of celestial parts covered by each in a muhūrta. //4.401//

दो चन्द्रमाके मिले हुए गगनखण्डोंका प्रमाण एक लाख नव हजार आठ सौ (१०६८००) है। चन्द्र सूर्य और नक्षत्र एक मुहुर्तमें अपने अपने जितने गगन खण्डोंमें भ्रमण करते हैं, उन उन गगन खण्डोंका १०६८०० में भाग देनेपर परिधिमें भ्रमणका काल प्राप्त होता है।।४०१।।

अट्ठट्ठी सत्तरसयमिंदू छावट्ठि पंचअहियकमं । गच्छन्ति सूररिक्खा णभखंडाणिगिमुहुत्तेण ।।४०२।।

The moon moves one thousand seven hundred sixty-eight celestial parts in a muhūrta, the sun moves eighteen hundred thirty and the constellations move eighteen hundred thirty- five celestial parts in a muhūrta. //4.402//

एक मुहुर्तमें चन्द्रमा १७६८ गगनखण्डोंमें भ्रमण करता है। सूर्य १८३० और नक्षत्र १८३५ गगनखण्डोंमें गमन करता है।।४०२।।

चंदो मंदो गमणे सूरो सिग्घो तदो गहा तत्तो । तत्तो रिक्खा सिग्घा सिग्घयरा तारया तत्तो ।।४०३।।

The motion of the moon is the slowest. The sun is faster than the moon, and the planets are faster than the sun, the constellations are faster than the planets and the stars are faster than the constellations being superfaster in motion. //4.403//

चन्द्रमाका सबसे मन्द गमन है। सूर्य चन्द्रमासे शीघ्रगामी है, ग्रह सूर्यसे शीघ्रगामी हैं, नक्षत्र ग्रहसे शीघ्रगामी और तारागण अतिशीघ्रगामी हैं।।४०३।।

इंदुरवीदो रिक्खा सत्तट्ठी पंच गगणखंडहिया । अहियहिदरिक्खखंडा रिक्खे इंदुरविअत्थणमुहुत्ता ।।४०४।।

The celestial parts of the constellations are in excessive motion relative to that of the moon and sun are respectively sixty-seven and five. When the own constellation-parts are divided by these excess of celectial parts, the proximate muhūrtas for the constellations as well as the moon, and the constellations as well as the sun are found out. //4.404//

चन्द्रमा और सूर्यके गगनखण्डोंसे नक्षत्रके गगनखण्ड क्रमसे ६७ और ५ अधिक हैं। इन अधिक गगनखण्डोंका अपने अपने नक्षत्रखण्डोंमें भाग देनेपर नक्षत्र और चन्द्र तथा नक्षत्र और सूर्यके आसन्न मुहूर्तोंका प्रमाण प्राप्त हो जाता है।।४०४।।

रविखंडादो बारसभागूणं वज्जदे जदो राहु । तम्हा तत्तो रिक्खा बारहिदिगिसट्ठिखंडहिया ।।४०५।।

The Rāhu moves as many celestial parts per muhūrta as the sun's reduced by one out of twelve parts. This is the reason why the celestial parts of the constellations are sixty-one upon twelve parts in excess of the celestial parts of the Rāhu. //4.405//

सूर्यके गगनखण्डोंसे $\frac{१}{१२}$ भागहीन (१८२९ $\frac{११}{१२}$) गगनखण्डोंपर राहु गमन करता है। इसी कारण राहुके गगनखण्डोंसे नक्षत्रोंके गगनखण्ड $\frac{६१}{१२}$ भाग अधिक हैं।।४०५।।

णक्खत्तसूरजोगजमुहुत्तरासिं दुबेहि संगुणिय । एकट्ठिहिदे दिवसा हवंति णक्खत्तराहुजोगस्स ।।४०६।।

For whatever muhūrtas there is conjunction of the constellation and the sun, those muhūrtas are multiplied by two and divided by sixty-one. This gives the amount of days of conjunction of the constellation and the Rāhu. //4.406//

नक्षत्र और सूर्यका जितने मुहुर्तों तक योग रहता है अर्थात् सूर्य जितने मुहुर्त तक नक्षत्रको भोगता है उन मुहुर्तोंके प्रमाणमें २ का गुणाकर ६१ का भाग देनेसे नक्षत्र और राहुके योगके दिनोंका प्रमाण प्राप्त होता है।।४०६।।

अभिजादि तिसीदिसयं उत्तरअयणस्स होंति दिवसाणि । अधिकदिणाणं तिण्णि य गद दिवसा होंति इगि अयणे ।।४०७।।

There are one hundred eighty-three days in the northern solstice of the Abhijt etc. constellations. How many are the days in excess besides these ? There are three elapsed days (gata divasa) in a solstice. //4.407//

अभिजित् आदि नक्षत्रोंके उत्तरायणमें एक सौ तेरासी दिन होते हैं। इनसे अतिरिक्त अन्य अधिक दिन कितने होते हैं? एक अयनमें तीन गतदिवस होते हैं।।४०७।।

एक्कपहलंघणं पडि जदि दिवसिगिसट्ठिभागमुवलद्धं । किं तेसीदिसदस्सिदि गुणिदे ते होंति अहियदिणा ।।४०८।।

Excess for traversing an orbit, if one out of sixty-one parts of a day elapses, the days for traversing one hundred eighty-three orbits will be how many ? Thus the excess of days is obtained as a product of one out of sixty-one parts by one hundred eighty-three. //4.408//

एक पथ (वीथी) उल्लंघनके प्रति यदि एक दिनका इकसठवाँ $\frac{१}{६१}$ भाग उपलब्ध होता है, तो एकसौ तेरासी पथों (वीथियों) के उल्लंघनमें क्या प्राप्त होगा? इस प्रकार $\frac{१}{६१}$ भागको १८३ से गुणित करनेपर अधिक दिनोंकी प्राप्ति होती है।।४०८।।

सतिपंचमचउदिवसे पुस्से गमियुत्तरायणसमत्ती । सेसेंदक्खिणआदीसावणपडि वदि रविस्स पढमपहे ।।४०९।।

In the Puṣya constellation, the northern solstice comes to an end, after four and three out of five parts of a day. On the Śrāvaṇa dark first, in the inner orbit, the remainder forty four upon five parts is the beginning of the southern solstice of the Puṣya constellation. //4.409//

पुष्यनक्षत्रमें पाँच भागोंमें से तीन भाग सहित चार ($४\frac{३}{५}$) दिन जाकर उत्तरायणकी परिसमाप्ति होती है। श्रावण कृष्णा प्रतिपदाके दिन अभ्यन्तर वीथीमें पुष्यनक्षत्रका शेष $\frac{४४}{५}$ भाग दक्षिणायनका आदि है अर्थात् दक्षिणायनका प्रारम्भ होता है।।४०९।।

इगिमासे दिणवड्ढी वस्से बारह दुवस्सगे सदले । अहिओ मासो पंचयवासप्पजुगे दुमासहिया ।।४१०।।

In a month, there is increase of thirty muhūrtas or one day, hence in twelve months there is an increase of twelve days. In two and a half years there is an increase of one month, and in a yuga or age of five years, there is an increase of two months. //4.410//

एक माहमें एक दिन (३० मुहुर्त) की वृद्धि होती है, अतः बारह मासमें १२ दिनकी अढ़ाई वर्षमें १ मास की और पाँच वर्षोंका समुदाय है स्वरूप जिसका ऐसे एक युगमें दो माहकी वृद्धि होती है।।४१०।।

आसाढपुण्णमीए जुगणिप्पत्ती दु सावणे किण्हे । अभिजिम्हि चंदजोगे पाडिवदिवसम्हि पारंभो ।।४११।।

In the afternoon of the full moonday of the Āṣāḍha month, at the end of northern solstice, there is the completion of the five year yuga. //4.411//

आषाढ़ मासकी पूर्णिमाके दिन पाँच वर्ष स्वरूप युगकी समाप्ति होती है, श्रावण कृष्णा प्रतिपदाके दिन चन्द्रका अभिजित् नक्षत्रके साथ योग होनेपर युगका प्रारंभ होता है।।४११।।

पढमंतिमवीहीदो दक्खिणउत्तरदिगयणपारंभो । आउट्टी एगादी दुगुत्तरा दक्खिणाउट्टी ।।४१२।।

From the first and the last orbit, the solstice of the south and north direction starts. This is called the first frequency. The southern frequency happens to be intially with one and then increases by two every time. //4.412//

प्रथम और अन्तिम वीथीसे ही क्रमानुसार दक्षिण दिशा और उत्तरदिशाके अयनका प्रारम्भ होता है। इसे ही दक्षिणायन उत्तरायण की प्रथम आवृत्ति कहते हैं। दक्षिणावृत्ति एकको आदि लेकर दो-दोकी वृद्धि प्रमाण (१, ३, ५, ७ आदि) होती है।।४१२।।

उत्तरगा य दुआदी दुचया उभयत्थ पंचयं गच्छो । विदिआउट्टी दु हवे तेरसि किण्हेसु मियसीसे ।।४१३।।

Similarly, the northern frequency starts with two and goes on increasing by two. In both the solstices, the measure of number of terms is five and five alone. The second frequency happens to be in the Mṛgaśīrṣa constellation on the thirteenth dark of Śrāvaṇa. //4.413//

उत्तरावृति भी दोको आदि लेकर दोसे अधिक होती जाती है। दानों अयनोंमें गच्छका प्रमाण पाँच पाँच ही है। श्रवण कृष्णा त्रयोदशीको मृगशीर्षा नक्षत्रमें द्वितीय आवृत्ति होती है।।४१३।।

सुक्कदसमीविसाहे तदिया सत्तमिगकिण्हरेवदिए । तुरिया दु पंचमी पुण सुक्कचउत्थीए पुव्वफग्गुणिये ।।४१४।।

The third frequency happens to be at the conjunction of Viśākhā constellation on the tenth white of this month. The fourth frequency happens to be at the conjunction of Revatī constellation on seventh dark of Śrāvaṇa. The fifth frequency happens to be in Pūrvāphālgunī constellation on the fourth white of Śrāvaṇa. //4.414//

इसी मासके शुक्ल पक्षकी दशमी तिथिमें विशाखानक्षत्रका योग होने पर तीसरी आवृति होती है तथा श्रवण कृष्णा सप्तमीको रेवती नक्षत्रका योग होने पर चौथी और श्रावण शुक्ला चतुर्थीको पूर्वाफाल्गुनी नक्षत्रमें पाँचवी आवृत्ति होती है।।४१४।।

दक्खिणअयणे पंचसु सावणमासेसु पंचवस्सेसु । एदाओ भणिदाओ पंचणियट्टीउ सूरस्स ।।४१५।।

Five frequencies in five years, in five Śrāvaṇa months, corresponding to southern solstice of the sun, have been related. //4.415//

(इस प्रकार) पाँच वर्षोंके भीतर पाँच श्रावण मासोंमें दक्षिणायन सम्बन्धी सूर्यकी पाँच आवृत्तियाँ कही गई हैं।।४१५।।

माघे सत्तमि किण्हे हत्थे विणिवित्तिमेदि दक्खिणदो । बिदिया सदभिससुक्के चोत्थीए होदि तदिया दु ।।४१६।।

पडवदि किण्हे पुस्से चोत्थी मूले य किण्हतेरसिए । कित्तियरिक्खे सुक्के दसमीए पंचमी होदि ।।४१७।।

On the seventh dark of Māgha month, in the conjunction with the Hasta constellation, the sun arrives at the northern solstice leaving the southern solstice. This is first frequency. The second frequency happens to be in the conjunction of the Śatabhiṣā constellation on the fourth white of māgha. The third frequency happens to be with conjunction of Puṣya constellation on the first dark of māgha. The fourth frequency happens tobe in Mūla constellation on thirteenth dark of māgha. The fifth frequency happens to be in the conjunction of Kṛttikā constellation on tenth white of māgha. //4.416-417//

माघ कृष्णा सप्तमीको हस्तनक्षत्रके योगमें सूर्य दक्षिणायनको छोड़ कर उत्तरायणमें आता है, यह प्रथम आवृत्ति है। माघ शुक्ला चतुर्थीको शतभिषा नक्षत्रके योगमें दूसरी आवृत्ति होती है, तथा तीसरी आवृत्ति माघ कृष्ण प्रतिपदाको पुष्य नक्षत्रके रहने पर होती है। चौथी आवृत्ति माघकृष्णा त्रयोदशीको मूल नक्षत्रमें और पाँचवी आवृति माघ शुक्ला दशमीको कृतिका नक्षत्रके योगमें होती है।।४१६-४१७।।

ताओ उत्तरअयणे पंचसु वासेसु माघमासेसु । आउट्टीओ भणिदा सूरस्सिह पुव्वसूरीहिं ।।४१८।।

Whatever frequencies in northern solstice in five Māgha months of five years have been related, the preceding preceptors relate them to be of that of the sun. //4.418//

जो आवृतियाँ उत्तरायणमें पाँच वर्षोंके पाँच माघ मासोंमें होती हैं वे पूर्व आचार्योंके द्वारा सूर्यकी कही गई हैं।।४१८।।

रूऊणाउगुणं इगिसीदसदं तु सहिद इगिवीसं । तिघणहिदे अवसेसा अस्सिणिपहुदीणि रिक्खाणि ।।४१६।।

One hundred eighty-one is multiplied by chosen frequencies as reduced by unity. The product is added by twenty-one and then divided by cube of three. The remainder gives the order number of the constellation beginning from Aśvinī. //4.419//

एक सौ इक्यासीको एक कम विवक्षित आवृत्तिसे गुणा करने पर जो लब्ध प्राप्त हो उसमें इक्कीस मिला कर तीनके घन (२७) का भाग देने पर जो शेष रहे, आश्विनीको आदि लेकर उतने ही नम्बरका नक्षत्र होता है।।४१६।।

वेगाउट्टिगुणं तेसीदिसदं सहिद तिगुणगुणरूवे । पण्णरभजिदे पव्वा सेसा तिहिमाणमयणस्स ।।४२०।।

One hundred eighty-three is multiplied by chosen frequencies as reduced by unity, then in it are added the three times multiplier and unity, and then the sum is divided by fifteen. The quotient gives the last days of the fortnight (parva) and the remainder gives the measure of the tithis or lunar days. // 4.420//

एक सौ तैरासीको एक कम विवक्षित आवृतियोंसे गुणित कर पश्चात् उसमें तिगुणा गुणकार और एक अंक मिलाकर पन्द्रहका भाग देने पर जो लब्ध प्राप्त हो वह वर्तमान अयनके पर्व तथा जो अवशेष रहे वह तिथियोंका प्रमाण होता है।।४२०।।

छम्मासद्धगयाणं जोइसयाणं समाणदिणरत्ती । तं इसुपं पढमं छसु पव्वसु तीदेसु तदियरोहिणिए ।।४२१।।

When the astral deities approach the half of the solstice or six months, the time during which the days and nights are equal is called an equinox (viṣupa). This first equinox happens to be at the instant of the Rohiṇī constellation on the third lunar day after the lapse of six fortnights (parvas). // 4.421//

ज्योतिषी देवोंके छह मास (एक अयन) के अर्ध भागको प्राप्त होने पर जिस कालमें दिन और रात्रिका प्रमाण बराबर होता है, उस कालको विषुप कहते हैं। यह प्रथम विषुप ६ पर्वोंके बीत जाने पर तृतीया तिथिमें

रोहिणी नक्षत्रके समय होता है।।४२१।।

बिगुण णव पव्वऽतीदे णवमीए बिदियगं धणिट्ठाए । इगितीसगदे तदियं सादीये पण्णरसमम्हि ।।४२२।।

तेदालगदे तुरियं छट्ठिपुणव्वसुगयं तु पंचमयं । पणवण्णपव्वतीदे बारसिए उत्तराभद्दे ।।४२३।।

अडसट्ठिगदे तदिए मित्ते छट्ठं असीदिपव्वगदे । णवमिमघाए सत्तममिह तेणउदिगदे दु अट्ठमयं ।।४२४।।

अस्सिणि पुण्णे पव्वे णवमं पुण पंचजुदसए पव्वे । तीते छट्ठितिहीए णक्खत्ते उत्तराषाढ़े ।।४२५।।

चरिमं दसमं विसुपं सत्तरसुत्तरसएसु पव्वेसु । तीदेसु बारसीए जाइदि उत्तरगफग्गुणिए ।।४२६।।

After a lapse of eighteen fortnights (parvas), on the ninth lunar day in the Dhaniṣṭhā constellation, there happens to be the second equinox. After a lapse of thirty-one fortnights (parvas), on the fifteenth dark lunar day, in Svāti constellation there is the third equinox. After a lapse of forty three fortnights (parvas), on the sixth lunar day, in Punarvasu constellation there is the fourth equinox. The fifth equinox is after a lapse of fifty-five fortnights on the twelfth, in the Uttarābhādrapada constellation. The sixth equinox is after a lapse of sixty-eight fortnights (parvas), on the third lunar day, in Maitra (Anurādhā) constellation. The seventh equinox is on the ninth lunar day Maghā constellation, after a lapse of eighty fortnights (parvas). The eighth equinox is after a lapse of ninety-three fortnights in Aśvinī constellation on full fortnight dark. The ninth equinox is in Uttarāṣāḍhā constellation on sixth after a lapse of one hundred five fortnights. The tenth equinox is in the Uttarāphālgunī constellation on the twelfth lunar day after a lapse of one hundred seventeen fortnights. //4.422-426//

अठारह पर्वोंके बीतने पर नवमी तिथिको धनिष्ठा नक्षत्रमें द्वितीय विषुप होता है। इकतीस पर्वोंके बीत जाने पर पंचदशी (अमावस्या) तिथिको स्वाति नक्षत्रमें तृतीय, तेतालीस पर्वोंके बीतने पर षष्ठी तिथिको पुनर्वसु नक्षत्रमें चतुर्थ, पचपन पर्वोंके बीतने पर द्वादशीके दिन उत्तराभद्रपद नक्षत्रमें पंचम, अड़सठ पर्वोंके बीतने पर तृतीया तिथिको मैत्र (अनुराधा) नक्षत्रमें षष्ठ, अस्सी पर्वोंके बीतने पर नवमी तिथिको मघा नक्षत्रमें सप्तम, तेरानवे पर्वोंके बीत जाने पर पूर्ण पर्व (अमावस्या) को अश्विनी नक्षत्रमें अष्टम् , एक सौ पाँच पर्वोंके बीत जाने पर षष्ठी तिथिको उत्तराषाढ़ा नक्षत्रमें नौवाँ, और एक सौ सत्तरह पर्वोंके बीत जाने पर द्वादशी तिथिको उत्तराफाल्गुनी नक्षत्रमें दशवाँ विषुप होता है।।४२२-४२६।।

बिगुणे सगिट्ठइसुपे रूऊणे छग्गुणे हवे पव्वं । तप्पव्बदलं तु तिथी पवट्टमाणस्स इसुपस्स ।।४२७।।

One is subtracted from twice the equinoxes and remainder is multiplied by six, resulting in the fortnight (parva). When the fortnight is halved, the number of lunar day of the present equinox is obtained. //4.427//

दुगुणे विषुपमें से एक अंक कम करके शेषको छहसे गुणित करने पर पर्वका प्रमाण प्राप्त होता है, तथा पर्वके प्रमाणको आधा करनेसे वर्तमान विषुपकी तिथि संख्या प्राप्त होती है। (यदि वह पर्वका आधा भाग १५ से अधिक हो तो उसमें १५ का भाग देने पर जो लब्ध प्राप्त हो उसे पर्व संख्यामें जोड़ कर शेषको तिथिका प्रमाण समझना चाहिये।)।।४२७।।

वेगपद छग्गुणं इगितिजुदं आउट्टिइसुपतिहिसंखा । विसमतिहीए किण्हो समतिथिमाणो हवे सुक्को ।।४२८।।

The ordering term-number of the frequency is reduced by unity and multiplied by six. One is added to the product giving the number of the lunar day of frequency. In the very product three is added to get the number of lunar day of equinox. When the lunar day is odd, there is dark fortnight and when it is even, the fortnight is white. //4.428//

एक कम आवृत्तिके पदको छहसे गुणित करके उसमें एक अंक मिलाने पर आवृत्तिकी तिथि संख्या और उसी लब्धमें तीन मिलानेसे विषुपकी तिथि संख्याका प्रमाण प्राप्त हो जाता है। इनमें तिथि संख्याके विषम होने पर कृष्ण पक्ष और सम होने पर शुक्ल पक्ष होता है।।४२८।।

आउट्टिलद्धरिक्खं दहजुद छट्ठट्ठदसमगेगूणं । इसुपे रिक्खा पण्णरगुणपव्वाजुदतिही दिवसा ।।४२६।।

Whatever constellation is obtained in frequency, ten is added to it, and when sixth, eighth, as well as tenth frequency is reduced by unity, the constellation of the equinox is obtained. When the terms measure of frequency and equinox are multiplied by fifteen, and in the product the measure of lunar day is added, then measure of all days of frequency and equinoxes is obtained. //4.429//

आवृत्तिमें जो नक्षत्र प्राप्त हो उसमें दश मिला कर छठवीं, आठवीं और दशवीं आवृत्तिमें एक अंक कम कर देने पर विषुपका नक्षत्र प्राप्त होता है, तथा आवृत्ति एवं विषुपके पर्वोंके प्रमाणको पन्द्रहसे गुणित कर लब्धमें अपनी अपनी तिथिका प्रमाण मिला देनेपर क्रमशः आवृत्ति और विषुपोंके समस्त दिनोंका प्रमाण प्राप्त हो जाता है।।४२६।।

आउट्टिरिक्खमस्सिणिपहुदीदो गणिय तत्थ अट्ठजुदे । इसुपेसु होंति रिक्खा इह गणणा कित्तियादीदो ।।४३०।।

Counting the constellation of a frequency from the Aśvinī constellation, and eight is added to the count, for counting from Kṛttikā. This will give the constellation of the equinox. //4.430//

आवृत्तिके नक्षत्रको अश्विनी नक्षत्रसे गिनकर उसमें ८ जोड़ देनेपर जो लब्ध प्राप्त हो, उसे कृतिकासे गिनना, वही विषुपका नक्षत्र होगा ।।४३०।।

अहियंकादडवीसं छंडेज्जो बिदियपंचमट्ठाणे । एक्कं णिक्खिव छट्ठे दशमे विय एक्कमवणिज्जो ।।४३१।।

The constellations of the equinoxes are obtained on subtracting twenty-eight from excess digits of the product, on adding one to each of the product of second and fifth frequency, and on subtracting one from each of the product of sixth and tenth frequency, the constellations of equinoxes are to be obtained. //4.431//

गुणनफलके अधिक अंकोंमें से २८ घटा कर दूसरी और पाँचवी आवृत्तिके गुणनफलमें एक एक जोड़कर तथा छठवीं और दशवीं आवृत्तिके गुणनफलमें से एक एक घटाकर विषुपोंके नक्षत्रोंको प्राप्त करना चाहिये।।४३१।।

कित्तियरोहिणिमियसिर अद्दपुणव्वस्सुसपुस्सअसिलेस्सा । मह पुव्वुत्तर हत्था चित्ता सादी विसाह अणुराहा ।।४३२।।
जेट्ठा मूल पुव्वुत्तर आसाढा अभिजिसवणसधणिट्ठा । तो सदभिसपुव्वुत्तरभद्दपदा रेवदस्सिणी भरणी ।।४३३।।
अग्गि पयावदि सोमोरुद्दो दिति देवमंति सप्पो य । पिदुभगअरियमदिणयरतोट्ठणिलिंदग्गिमित्तिंदा ।।४३४।।
तो णेरिदि जल विस्सो बह्मा विण्हू वसू य वरुणअजा । अहिवड्ढि पूसण अस्सा जमो वि अहिदेवदा कमसो ।।४३५।।
कित्तियपडंतिसमये अट्ठम मघरिक्खमेदि मज्झण्हं । अणुराहारिक्खुदओ एवं सेसे वि भासिज्जो ।।४३६।।

At the set of the Kṛttikā constellation, its eighth Maghā constellation gets to the noon time, and from Maghā the eighth Anurādhā constellation rises. The same process of sequence be followed about the remaining constellations. //4.436//

कृतिका नक्षत्रके पतन अर्थात् अस्त होनेके समयमें उसका आठवाँ मघा नक्षत्र मध्यान्ह कालको प्राप्त होता है तथा मघासे आठवाँ अनुराधा नक्षत्र उदयको प्राप्त होता है इसी क्रमकी योजना शेष नक्षत्रोंके विषयमें भी करनी चाहिए।।४३६।।

अभिजिणव सादिपुव्वुत्तरो य चंदस्स पढममग्गम्हि । तदिए मघापुणव्वसु सत्तमिए रोहिणी चित्ता ।।४३७।।

The twelve constellations, Abhijit etc. nine, Svāti, Pūrvāphālgunī and Uttarā phālgunī, move in the first orbit of the moon. Maghā and Punarvasu move in the third orbit, and Rohiṇī as well as Citrā move in the seventh orbit. //4.437//

अभिजित् आदि ९ स्वाति पूर्वाफाल्गुनी और उत्तराफाल्गुनी ये बारह नक्षत्र चन्द्रमाके प्रथम मार्गमें संचार करते हैं। मघा और पुनर्वसु तृतीय मार्गमें तथा रोहिणी और चित्रा सातवीं वीथीमें संचार करते हैं।।४३७।।

छट्ठट्ठमदसमेयारसमे कित्तिय विसाह अणुराहा । जेट्ठा कमेण सेसा पण्णारसमम्हि अट्ठेव ।।४३८।।

हत्थं मूलतियं विय मियसिरदुगपुस्सदोण्णि अट्ठेव । अट्ठपहे णक्खत्ता तिट्ठंति हु बारसादीया ।।४३९।।

The Kṛttikā, Viśākhā, Anurādhā and Jyeṣṭhā constellations move on the sixth, eighth, tenth and eleventh orbit. The remaining Hasta, Mūlatraya [Mūla, Pūrvāṣaḍhā, Uttarāṣāḍhā], Mṛgaśīrṣa dvaya (Mṛgaśīrṣa, Ārdrā) and Puṣya dvaya (Puṣya and Aśleṣā), are the eight constellations which move on the fifteenth orbit of the moon. In this way, initiating with initial twelve initial constellations, over the eight orbits out of the fifteen orbits of the moon, all the constellation lie. //4.438-439//

छठे, आठवे, दसवें और ग्यारहवें मार्गमें क्रमशः कृतिका, विशाखा, अनुराधा और ज्येष्ठा नक्षत्र भ्रमण करते हैं। शेष हस्त, मूलत्रय (मूल, पूर्वाषाढ़ा, उत्तराषाढ़ा) मृगशीर्ष द्वय (मृगशीर्ष आर्द्रा) और पुष्यद्वय (पुष्य और आश्लेषा) ये आठ नक्षत्र चन्द्रमाकी अन्तिम १५वीं वीथीमें संचार करते हैं। इस प्रकार बारह आदि नक्षत्रोंको आदि करके चन्द्रमाकी पन्द्रह वीथियोंमें से आठ वीथियोंके ऊपर सम्पूर्ण नक्षत्र स्थित हैं।।४३८-४३९।।

कित्तिय पहुदिसु तारा छप्पण तियएक्क छत्ति छक्क चऊ । दोद्दो पंचकेक्कं चउ छत्तियणवचउक्क चऊ ।।४४०।।

तिय तिय पंचेकाराहियसय दो द्दो कमेण बत्तीसा । पंच य तिण्णि य तारा अट्ठाबीसाण रिक्खाणं ।।४४१।।

The numbers of stars in the Kṛttikā etc., twenty-eight constellations, are respectively, six, five, three, one, six, three, six, four, two, two, five, one, one, four, six, three, nine, four, four, three, three, five, one hundred eleven, two, two, thirty-two, five and three. //4.440-441//

कृतिका आदि २८ नक्षत्रोंके ताराओंकी संख्या क्रमशः छह, पाँच, तीन, एक, छह, तीन, छह, चार, दो, दो, पाँच, एक, एक, चार, छह, तीन, नौ, चार, चार, तीन, तीन, पाँच, एक सौ ग्यारह, दो, दो, बत्तीस, पाँच, और तीन हैं।४४०-४४१।।

वीयणसयलुद्दीए मियसिरदीवे य तोरणे छत्ते । वेम्हियगोमुत्ते विय सरजुगहत्थुप्पले दीवे ।।४४२।।

अधियरणे वरहारे वीणासिंगे य विच्छिए सरिसा । दुक्कयवावीहरिगजकुंभे मुरवे पतंतपक्खीए ।।४४३।।

सेणागयपुव्वावरगत्ते णावा हयस्स सिरसरिसा । चुल्लीपासाणणिभा कित्तियआदीणि रिक्खाणि ।।४४४।।

The above mentioned stars of Kṛttikā etc. constellations, have the shapes similar to fan, wheel's spoke, head of a deer, lamp, archade (toraṇa) umbrella, hole (bāmbī), cow's urine, arrow (śara) yuga, hand, blue lotus, lamp [candle], support, best garland, lute, scorpion, complex well, lion, pitcher, elephant, drum, falling bird, army, earlier body of elephant, later body of elephant, boat, head of horse, stone of oven. //4.442-444//

कृतिका आदि नक्षत्रोंकी उपर्युक्त ताराएँ क्रमसे वीजना सदृश, गाड़ीकी उद्धिका सदृश, मृगके शिर सदृश, दीपक, तोरण, छत्र, वल्मीक (बाँबी), गोमूत्र, शर (बाण), युग, हाथ, उत्पल, नीलकमल, द्वीप, अधिकरण, वरहार, वीणाशृंग, वृश्चिक (बिच्छू), दुष्कृतवापी, सिंहकुम्भ, गजकुम्भ, मुरज (मृदंग) गिरते हुए पक्षी, सेना, हाथीके पूर्व शरीर, हाथीके उत्तर शरीर, नाव, अश्वके शिर और चूल्हेके पत्थर सदृश आकार वाली होती है।।४४२-४४४।।

एक्कारसयसहस्सं सगसगतारापमाणसंगुणिदं । परिवारतारसंखा कित्तियणक्खत्तपहुदीणं ।।४४५।।

When one thousand one hundred eleven is multiplied by the number of their own stars, then the measure of the family stars of Kṛttikā etc. constellations is obtained respectively. //4.445//

एक हजार एक सौ ग्यारहको अपने अपने ताराओंके प्रमाणसे गुणित करनेपर कृतिका आदि नक्षत्रोंके परिवार ताराओंका प्रमाण प्राप्त होता है।।४४५।।

इंदिणसुक्कगुरिदरे लक्खसहस्सा सयं च सहपल्लं । पल्लं दलं तु तारे वरावरं पादपादद्धं ।।४४६।।

The ages of the moon, the sun, Venus, Jupiter, and other planets are respectively one palya and one lac years, one palya with thousand years, one palya with one hundred years, one palya, half palya, and half palya. The maximal age of the stars is one fourth palya, and the minimal age is one eighth palya. //4.446//

चन्द्र, सूर्य, शुक्र, गुरु एवं अन्य ग्रहोंकी आयु क्रमसे एक लाख वर्ष सहित एक पल्य, हजार वर्ष सहित एक पल्य, सौ वर्ष सहित एक पल्य, एक पल्य और आधा आधा पल्य है, ताराओं (और नक्षत्रों) की उत्कृष्टायु पाव पल्य और जघन्यायु पल्यके आठवें भाग प्रमाण है।।४४६।।

चन्दाभा य सुसीमा पहंकरा अच्चिमालिणी चंदे । सूरे दुदि सूरपहा पहंकरा अच्चिमालिणी देवी ।।४४७।।

जेट्ठा तोओ पुह पुह परिवारचदुस्सहस्सदेवीणं । परिवारदेविसरिसं पत्तेयमिमा विउव्वंति ।।४४८।।

जोइसदेवीणाऊ सगसगदेवाणमद्धयं होदि । सव्वणिगिट्ठसुराणां बत्तीसा होंति देवीओ ।।४४९।।

उम्मग्गचारि सणिदाणणलादिमुदा अकामणिज्जरिणो । कुदवा सवलचरित्ता भवणत्तिय जंति ते जीवा ।।४५०।।

* ५ * वैमानिकलोकाधिकारः

चुलसीदिलक्खसत्ताणउदिसहस्से तहेव तेवीसे । सव्वे विमानसमगेजिणिंदगेहे णमंसामि ।।४५१।।

चौरासी लाख सत्यानवे हजार तेईस सर्व विमानोंकी संख्या प्रमाण जिन-मन्दिरोंको (मैं नेमिचन्द्राचार्य) नमस्कार करता हूँ।।४५१।।

सोहम्मीसाणसणक्कुमारमाहिंदगा हु कप्पा हु । बह्मब्बह्मुत्तरगो लांतवकापिट्ठगो छट्ठो ।।४५२।।

सुक्कमहासुक्कगदो सदरसहस्सारगो हु तत्तो दु । आणदपाणद आरणअच्चुदगा होंति कप्पा हु ।।४५३।।

The choice (kalpa) or indra happens to be in the Saudharma, Aiśāna, Sānatkumāra, Māhendra-(four), Brahma-Brahmottara- (one), Lāntava-Kāpiṣṭha- (one), Śukra-Mahāśukra- (one), Śatāra-Sahasrāra- (one), Ānata- (one), Prāṇata- (one), Āraṇa- (one), Acyuta- (one). //5.452-453//

सौधर्मैशान, सानत्कुमार-माहेन्द्र (ये चार), ब्रह्मब्रह्मोत्तर (पाँचवा) लान्तव-कापिष्ठ (छठा) शुक्र-महाशुक्र (सातवाँ) शतार-सहस्रार (आठवाँ) आनत-प्राणत, आरण और अच्युत (के एक एक) कल्प होते हैं।।४५२-४५३।।

मज्झिमचउजुगलाणं पुव्वावरजुम्मगेसु सेसेसु । सव्वत्थ होंति इंदा इदि बारस होंति कप्पा हु ।।४५४।।

Out of the middle four pairs, in the former and latter, two pairs have one indra each. In the remaining four pairs there are eight indras. In this way, relative to indras, there are twelve choices (kalpas). //5.454//

मध्यके चार युगलोंमें से पूर्व और अपरके दो दो युगलोंमें एक एक इन्द्र होते हैं। शेष चार युगलोंके आठ इन्द्र होते हैं। इस प्रकार बारह इन्द्रोंकी अपेक्षा बारह कल्प होते हैं।।४५४।।

हिट्ठिममज्झिमउवरिमतितिय गेवेज्ज णव अणुद्दिसगा । पंचाणुत्तरगा विय कप्पादीदा हु अहमिंदा ।।४५५।।

There are three Graiveyakas, each for the lower, the middle and the upper. Above these there are nine Anudiśa and five Anuttara celestial planes. All these are beyond choice (transcendental) and Ahamindras reside in them. //5.455//

अधस्तन, मध्यम और उपरिम तीन तीन ग्रैवेयक अर्थात् नवग्रैवेयक हैं। उनके ऊपर नव अनुदिश और पाँच अनुत्तर विमान हैं। ये सब कल्पातीत विमान हैं इनमें अहमिन्द्र रहते हैं।।४५५।।

अच्चीय अच्चिमालिणि वइरे वइरोयणा अणुद्दिसगा । सोमो य सोमरूवे अंके फलिके य आइच्चे ।।४५६।।

The nine Anudiśa celestial planes are Arci, Arcimālinī, Vaira, Vairocana, Soma, Somaprabha, Aṅka, Sphaṭika, and Āditya. //5.456//

अर्चि, अर्चिमालिनी, वैर, वैरोचन, सोम, सोमप्रभ, अंक, स्फटिक और आदित्य ये नव अनुदिश विमान है।।४५६।।

विजयो दु वैजयंतो जयंत अवराजिदो य पुव्वाइं । सव्वट्ठसिद्धिणामा मज्झम्मि अणुत्तरा पंच ।।४५७।।

The five Anuttara celestial planes have the following arrangements. Vijaya, Vaijayanta, Jayanta and Aparājita are four series ordered, one each in four directions. In their centre is the indraka celestial plane called the Sarvārthasiddhi. //5.457//

विजय, वैजयन्त, जयन्त और अपराजित ये चार श्रेणीबद्ध विमान क्रमशः पूर्वादि दिशाओंमें (एक एक) हैं। इनके मध्यमें सर्वार्थसिद्धि नामक इन्द्रक विमान है। इस प्रकार पाँच अनुत्तर विमान हैं।।४५७।।

मेरुतलादु दिवड्ढं दिवड्ढदलछक्कएक्करज्जुम्हि । कप्पाणमट्ठजुगला गेवेज्जादी य होंति कमे ।।४५८।।

There are eight pairs of the choice (kalpa) paradises, respectively, one and half rājus, one and half rājus, and six pairs in half rājus above the Meru plane. Beyond these, above, in one rāju there are choiceless or transcendental (Kalpātīta), nine Graiveyaka etc., celestial planes. //5.458//

मेरुतलसे डेढ़ राजू, डेढ़ राजू और छह अर्ध राजुओंमें क्रमसे कल्प स्वर्गोंके आठ युगल हैं। इनके ऊपर एक राजूमें कल्पातीत नवग्रैवेयक आदि विमान हैं।।४५८।।

बत्तीसट्ठावीसं बारस अट्ठेव होंति लक्खाणि । सोहम्मादिचउक्के लक्खचउक्कं तु बह्मदुगे ।।४५९।।
तत्तो जुम्माण तिए पण्णासं ताल छस्सहस्साणं । सत्तसयाणि य आणदकप्पचउक्केसु पिंडेण ।।४६०।।
एक्कारसत्तसमहियसयमेक्काणउदी णव य पंचेव । गेवज्जाणं तितिसु अणुदिस्साणुत्तरे होंति ।।४६१।।

बत्तीस लाख, अट्ठाईस लाख, बारह लाख और आठ लाख क्रमसे सौधर्मादिक चार कल्पोंके विमानोंका प्रमाण है, तथा ब्रह्म और ब्रह्मोत्तर इन दोनोंके (मिलाकर) विमानोंका प्रमाण चार लाख है इसके बादके तीन युगलोंमें क्रमसे पचास हजार, चालीस हजार और छह हजार हैं, तथा अनतादि चार कल्पोंके विमानोंका प्रमाण सम्मिलित रूपसे सात सौ है एक सौ ग्यारह, एक सौ सात, इक्यानवे, नव और पाँच ये क्रमसे तीन तीन ग्रैवेयकों, अनुदिश और अनुत्तर विमानोंका प्रमाण है।।४५९-४६१।।

इगितीससत्त चत्तारि दोण्णि एक्केक्क छक्क चदुकप्पे । तितिय एक्केक्किंदियणामा उडुआदितेवट्ठी ।।४६२।।

इकतीस, सात, चार, दो, एक, एक, चार कल्पोंमें छह, तीन, तीन, तीन एक और एक ये क्रमसे इन्द्रक विमान हैं। इनके ऋतु विमानादि त्रेसठ नाम हैं।।४६२।।

एक्केक्कइंदयस्य य विच्चालमसंखजोयणपमाणं । एदाणं णामाणं बोच्छामो आणुपुव्वीओ ।।४६३।।

एक एक इन्द्रकके बीचका अन्तराल असंख्यात योजन प्रमाण है। इनके नामोंको आनुपूर्वी क्रमसे कहेंगे।।४६३।।

उडुविमलचंदवग्गू वीररुणं णंदणं च णलिणं च । कंचण रोहिद चंचं मरुदं रिड्डिसय वेलुरियं ।।४६४।।

रुचग रुचिरंक फलिहं तवणीयं मेघमब्भ हारिद्दं । पउमं लोहिद वज्जं णंदावत्तं पहंकरयं ।।४६५।।

पिट्ठक गजमित्तपहा अंजण वणमाल णाग गरुडं च । लंगल बलभद्दं च य चक्कं चरिमं च अडतीसो ।।४६६।।

ऋतु, विमल, चन्द्र, वल्गु, वीर, अरुण, नन्दन, नलिन, कांचन, रोहित, चंच, मरुत्, ऋद्धीश, वैडूर्य, रुचक, रुचिर, अंक, स्फटिक, तपनीय, मेघ, अभ्र, हारिद्र, पद्म, लोहित, वज्र, नन्द्यावर्त, प्रभंकर, पृष्ठक, गज, मित्र, प्रभा, अंजन, वनमाल, नाग, गरुण, लांगल, बलभद्र और अन्तिम चक्र नामा इन्द्रक है। इस प्रकार अड़तीस इन्द्रक है।।४६४-४६६।।

रिट्ठसुरसमिदिबह्मं बह्मुत्तरबह्महिदयलांतवयं । सुक्कं खलु सुक्कदुगे सदरविमाणं तु सदरदुगे ।।४६७।।

अरिष्ट, सुरस, ब्रह्म और ब्रह्मोत्तर ये तीसरे युगलके ब्रह्महृदय और लान्तव ये चौथे युगलके शुक्रद्विकका शुक्र और शतार युगलका शतार नामक इन्द्रक विमान है।।४६७।।

आणद पाणदपुप्फय सातक तह आरणच्चुदवसाणे । तो गेवेज्ज सुदरिसण अमोह तह सुप्पबुद्धं च ।।४६८।।

आनत, प्राणत, पुष्पक, शातक, आरण और अच्युत ये छह आनतादिमें तथा इनके बाद ग्रैवेयकमें सुदर्शन, अमोघ, सुप्रबुद्ध, यशोधर, सुभद्र, सुविशाल, सुमनस, सौमनस और प्रीतिंकर ये नव इन्द्रक हैं। आदित्य इन्द्रक एवं अन्तमें एक सर्वार्थसिद्धि नामका इन्द्रक है।।४६८।।

जसहर सुभद्दणामा सुविमालं सुमणसं च सोमणसं । पीदिंकरमाइच्चं चरिमे सव्वत्थसिद्धी दु ।।४६९।।

णाभिगिरिचूलिगुवरिं वालग्गंतर ट्ठियो हु उडु इंदो । सिद्धीदो धो बारह जोयणमाणम्हि सव्वट्ठं ।।४७०।।

नाभिगिरिकी चूलिकाके ऊपर बालका अग्रभाग प्रमाण अन्तर छोड़कर ऋतु विमान स्थित है, तथा सिद्धक्षेत्रसे बारह योजन प्रमाण नीचे सर्वार्थसिद्धि नामका इन्द्रक विमान अवस्थित है।।४७०।।

सगसगचरिमिंदयधयदंडं कप्पावणीणमंतं खु । कप्पादीदवणिस्स य अंतं लोयंतयं होदि ।।४७१।।

अपने अपने अन्तिम इन्द्रकका ध्वजादण्ड ही (अपनी अपनी) कल्प अवनीका अन्त है, और जहाँ कल्पातीत अवनीका अन्त होता है, वहीं लोकका अन्त है।।४७१।।

माणुसखित्तपमाणं उडु सव्वट्ठं तु जंबुदीवसमं । उभयविसेसे रूऊणिंदयभजिदे दु हाणिचयं ।।४७२।।

The extension of the first Ṛtu indraka celestial plane is equal to the human-region (two and a half islands), and the extension of the last Sarvārthasiddhi indraka celestial plane is equal to that of the Jambū island. The decrease (increase) as common difference is obtained on mutual subtraction of the above and on dividing remainder by the number of indrakas as reduced by unity. //5.472//

प्रथम ऋतु इन्द्रक विमानका विस्तार मनुष्य क्षेत्र (ढाई द्वीप) के बराबर और अन्तिम सर्वार्थसिद्धि इन्द्रक विमानका विस्तार जम्बूद्वीपके बराबर है। उन दोनोंके प्रमाणको परस्पर घटाकर शेषमें एक कम इन्द्रक प्रमाणका भाग देने पर हानि (वृद्धि) चयका प्रमाण प्राप्त होता है।।४७२।।

बासट्ठी सेढिगया पढमिंदे चउदिसासु पत्तेयं । पडिदिसमेक्केक्कोणं अणुद्दिसाणुत्तरेक्कोत्ति ।।४७३।।

There are sixty-two series-ordered celestial planes each in four directions of the first indraka celestial plane. Above these, in every direction of second etc. discs, reducing one by one, in every direction of the Anudiśa and the Anuttara, there is one and only one series-ordered. //5.473//

प्रथम इन्द्रक विमानकी चारों दिशाओंमें बासठ बासठ श्रेणीबद्ध विमान हैं। इसके ऊपर द्वितीयादि पटलोंकी प्रत्येक दिशामें एक एक कम होते हुए अनुदिस और अनुत्तरकी प्रत्येक दिशामें एक एक ही श्रेणीबद्ध है।।४७३।।

उडुसेढीबद्धदलं सयंभुरमणुवहिपणिधिभागम्हि । आइल्लतिण्णि दीवे तिण्णि समुद्दे य सेसा हु ।।४७४।।

ऋतु इन्द्रक विमानकी एक दिशामें ६२ श्रेणीबद्ध है। इनके आधे (३१) श्रेणीबद्ध विमान तो स्वयम्भूरमण समुद्रके निकटवर्ती उपरिम भागमें है और शेष (३१) स्वयम्भूरमण समुद्रसे अर्वाचीन तीन द्वीप और तीन समुद्रोंके ऊपर स्थित हैं।।४७४।।

सेढीणं विच्चाले पुप्फपइण्णग इव ट्ठियविमाणा । होंति पइण्णइणामा सेढींदयहीणरासिसमा ।।४७५।।

The celestial planes lying like scattered flowers in the interval of the series-ordered celestial planes, are called scattered (Prakīrṇaka). Their measure is the own set as reduced by the number of the indraka and series-ordered celestial planes. //5.475//

श्रेणीबद्ध विमानोंके बीच बीचमें अर्थात् अन्तरालमें बिखरे हुए पुष्पोंके सदृश जो विमान स्थित हैं उन्हें प्रकीर्णक कहते हैं। इनका प्रमाण इन्द्रक और श्रेणीबद्ध विमानोंकी राशिसे हीन स्वराशि समान है।।४७५।।

उत्तरसेढीबद्धा वायव्वीसाणकोणगपइण्णां । उत्तरइंदणिबद्धा सेसा दक्खिणदिसिंदपडिबद्धा ।।४७६।।

उत्तर दिशा सम्बन्धी श्रेणीबद्ध विमान और वायव्य एवं ईशान कोणमें स्थित प्रकीर्णक ये उत्तरेन्द्र सम्बन्धी हैं, तथा शेष बचे हुए विमान दक्षिणेन्द्र सम्बन्धी हैं।।४७६।।

इंदयसेढीबद्धप्पइण्णयाणं कमेण वित्थारा । संखेज्जमसंखेज्जं उभयं चय जोयणाणं तु ।।४७७।।

इन्द्रक, श्रेणीबद्ध और प्रकीर्णक विमानोंका विस्तार क्रमशः संख्यात योजन, असंख्यात योजन और संख्यातासंख्यात योजन है।।४७७।।

कप्पेसु रासिपंचमभागं संखेज्जवित्थडा होंति । तत्तो तिण्णट्ठारस सत्तरसेक्केकयं कमसो ।।४७८।।
सगसगसंखेज्जूणा सगसगरासी असंखवासगया । अहवा पंचमभागं चउगुणिदे होंति कप्पेसु ।।४७९।।
छज्जुगल सेसकप्पे तितित्तिसु सेसे विमाणतलबहलं । इगिबीसेयारसयं णवणउदिरिणक्कमा होंति ।।४८०।।
दोद्दो चउचउकप्पे पंचयवण्णा हु किण्णवज्जा हु । णीलूणा रत्तूणा विमाणवण्णा तदो सुक्का ।।४८१।।
दुसु दुसु अट्ठसु कप्पे जलवादुभये पइट्ठियविमाणा । सेसविमाणा सव्वे आगासपइट्ठया होंति ।।४८२।।
छज्जुगलसेसकप्पे अट्ठारसमम्हि सेढिबद्धम्हि । दोहीणकमं दक्खिणउत्तरभागम्हि देविंदा ।।४८३।।
इंदट्ठियं विमाणं सगसगकप्पं तु तस्स चउपासे । वेलुरियरजतसोकं मिसक्कसारं तु पुव्वादी ।।४८४।।
रुचकं मंदरसोकं सत्तच्छदमणामयं विमाणं तु । सव्वुत्तरइंदाणं विमाणपासेसु होंति कमे ।।४८५।।
सोहम्मादीबारस साणदआरणगजुगलएवि कमा । देवाण मउल चिण्हं वराहमयमहिसमच्छावि ।।४८६।।
कुम्मो दद्दरतुरया तो कुंजर चंद सप्प खग्गी य । छगलो बसहोतत्तो चोद्दसमो होदि कप्पतरू ।।४८७।।

सोहम्मादिचउक्के जुम्मचउक्के य सेसकप्पे य । सगदेविजुदिंदाणं णयराणि हवंति णवयपदे ।।४८८।।

चुलसीदीय असीदी बिहत्तरी सत्तरीय जोयणगा । जावय वीससहस्सं समचउरस्साणि रम्माणि ।।४८९।।

छज्जुगलसेसकप्पे तप्पायारुदय जोयणं तिसदं । पण्णासूणं पंचम तीसूणं उवरि वीसूणं ।।४९०।।

गाढो वित्थारो विय पण्णासं दलकमं तु पंचमगे । चत्तारि तियं छट्ठे चरिमे दुगमद्धसंजुत्तं ।।४९१।।

पडिदिस गोउरसंखा तेसिं उदओवि चउतिदोण्णिसया । तत्तो दुगुणासीदी बीसविहीणं तदो होदि ।।४९२।।

गोउरवासो कमसो सयजोयणगाणि तिसु य दसहीणं । बीसूणं पंचमगे तत्तो सव्वत्थ दसहीणं ।।४९३।।

णयरपदे तस्संखा समाणिया चउगुणा य तणुरक्खा । बसहतुरंगरथेभपदातीगंधव्वणच्चणी चेदि ।।४९४।।

सत्तेव य आणीया पत्तेयं सत्तसत्तकक्खजुदा । पढमं ससमाणसमं तद्दुगुणं चरिमकक्खोत्ति ।।४९५।।

दामेट्ठी हरिदामा मादलि अइरावदा महत्तरया । वाउअरिट्ठजसा णीलंजणया दक्खिणिंदाणं ।।४९६।।

महदामेट्ठि मिदगदी रहमंथण पुप्फयंत इदि कमसो । सलघुपरक्कमगीदरदि महासुसेणा य उत्तरिंदाणं ।।४९७।।

बारस चोद्दस सोलस सहस्स अब्भंतरादिपरिसाओ । तत्थ सहस्सदुउण्णा दुसहस्सादो हु अद्धद्धं ।।४९८।।

णयराणं बिदियादीपायारा पंचमोत्ति तेरसयं । तेसट्ठि अडकदी चुलसीदी लक्खाणि गंतूणं ।।४९९।।

सेण्णावदितणुरक्खा पढमे विदियंतरे दु परिसतयं । सामाणियदेवा पुण तदिए णिवसंति तुरिए दु ।।५००।।

आरोहियाभियोग्गगकिब्भिसियादी य जोग्गपासादे । गमिय तदो लक्खदलं णंदणमिदि तव्विसेसणामाणि ।।५०१।।

सुरपुरबहिं असोयं सत्तच्छदचंपचूदवणखण्डा । पउमद्दहसममाणा पत्तेयं चेत्तरुक्खजुदा ।।५०२।।

चउचेत्तदुमा जंबूमाणा कप्पेसु ताण चउपासे । पल्लंकगजिणपडिमा पत्तेयं ताणि वंदामि ।।५०३।।

तत्तो बहुजोयणयं गंतूण दिसासु लोगवालाणं । णयराणि अजुदसंगुणपणघणवित्थारजुत्ताणि ।।५०४।।

गणिकामहत्तरीणं पुराणि तत्थेव अग्गिपहुदीसु । विदिसासु लक्खजोयणवित्थारायामसहियाणि ।।५०५।।

ताओ चउरो सग्गे कामा कामिणि य पउमगंधा य । तो होदि अलंबूसा सव्विंदपुराणगेस कमो ।।५०६।।

छज्जुगलसेसकप्पे तित्तिसु य अणुद्दिसे अणुत्तरगे । मेहुदओ छप्पणसय पण्णास रिणं दलं चरिमे ।।५०७।।

सत्तेपदे देवीणं गिहोदयं पणसयं तु पण्णरिणं । सव्वगिहदिग्घवासं उदयस्स य पंचमं दसमं ।।५०८।।

सत्तपदे अट्ठट्ठमहादेवीयो पुधादि मेक्किस्से । ससमं सोलसहस्सा देवीओ उवरि अद्धद्धा ।।५०९।।

सचिपउम सिवसियामा कालिंदीसुलसअज्जुकाणामा । भाणुत्ति जेट्ठदेवी सव्वेसिं दक्खिणिंदाणं ।।५१०।।

सिरिमदि रामसुसीमा पभावदि जयसेण णामय सुसेणा । वसुमित्त वसुंधर वरदेवीओ उत्तरिंदाणं ।।५११।।

अट्ठण्हं देवीणं पुधपुध सोलससहस्सविक्किरिया । मूलसरीरेण समं सेसे दुगुणा मुणेदव्वा ।।५१२।।

सत्तपदे वल्लभिया बत्तीसट्ठेव दो सहस्साइं । पच्चसयं अद्धद्धं तेस्सट्ठी होंति सत्तमगे ।।५१३।।

देवीपासादुदया वल्लभियाणं तु बीसअहियं खु । इंदत्थंभगिहादो बल्लभियावासया पुव्वे ।।५१४।।

अमरावदिपुरमज्झे थंभगिहीसाणदो सुधम्मक्खं । अट्ठाणमण्डवं सयतद्दलदीहदु तदुभयदल उदयं ।।५१५।।

पुव्वुत्तदक्खिणदिस तद्दारा अट्ठवास सोलुदया । मज्झे हरिसिंहासणमडदेवीणासणं पुरदो ।।५१६।।

तव्वाहिं पुव्वादिसु सलोयवालाण परिसतिदयस्स । अग्गिजमणेरिदीए तेत्तीसाणं तु णेरिदिए ।।५१७।।

सेणावईणमवरे समाणियाणं तु पवणईसाणे । तणुरक्खाणं भद्दासणाणि चउदिसगयाण बहिं ।।५१८।।

तस्साग्गे इगिबासो छत्तीसुदओ सबीढ वज्जमओ । माणत्थंभो गोरुद वित्थारय बारकोडिजुदो ।।५१९।।

चिट्ठंति तत्थ गोरुदचउत्थवित्थार कोसदीहजुदा । तित्थयराभरणचिदा करण्डया रयणसिक्कधिया ।।५२०।।

साणक्कुमारजुगले पुव्ववरविदेहतित्थयरभूसा । ठविदच्चिदा सुरेहिं कोडीपरिणाह बारंसो ।।५२२।।

पासे उववादगिहं हरिस्स अडवास दीहरुदयजुदं । दुगरयणसयण मज्झं वरजिणगेहं बहुकूडं ।।५२३।।

दक्खिणउत्तरदेवी सोहम्मीसाण एव जायंते । तहिं सुद्धदेविसहिया छच्चउलक्खं विमाणाणं ।।५२४।।

तेद्देवीओ पच्छा उवरिमदेवा णयंति सगठाणं । सेसविमाणा छच्चदुबीसलक्ख देवदेविसम्मिस्सा ।।५२५।।

दुसु दुसु तिचउक्केसु य काये फासे य रूव सद्दे य । चित्तेवि य पडिचारा अप्पडिचारा हु अहमिंदा ।।५२६।।

दुसु दुसु तिचउक्केसु य णवचोद्दसगे बिगुव्वणासत्ती । पढमखिदीदो सत्तमखिदिपेरंतो त्ति अवही य ।।५२७।।

The transformation (vikriyā) and the knowing power of the Saudharma etc. two, two, three, fourfold, nine and fourteen (nine Anudiśa and five Anuttara) deities of the heavens ranges respectively, from the first earth of the hell to the seventh earth. //5.527//

सौधर्मादि दो, दो, तीन चतुष्क अर्थात् चार, चार और चार, नव और चौदह (नव अनुदिश, ५ अनुत्तर स्वर्गोंके देवोंकी विक्रिया करनेकी एवं अवधिज्ञानसे जाननेकी शक्ति क्रमसे नरककी प्रथम पृथ्वीसे सातवीं पृथ्वी पर्यन्त है।।५२७।।

सव्वं च लोयणालिं पस्संति अणुत्तरेसु जे देवा । सगखेत्ते य सकम्मे रूवगदमणंतभागो य ।।५२८।।

Five Anuttara celestial plane resident deities visualize the whole of the universe-channel (loka-nālī). Go on dividing the Karma ultimate particles by infinitesimal part and every time go on reducing one point (pradeśa) from its [clairvoyance] region. //5.528//

पाँच अनुत्तर विमानवासी देव सम्पूर्ण लोकनाड़ीको देखते हैं। अपने कर्म परमाणुओंमें अनन्तवें भागका भाग देते जाना और प्रत्येक बार अपने (अवधि) क्षेत्रमें से एक प्रदेश घटाते (हीन करते) जाना चाहिए।।५२८।।

दुसुदुसु तिचउक्केसु य सेसे जणणंतरं तु चवणे य । सत्तदिण पक्ख मासं दुगचदुछम्मासगं होदि ।।५२९।।

सौधर्मादि दो, दो, तीन चतुष्कों (चार, चार, चार) और शेष विमानोंमें जन्म एवं मरणका अन्तर क्रमसे सात दिन, एक पक्ष, एक माह, दो माह, चार माह, और छह माहका होता है।। ५२९।।

वरविरहं छम्मासं इंदमहादेविलोयपालाणं । चउ तेत्तीससुराणं तणुरक्खसमाणपरिसाणं ।।५३०।।

इन्द्र, इन्द्रकी महादेवी और लोकपालोंका उत्कृष्ट विरहकाल छह माहका तथा त्रायस्त्रिंश, सामानिक, तनुरक्षक और पारिषद देवोंके जन्म मरणका उत्कृष्ट अन्तर चार माहका है।।५३०।।

ईसाणलांतवच्चुदकप्पोत्ति कमेण होंति कंदप्पा । किब्मिसिय आभिजोगा सगकप्पजहण्णठिदिसहिया ।।५३१।।

ईशान, लान्तव और अच्युत कल्प पर्यन्त क्रमसे अपने अपने कल्प सम्बन्धी जघन्य आयु सहित कन्दर्प, किल्विषिक और आभियोग्य जातिके देव उत्पन्न होते हैं।।५३१।।

सोहम्म वरं पल्लं वरमुबहिबि सत्त दस य चोद्दसयं । बावीसोत्ति दुवड्ढी एक्केक्कं जाव तेत्तीसं ।।५३२।।

The minimal longevity of Saudharma pair is one palya and maximal logevity is two sāgaras. Ahead of this the measures are, respectively, seven sāgaras, ten sāgaras, fourteen sāgaras. The maximal longevity is from fourteen sagaras upto twenty-two sāgaras, having increment of two sāgaras and above it upto thirty-three sāgaras having increment of one sāgara. //5.532//

सौधर्म युगलकी जघन्यायु एक पल्य और उत्कृष्टायु दो सागरकी है। इसके आगे क्रमसे सात सागर दश सागर चौदह सागर प्रमाण है। चौदह सागरसे बाबीस सागर पर्यन्त दो दो सागरकी वृद्धिको लिये हुए तथा उसके ऊपर तेतीस सागर पर्यन्त एक एक सागरकी वृद्धिको लिए हुए उत्कृष्ट आयुका प्रमाण है।।५३२।।

सम्मे घादेऊणं सायरदलमहियमा सहस्सारा । जलहिदलमुडुवराऊ पडलं पडि जाण हाणिचयं ।।५३३।।

[In the Saudharma pair] the longevity of strategic longevity of serene visioned bios is half a sagara in excess. This should be known upto sahasrāra paradise [because above the sahasrāra paradise there is no generation of srategy longevity (ghātāyuṣka). The maximal age of Ṛtu disc is half a sāgara, hence [after having kept the age of the first and last disc] the decreasing common-difference should be known of every disc. //5.533//

(सौधर्म युगल में) घातायुष्क सम्यग्दृष्टि जीवकी आयु आधा सागर अधिक है। इस प्रकार सहस्रार स्वर्ग पर्यन्त जानना, (क्योंकि सहस्रार स्वर्गसे ऊपर घातायुष्ककी उत्पत्ति नहीं होती) ऋतु पटलकी उत्कृष्टायु आधा सागर है, इसीसे (प्रथम और चरम पटलकी आयु रखकर) प्रत्येक पटलका हानि चय जानना चाहिये।।५३३।।

णिवसंति बह्मलोयस्संते लोयंतिया सुरा अट्ठ । ईसाणादिसु अट्ठसु वट्टेसु पइण्णएसु कमा ।।५३४।।

At the end of Brahmaloka, in the Aiśāna etc. eight directions, in the spherical scattered celestial planes eight Laukāntika deities reside. //5.534//

ब्रह्मलोकके अन्तमें ऐशानादि आठ दिशाओंमें गोलाकार प्रकीर्णक विमानोंमें क्रमशः आठ लौकान्तिक देव निवास करते हैं।।५३४।।

सारस्सद आइच्चा सत्तसया सगजुदा य वण्हरुणा । सगसगसहस्समुवरिं दुसु दुसु दोदुगसहस्सवड्ढिकमा ।।५३५।।

तो गद्दतोयतुसिदा अव्वावाहा अरिट्ठसण्णा य । सेढीबद्धे रिट्ठा विमाणणामं च तच्चेव ।।५३६।।

सारस्सदआइच्चप्पहुदीणं अंतरालए दोद्दो । जाणग्गिसूरचंदयसच्चाभा सेयखेमकरा ।।५३७।।

वसहिट्ठकामधरणिम्माणरजा दिगंत अप्पसव्वादी । रखिदमरुवसुअस्सविसापढमरुणसम पुव्वचयमुवरिं ।।५३८।।

ते हीणाहियरहिया विसयविरत्ता य देवरिसिणामा । अणुपिक्खदत्तचित्ता सेससुराणच्चणिज्जा हु ।।५३९।।

चोद्दसपुव्वधरा पडिवोहपरा तित्थयरविणिक्कमणे । ऐदेसिमट्ठजलहिट्ठिदी अरिट्ठस्स णव चेव ।।५४०।।

उवहिदलं पल्लद्धं भवणे विंतरदुगे कमेणहियं । सम्मे मिच्छे घादे पल्लासंखं तु सव्वत्थ ।।५४१।।

साहियपल्लं अवरं कप्पदुगित्थीण पणग पढमवरं । एक्कारसे चउक्के कप्पे दोसत्तपरिवड्ढी ।।५४२।।

दुसु दुसु चदु दुसु दुसु चउ तित्तिसु सेसेसु देहउस्सेहो । रयणीण सत्त छप्पणचत्तारि दलेण हीणकमा ।।५४३।।

पक्खं वाससहस्सं सगसगसायरसलाहि संगुणियं । उस्सासाहाराणं कमेण माणं विमाणेसु ।।५४४।।

When a fort night and a thousand year are multiplied by own sāgara measuring age logos, the measures of respiration and food, respectively, in own celestial planes are obtained. //5.544//

अपनी अपनी आयु प्रमाण सागर शलाकाओंसे संगुणित पक्ष एवं हजार वर्ष अपने अपने विमानोंमें क्रमसे उच्छ्वास और आहारका प्रमाण होता है।।५४४।।

णरतिरिय देसअयदा उक्कस्सेणच्चुदोत्ति णिग्गंथा । ण य अयद देसमिच्छा गेवेजजंतोत्ति गच्छंति ।।५४५।।

सव्वट्ठोत्ति सुदिट्ठी महव्वई भोगभूमिजा सम्मा । सोहम्मदुगं मिच्छा भवणतियं तावसा य वरं ।।५४६।।

चरया य परिव्वाजा बह्मोत्तरपदोत्ति आजीवा । अणुदिसअणुत्तरादो चुदा ण केसवपदं जांति ।।५४७।।

सोहम्मो वरदेवी सलोगवाला य दक्खिणमरिंदा । लोयंतिय सव्वट्ठा तदो चुदा णिव्वुदिं जांति ।।५४८।।

णरतिरियगदीहिंतो भवणतियादो य णिग्गया जीवा । ण लहंते ते पदविं तेवट्ठिसलागपुरिसाणं ।।५४९।।

सुहसयणग्गे देवा जायंते दिणयरोव्व पुव्वणगे । अंतोमुहुत्त पुण्णा सुगंधिसुहफाससुचिदेहा ।।५५०।।

आणंदतूरजयथुदिरवेण जम्मं विबुज्झ सं पत्तं । दट्ठूण सपरिवारं गयजम्मं ओहिणा णव्वा ।।५५१।।

धम्मं पसंसिदूण ण्हादूण दहे भिसेयलंकारं । लद्धा जिणाभिसेयं पूजं कुव्वंति सिद्दिट्ठी ।।५५२।।

सुरबोहियावि मिच्छा पच्छा जिणपूजणं पकुव्वंति । सुहसायरमज्झगया देवाण विदंति गयकालं ।।५५३।।

महपूजासु जिणाणं कल्लाणेसु य पजांति कप्पसुरा । अहमिंदा तत्थ ठिया णमंति मणिमउलिघडिदकरा ।।५५४।।

विविहतवरयणभूसा णाणसुची सीलवत्थसोम्मंगा । जे तेसिमेव वस्सा सुरलच्छी सिद्धिलच्छी य ।।५५५।।

तिहुवणमुड्ढारूढा ईसिपभारा धरट्ठमी रुंदा । दिग्घा इगिसगरज्जू अडजोयणपमिदबाहल्ला ।।५५६।।

तम्मज्झे रुप्पमयं छत्तायारं मणुस्समहिवासं । सिद्धक्खेतं मज्झडवेहं कमहीण बेहुलियं ।।५५७।।

उत्ताणट्ठियमंते पत्तं व तणु तदुवरि तणुवादे । अट्ठगुणड्ढा सिद्धा चिट्ठंति अणंतसुहतित्ता ।।५५८।।

एयं सत्थं सव्वं सत्थं वा सम्ममेत्थ जाणंता । तिव्वं तुस्संति णरा किण्ण समत्थत्थतच्चण्हा ।।५५९।।

चक्किकुरुफणिसुरेंदेसहमिंदे जं सुहं तिकालभवं । तत्तो अणंतगुणिदं सिद्धाणं खणसुहं होदि ।।५६०।।

६ नरतिर्यग्लोकाधिकारः

णमह णरलोयजिणधर चत्तारि सयाणि दोविहीणाणि । बावण्णं चउ चउरो णंदीसर कुंडले रुचगे ।।५६१।।

Adore the four hundred as reduced by two Jina temples of human universe and fifty-two, four and four Jina temples situated respectively, in Nandīśvara island, Kuṇḍalagiri and Rucakagiri relating to horizontal universe (tiryagloka). //6.561//

मनुष्य लोक सम्बन्धी दो कम चार सौ (३९८) जिन मन्दिरोंको तथा तिर्यग्लोक सम्बन्धी नन्दीश्वर द्वीप, कुण्डलगिरि और रुचकगिरिमें क्रमसे स्थित बावन, चार और चार जिन मन्दिरोंको नमस्कार करो।।५६१।।

मंदरकुलवक्खारिसुमणुसुत्तररुप्पजंबुसामलिसु । सीदी तीसं तु सयं चउ चउ सत्तरिसयं दुपणं ।।५६२।।

There are eighty, thirty, one hundred, four, four, one hundred seventy, five and five Jina temples in Sumeru, Kulācala, Vakṣāragiri, Iśvākāra, Mānuṣottara, Rūpyagiri (Vijayārdha), Jambū tree and Śālmalī trees. //6.562//

सुमेरु, कुलाचल, वक्षारगिरि, इष्वाकार, मानुषोत्तर, रूप्यगिरि (विजयार्ध) जम्बूवृक्ष और शाल्मलि वृक्षोंपर क्रमसे अस्सी, तीस, सौ, चार, चार, एक सौ सत्तर, पाँच और पाँच जिनमन्दिर हैं।।५६२।।

जंबूदीवे एक्को इसुकयपुव्ववरचावदीवदुगे । दो द्दो मन्दरसेला बहुमज्झगविजयबहुमज्झे ।।५६३।।

There is a Meru mountain in Jambū island. There are two Meru mountains each pair in two bow-shaped regions in the east west done by arrow shaped mountains in two islands. These Meru mountains are situated at the exact centre of Videhas situated in exact centre of those bow shaped regions. //6.563//

जम्बूद्वीपमें एक मेरुगिरि है। दो द्वीपोंमें इष्वाकार पर्वतोंके द्वारा किए हुए पूर्व पश्चिममें दो दो धनुषाकार क्षेत्रोंमें दो दो मेरुपर्वत हैं, इन मेरु पर्वतोंका अवस्थान उन धनुषाकार क्षेत्रोंके ठीक मध्यमें स्थित विदेहोंके ठीक मध्यमें है।।५६३।।

दक्खिणदिसासु भरहो हेमवदो हरिविदेहरम्मो य । हइरण्णवदेरावदवस्सा कुलपव्वयंतरिया ।।५६४।।

हिमवं महादिहिमवं णिसहो णीलो य रुम्मि सिहरी य । मूलोवरि समवासा मणिपासा जलणिहिं पुट्ठा ।।५६५।।

हेमज्जुणतवणीया कमसो वेलुरियरजदहेममया । इगिदुगचउचउदुगइगिसयतुंगा होंति हु कमेण ।।५६६।।

पउममहापउमा तिगिंछा केसरि महादिपुंडरिया । पुंडरिया य दहाओ उवरिं अणुपव्वदायामा ।।५६७।।

बासायामोगाढं पणदसदसमहदपव्वदुदयं खु । कमलस्सुदओ वासो दोविय गाहस्स दसभागो ।।५६८।।

When the heights of the mountains are multiplied by five, the diameters of the lakes are obtained. On multiplication by ten the lengths of the lakes are obtained, and on division by ten, the depths of the lakes are obtained. The diameters of the lotuses in the lakes, as well as the heights, both are the tenth part of the depths of the lakes. //6.568//

पर्वतोंके (अपने अपने) उदय (ऊँचाई) को पाँचसे गुणित करनेपर द्रहोंका व्यास, दससे गुणित करने पर द्रहोंका आयाम और दससे भाजित करनेपर द्रहोंकी गहराई प्राप्त होती है। द्रहोंमें रहने वाले कमलोंका व्यास एवं उदयये दोनों भी द्रहोंकी गहराईके दसवें भाग प्रमाण है।।५६८।।

णियगंधवासियदिसं वेलुरियविणिम्मिउच्चणालजुदं । एक्कारसहस्सदलं णववियसियमत्थि दहमज्झे ।।५६९।।

दहमज्झे अरविंदयणालं बादालकोसमुव्विद्धं । इगिकोसं बाहल्लं तस्स मुणालं ति रजदमयं ।।५७०।।

कमलदलजलविणिग्गयतुरियुदयं वास कण्णियं तत्थ । सिरिरयणगिहं दिग्घति कोसं तस्सद्धमुभयजोगदलं ।।५७१।।

सिरिहिरिधिदिकित्तीवि य बुद्धीलच्छी य पल्लठिदिगाओ । लक्खं चत्तसहस्सं सयदहपण पउमपरिवारा ।।५७२।।

आइच्चचंदजदुपहुदीओ तिप्परीसमग्गिजमणिरुदी । बत्तीसताल अडदाल सहस्सा कमलममरसमं ।।५७३।।

आणीयगेहकमला पच्छिमदिसि सग गयस्सरहवसहा । गंधव्वणच्चपत्ती पत्तेयं दुगुणसत्तकक्खजुदा ।।५७४।।

उत्तरदिसि कोणदुगे सामाणियकमल चदुसहस्समदो । अब्भंतरे दिसं पडि पुह तेत्तियमंगरक्खपासादं ।।५७५।।

अब्भंतरदिसि विदिसे पडिहारमहत्तरट्ठसयकमलं । मणिदलजलसमणालं परिवारं पउममाणद्धं ।।५७६।।

In both corners of the north direction [north east and north west] there are four thousand lotuses of Sāmānika deities. In the interior of these lotuses, in all the four directions, there are for each four thousand lotuses of the bodyguards. In the interior of the lotuses of those bodyguards, in the four directions and four extra-directions, there are one hundred eight lotuses of the greater porters. The whole family is composed of lotus gems. The measure of the diameters etc. of all these are each half of those of the basic lotus. The height of the stalk of the family lotuses is equal to that of the depth of water. //6.575-576//

उत्तर दिशाके दोनों कोनोंमें अर्थात् ऐशान और वायव्यमें सामानिक देवोंके चार हजार कमल हैं, इन कमलोंके भीतरी भागमें (मूल कमल की और) चारों दिशाओंमें चार चार हजार ही तनुरक्षकोंके कमल हैं। अर्थात् उन पार्थिव कमलोंपर भवन बने हुए हैं। उन अंग रक्षकोंके कमलोंके अभ्यन्तर भागमें (मूल कमल की ओर) चारों दिशाओं एवं चारों विदिशाओंमें प्रतीहार महत्तरोंके एक सौ आठ कमल है। ये सब परिवार कमल मणियोंसे रचित हैं। इन सबके व्यासादिका प्रमाण पद्म (मूल) कमलके प्रमाणसे अर्ध अर्ध है। परिवार कमलोंके नालकी ऊँचाई जल की गहराई के सदृश ही है।।५७५-५७६।।

सिरिगिहदलमिदरगिहं सोहम्मिंदस्स सिरिहिरिधिदीओ । कित्ती बुद्धी लच्छी ईसाणहिवस्स देवीओ ।।५७७।।

सरजा गंगासिंधू रोहि तहा रोहिदास णाम णदी । हरि हरिकंता सीदा सीदोदा णारि णरकंता ।।५७८।।

सरिदा सुवण्णरूप्पयकूला रत्ता तहेव रत्तोदा । पुव्वावरेण कमसो णाभिगिरिपदक्खणेण गया ।।५७६।।

पुण्णागणागपूगीकंकेल्लितमालकेलितंबूली । लवलीलवंगमल्लीपहुदी सयलणदिदुतडेसु ।।५८०।।

गंगादु रोहिदस्सा पउमे रत्तदु सुवण्णमंतदहे । सेसे दो द्दो जोयणदलमंतरिदूण णाभिगिरिं ।।५८१।।

वज्जमुहदो जणित्ता गंगा पंचसयमेत्थ पुव्वमुहं । गत्ता गंगाकूडं अविपत्ता जोयणद्धेण ।।५८२।।

दक्खिणमुहं बलित्ता जोयणतेवीससहियपंचसयं । साहियकोसद्धजुदं गत्ता जा विविहमणिरूवा ।।५८३।।

कोसदुगदीहबहला वसहायारा य जिब्भियारुंदा । छज्जोयणं सकोसं तिस्से गंतूण पडिदा सा ।।५८४।।

The Gaṅgā river originates from the source full of diamonds, moves towards east for five hundred yojanas, does not find Gaṅgā-peak and turns towards south before half yojana, moves forward for five hundred twenty-three yojanas in excess of half kośa, enters into a bull shaped channel full of various gems composition, two kośa long , two kośa thick, and six yojanas and one out of four parts of yojana and falls down. //6.582-584//

गंगा नदी वज्रमय मुखसे (उत्पन्न) निकलकर पाँच सौ योजन पूर्वकी ओर जाती हुई गंगाकूटको न पाकर अर्धयोजन पूर्वसे दक्षिणकी ओर मुड़कर साधिक अर्ध कोश अधिक पाँच सौ तेईस योजन आगे जाकर नाना प्रकारके मणियोंसे रचित, दो कोस लम्बी, दो कोस मोटी और सवा छह योजन चौड़ी वृषभाकार जिह्विका (नाली) में जाकर (हिमवान् पर्वत से) नीचे गिरती है।।५८२-५८४।।

केसरिमुहसुदिजिब्भादिट्ठी भूसीसपहुदिणो सरिसा । तेणिह पणालिया सा वसहायारेत्ति णिद्दिट्ठा ।।५८५।।

भरहे पणकदिमचलं मुच्चा कहलोवमा दहब्वासा । गिरिमूले दहगाहं कुंडं वित्थारसट्ठिजुदं ।।५८६।।

मज्झे दीओ जलदो जोयणदलमुग्गओ दुघणवासो । तम्मज्झे वज्जमओ गिरी दसुस्सेहओ तस्स ।।५८७।।

भूमज्झगो वासो चदुदुगि सिरिगेहमुवरि तव्वासो । चावाणं तिदुगेक्कं सहस्समुदओ दु दुसहस्सं ।।५८८।।

पणसयदलं तदंतो तद्दारं ताल वास दुगुणुदयं । सव्वत्थ धणू ऐयं दोण्णि कवाला य वज्जमया ।।५८६।।

सिरिगिहसीसट्ठियंबुजकण्णियसिंहासणं जडामउलं । जिणमभिसेत्तुमणा वा ओदिण्णा मत्थए गंगा ।।५६०।।

कुंडादो दक्खिणदो गत्ता खंडप्पवादणामगुहं । अडजोयणवित्थिण्णा विणिग्गया कुदवहिट्ठादो ।।५६१।।

दारगुहुच्छयवासा अड बारस पव्वदं व दीहत्तं । वज्जछवासकवाडदु वेयड्ढगुहा दुगुभयंते ।।५६२।।

उम्मग्गणिमग्गणदी गुहमज्झगकुंडजा दु पुव्ववरे । जोयणदुगदीहाओ पुसंति उभयंतदो गंगं ।।५६३।।

णियजलपवाहपडिदं दव्वं गुरुगंपि णेदि उवरि तटं । जम्हा तम्हा भण्णदि उम्मग्गा वाहिणी एसा ।।५६४।।

णियजलभरउवरि गदं दव्वं लहंगंपि णेदि हिट्ठम्मि । जेण्णं तेण्णं भण्णदि एसा सरिया णिमग्गंति ।।५६५।।

तत्तो दक्खिणभरहस्सद्धं गंतूण पुव्वदिसवदणा । मागहदारंतरदो लवणसमुद्दं पविट्ठा सा ।।५६६।।

गंगसमा सिंधुणदी अवरमुहा सिंधुकूडविणिवित्ता । तिमिसगुहादवरंबुहिमिया पभासक्खदारादो ।।५६७।।

सेसा रूप्पंता दहवित्थारूणचलरुंददलमुवरिं । गंतूण दक्खिणुत्तरमणुपुट्ठा पुव्ववरजलहिं ।।५६८।।

गंगादुगं व रत्तारत्तोदा जिब्भियादिया सव्वे । सेसाणं पि य णेया तेवि विदेहोत्ति दुगुणकमा ।।५६६।।

गंगदु रत्तदु वासा सपादछण्णिग्गमे विदेहोत्ति । दुगुणा दसगुणमंते गाहो वित्थार पण्णंसो ।।६००।।

णदिणिग्गमे पवेसे कुंडे अण्णत्थ चावि तोरणयं । विंबजुदं उवरिं तु दिक्कण्णावाससंजुत्तं ।।६०१।।

तत्तोरणवित्थारो सगसगणदिवाससरिसगो उदओ । वासादु दिवड्ढगुणो सव्वत्थ दलं हवे गाहो ।।६०२।।

विजयकुलद्दी दुगुणा उभयंतादो विदेहवस्सोत्ति । गुणपिंडदीवसगगुणगारो हु पमाणफलइच्छा ।।६०३।।

The Vijaya-region and mountain, both from the south direction upto Videha and from north direction upto Videha, are of twice width each. In order to find out the measure of their widths, the multiplier-set, island and own multiplier logos (śalākās) are respectively, measure (pramāṇa), fruit (phala) and requisition (icchā) sets. //6.603//

विजय क्षेत्र और कुलाचल ये, दोनों दक्षिण दिशासे विदेह पर्यन्त और उत्तर दिशासे भी विदेह पर्यन्त दूने दूने विस्तार वाले हैं। इनके विस्तारका प्रमाण प्राप्त करनेके लिए यहाँ गुणकार पिण्ड द्वीप और अपनी अपनी गुणकार शलाकाएँ ही क्रमशः प्रमाण, फल और इच्छा राशि स्वरूप है।।६०३।।

भरहस्स य विक्खंभो जंबूदीवस्स णउदिसदभागो । पंचसया छव्वीसा छच्च कला ऊणवीसस्स ।।६०४।।

The height of segment of Bharata region is five hundred twenty-six yojanas and six out of nineteen parts of a yojana, which is one hundred ninetieth part of diameter of the Jambū island. //6.604//

भरतक्षेत्रका विष्कम्भ ५२६ $\frac{६}{१९}$ योजन है, जो जम्बूद्वीपके विस्तारका एक सौ नब्बेवाँ भागमात्र है।।६०४।।

चुलसीदि छत्तेत्तीसा चत्तारि कला विदेहविक्खंभो । णदिहीणदलं विजया वक्खारविभंगवणदीहा ।।६०५।।

The width of or height of segment of Videha region is thirthy-three thousand six hundred eighty-four yojanas and four out of nineteen parts of a yojana. On subtracting the width of the rivers Sītā, Sītoda, and halving the remainder, the result gives the lengths of the Videha city [32], Vakṣāragiri [16], Vibhaṅga river [12], and Devārañya etc. forests. //6.605//

तेतीस हजार छह सौ चौरासी और एक योजनके उन्नीस भागोंमें से चार भाग (३३६८४ $\frac{४}{१९}$ योजन) प्रमाण विदेह क्षेत्रका विष्कम्भ (चौड़ाई) है। इसमेंसे सीता सीतोदा नदियोंका विष्कम्भ घटाकर अवशेषका आधा करने पर जो प्रमाण प्राप्त हो वही विदेह नगर (३२), वक्षारगिरि (१६), विभंगा नदी (१२) और देवारण्यादि वनोंकी लम्बाईका प्रमाण है।।६०५।।

मेरू विदेहमज्झे णवणउदिदहेक्कजोयणसहस्सा । उदयं भूमुहवासं उवरुवरिगवणचउक्कजुदो ।।६०६।।

At the central portion of the Videha region, Sudarśana Meru is situated, whose height, base diameter and top diameter are respectively, ninety-nine thousand, ten thousand and one thousand yojanas. //6.606//

विदेहक्षेत्रके मध्यप्रदेशमें सुदर्शन मेरु स्थित है। जिसका उदय, भू व्यास और मुख व्यास क्रमशः ९९०००, १०००० और १००० योजन है। यह मन्दर मेरु ऊपर ऊपर चार वनोंसे संयुक्त है।।६०६।।

भू भद्दसाल साणुग णंदणसोमणसपांडुकं च वणं । इगिपणघणबावत्तरिहदपंचसयाणि गंतूणं ।।६०७।।

The Bhadraśāla forest is on the basic earth of Meru, and on its ridge are the Nandana, Saumanasa, and Pāṇḍuka forests. Their positons are given by the products of five hundred with one, cube of five and seventy-two yojanas. //6.607//

मेरुकी मूल पृथ्वीपर भद्रसाल वन हैं, तथा इसके सानु प्रदेश अर्थात् कटनीपर नन्दनवन, सौमनसवन और पाण्डुकवन हैं। इनकी अवस्थिति एकसे गुणित पाँच सौ पाँचके घन (१२५) से गुणित पाँच सौ और बहत्तरसे गुणित पाँच सौ योजन प्रमाण आगे जाकर है।।६०७।।

मंदारचूदचंपयचंदणघणसारमोचचोचेहिं । तंबूलिपूगजादीपहुदीसुरतरुहि कयसोहं ।।६०८।।

पणसय पणसयसहियं पणवण्णसहस्सयं सहस्साणं । अट्ठावीसिदराणं सहस्सगाढं तु मेरूणं ।।६०६।।

There is Bhadrasala forest on the base of Meru on other four Meru mountains. Above it, there are forests respectively, on moving ahead for five hundred yojanas, fifty-five thousand five hundred and twenty-eight thousand yojanas. The sum of these intervals is the height of the Meru mountains. The foundation of the five Meru mountains is one thousand yojanas. //6.609//

अन्य चार मेरु पर्वतोंपर भी मेरुके मूल अर्थात् पृथ्वीपर भद्रशाल वन है, इसके ऊपर क्रमसे पाँच सौ योजन, पचपन हजार पाँच सौ और अट्ठाईस हजार योजन जा जाकर अन्य वनोंकी अवस्थिति है। इन्हीं अन्तरालोंके योगका प्रमाण मेरु पर्वतोंकी ऊँचाईका प्रमाण है। पाँचों मेरु पर्वतोंका गाध-नींवका प्रमाण एक हजार योजन है।।६०६।।

बावीसं च सहस्सा पणपणछक्कोणपणसयं वासं । पढमवणं वज्जित्ता सव्वणगाणं वणाणि सरिसाणि ।।६१०।।

एक्केक्कवणे पडिदिसमेक्केक्कजिणालया सुसोहंति । पडिमेरुमुपरि तेसिं वण्णणमणुवण्णइस्सामि ।।६११।।

पढमवणडसीदंसो दक्खिणउत्तरगभद्दसालवणं । बिसदं पण्णासहियं खुल्लयमंदरणगेवि तहा ।।६१२।।

वेदी वणुभयपासे इगिदलचरणुदयवित्थररोगाढो । हेमी सघंटघंटाजालसुतोरणग बहुदारा ।।६१३।।

इदि जोयण एगारहभागो जदि वड्ढदे पहायदि वा । तलणंदणसोमणसे किमिदि चयं हाणिमाणिज्जो ।।६१४।।

What will be the decrease or increase at the heights of the bottom Nandana forest, and Saumanas forest, when at a height of one yojana there is a reduction or increase of one out of eleven parts of a yojana. //6.614//

(जबकि) एक योजनकी ऊँचाई पर $\frac{१}{११}$ योजन घटता या बढ़ता है, तब तल भाग नन्दन वन और सौमनस वनकी ऊँचाईपर कितनी हानि अथवा वृद्धि होगी? इस प्रकार त्रैराशिक द्वारा हानि वृद्धि प्राप्त करना चाहिये।।६१४।।

सगसगहाणिविहीणे भूवासे चयजुदे मुहव्वासे । गिरिवणबहिरब्भंतरतलवित्थारप्पमा होदि ।।६१५।।

When the measure of decrease is subtracted from own base-diameter of Meru, and when the common-difference increase is added to the top-diameter each, the measure of the bottom diameter as well as the external internal diameters of the forests are obtained. //6.615//

मेरुके अपने अपने भूव्यासमें से हानिका प्रमाण घटा देनेपर तथा अपने अपने मुखव्यासमें चय (वृद्धि) का प्रमाण जोड़ देनेपर मेरु पर्वतके तल विस्तारका प्रमाण एवं वनोंके बाह्य अभ्यन्तर विस्तारका प्रमाण प्राप्त होता है।।६१५।।

एयारंसोसरणे एगुदओ दससएसु किं लद्धं । णंदणसोमणसुवरिं सुदंसणे सरिसरुंदुदओ ।।६१६।।

When one out of eleven parts of a yojana decreases corresponds to a height of one yojana, then what height would correspond to the decrease of one thousand yojanas ? By the rule of trio-set, the height of eleven thousand yojanas is obtained. This is the measure of height of Samarundra of Nandana and Saumanasa forests of the Sudarśana Meru. //6.616//

जबकि $\frac{१}{११}$ योजन हानिपर एक योजनकी ऊँचाई प्राप्त होती है, तब १००० योजन हानिपर कितनी ऊँचाई प्राप्त होगी? इस प्रकार त्रैराशिक करनेपर $\left(\frac{१ \times १०००}{१}\right)$ = ११००० योजन ऊँचाईका प्रमाण प्राप्त हुआ। यही सुदर्शन मेरुके ऊपर नन्दन और सौमनस वनोंके समरुन्द्रकी ऊँचाईका प्रमाण है।।६१६।।

भूमीदो दसभागो हायदि खुल्लेसु णंदणादुवरि । सयवग्गं समरुंदो सोमणसुवरिंपि एमेव ।।६१७।।

For a reduction of one tenth of a yojana from the base, the height of one yojana is obtained, then what height would be obtained for a reduction of one thousand yojanas ? Following such trio-set rule, the height of the samarundra width above the Nandana forest of Meru mountains of four small types is obtained as one hundred squared or ten thousand yojanas. This is also the measure of height of Samarundra diameter above the Saumanasa forest. //6.617//

भूमिसे $\frac{१}{१०}$ योजनकी हानिपर १ योजनकी ऊँचाई प्राप्त होती है, तब १००० योजनकी हानिपर कितनी ऊँचाई प्राप्त होगी? इस प्रकार त्रैराशिक करनेपर शतवर्ग अर्थात् १०००० योजन चारों क्षुल्लक मेरु पर्वतोंकी नन्दन वनसे ऊपर समरुन्द्र व्यासकी ऊँचाईका प्रमाण होता है। सौमनस वनके ऊपर भी समरुन्द्र व्यासकी ऊँचाईका प्रमाण इतना ही है।।६१७।।

णाणारयणविचित्तो इगिसट्ठिसहस्सगेसु पढमादो । तत्तो उवरिं मेरू सुवण्णवण्णिदो होदि ।।६१८।।

माणीचारणगंधव्वचित्तणामाणि वट्टभवणाणि । णंदणचउदिसमुदओ पण्णासं तीस वित्थारो ।।६१९।।

सोमणसदुगे वज्जं वज्जादिप्पह सुवण्ण तप्पहयं । लोहिदअंजणहारिद्दपांडुरा दलिददलमाणा ।।६२०।।

तब्भवणवदी सोमो यमवरुणकुवेरलोयवालक्खा । पुव्वादी तेसिं पुह गिरिकण्णा साद्धकोडितियं ।।६२१।।

सोमदु वरुणदुगाऊ सदलदु पल्लत्तयं च देसूणं । ते रत्तकिण्हकंचणसिदणेवत्थंकिया कमसो ।।६२२।।

ते य सयंपहरिट्ठजलप्पहवग्गुप्पहा विमाणीसा । कप्पे सु लोयवाला पहुणो बहुसयविमाणाणं ।।६२३।।

बलभद्दणामकूडे णंदणगे मेरुपव्वदीसाणे । उदयमहियसयदलगो तण्णामो वेंतरो वसई ।।६२४।।

णंदण मंदर णिसहा हिमवं रजदो य रुजयसायरया । वज्जो कूडा कमसो णंदणवसईण पासदुगे ।।६२५।।

हेममया तुंगधरा पंचसयं तद्दलं मुहस्स पमा । सिहिरगिहे दिक्कण्णा वसंति तासिं च णाममिणं ।।६२६।।

मेहंकरमेहवदी सुमेहमहादिमालिणी तत्तो । तोयंधरा विचित्ता पुप्फादिममालिणिंदिदया ।।६२७।।

अग्गिदिसादोचउचउउप्पलगुम्मायणलिणिउप्पलिया । वावीओ उप्पलुज्जल भिंगा छट्ठी दु भिंगणिभा ।।६२८।।

कज्जल कज्जलपह सिरिभूदा सिरिकंदसिरिजुदा महिदा । सिरिणिलयणलिणि णलिणादिमगुम्मिय कुमुदकुमुदपहा ।।६२९।।

मणितोरणरयणुब्भवसोवाणा हंसमोरजंतजुदा । पण्णदलदीहवासो दसगाहो सोलवावीओ ।।६३०।।

दक्खिणउत्तरवावीमज्झे सोहम्मजुगलपासादा । पणघणदलचरणुच्छयवासा दलगाढचउरस्सा ।।६३१।।

सोचिदठाणासिदपरिवारेणिंदो ठिदो सपासादे । सव्वमिणं कहियव्वं सोमणसवणेवि सविसेसं ।।६३२।।

पांडुकपांडुकंबलरत्ता तह रत्तकंबलक्ख सिला । ईसाणादो कंचणरुप्पयतवणीयरुहिरणिहा ।।६३३।।

भरहवरविदेहेराबदपुव्वविदेहजिणणिबद्धाओ । पुव्ववरदक्खिणुत्तरदीहा अथिरथिरभूमिमुहा ।।६३४।।

अद्धिंदुणिहा सव्वे सयपण्णासट्ठदीहवासुदया । आसणतियं तदुवरिं जिणसोहम्मदुगपडिबद्धं ।।६३५।।

All these rocks are of the shape of half moon. Their length is one hundred yojanas, the mid-breadth is fifty yojanas and the thickness is eight yojanas. Above these rocks are three thrones corresponding to the ford-founder, Saudharmendra and Īśānendra. //6.635//

वे सब शिलाएँ अर्धचन्द्राकार सदृश हैं। उनकी लम्बाई सौ योजन, बीचकी चौड़ाई पचास योजन और मोटाई ८ योजन प्रमाण है। उन शिलाओंके ऊपर तीर्थंकर, सौधर्मेन्द्र और ईशानेन्द्र सम्बन्धी तीन सिंहासन हैं।। ६३५।।

मज्झे सिंहासणयं जिणस्स दक्खिणगयं तु सोहम्मे । उत्तरमीसाणिंदे भद्दासणमिह तयं वट्टं ।।६३६।।

Out of those thrones the central throne corresponds to the Lord Jina, the southern one is the auspicious seat (posture) of Saudharmendra and the northern one is that of Īśānendra. These three thrones are circular. //6.636//

उन तीनों सिंहासनोंमें बीचका सिंहासन जिनेन्द्रदेव सम्बन्धी है, दक्षिणगत सौधर्मेन्द्रका भद्रासन और उत्तरगत ईशानेन्द्रका भद्रासन है ये तीनों आसन गोलाकार हैं।।६३६।।

उदयं भूमुहवासं धणु पणपणसयतदद्धपुव्वमुहा । वेलुरिय चूलियस्स य जोयण चत्तं तु बारचउ ।।६३७।।

The height, the base-diameter, and top-diameters of those thrones are respectively, five hundred, five hundred and half of five hundred dhanuṣa. The faces of these thrones are towards the east. [The central Meru of Pāṅḍuka forest] has lapis-lazuli peak whose height, base-diameter and top-diameter are, respectively, forty yojanas, twelve yojanas, and four yojanas. //6.637//

उन आसनोंका उदय, भू व्यास और मुख व्यास क्रमसे पाँच सौ, पाँच सौ और पाँच सौ के अर्ध (२५०) धनुष प्रमाण है। उन आसनोंका मुख पूर्व दिशाकी ओर है। (पाण्डुक वनके मध्य मेरुकी) वैडूर्यमयी चूलिका है जिसका उदय भूव्यास और मुख व्यास क्रमसे चालीस योजन बारह योजन और चार योजन प्रमाण है।।६३७।।

पव्वदवावीकूडा सव्वाओ पंडुगादिय सिलाओ । वणवेदितोरणेहिं णाणामणिणिम्मिएहिं जुदा ।।६३८।।

णीलसमीवे सीदापुव्वतडे मंदराचलीसाणे । उत्तरकुरुम्हि जंबूथली सपंचसयतलवासा ।।६३९।।

अंते दलबाहल्ला मज्झे अट्ठुदय वट्ट हेममया । मज्झे थलिस्स पीठीमुदयतियं अट्ठबारचऊ ।।६४०।।

तत्थलिउवरिमभागे बाहिं बाहिं पवेढिऊण ठिया । कंचणवलयसमाणा बारंबुजवेदिया णेया ।।६४१।।

चउगोउरवं वेदीबाहिरदो पढमबिदियगे सुण्णं । तदिए सुरुत्तमाणं अट्ठदिसे अट्ठसयरुक्खा ।।६४२।।

तुरिए पुव्वदिसाए देवीणं चारि पंचमे दु वणं । वावी वट्टचउरस्सादी छट्ठे हवे गयणं ।।६४३।।

चउदिससोलसहस्सं तणुरक्खे सत्तमम्हि अट्ठमगे । ईसाणुत्तरवादे चदुस्सहस्सं समाणाणं ।।६४४।।

णवमतिए जलणजमे णेरिदि अब्भंतरत्तिपरिसाणं । बत्तीस ताल अडदालसहस्सा पायवा कमसो ।।६४५।।

सेणामहत्तराणं बारसमे पच्छिमम्हि सत्तेव । मुक्खजुदा परिवारा पउमादो पंचयज्झहिया ।।६४६।।

दलगाढवासमरगय जोयणदुगतुंग सुत्थिरक्खंधो । पीठिय उवरिं जंबू वज्जदलडवासदीह चउसाहा ।।६४७।।

णाणारयणुवसाहा पवालसुमणा मुदिंगसरिसफला । पुढविमया दसतुंगा मज्झेग्गे छच्चदुव्वासा ।।६४८।।

उत्तरकुलगिरिसाहे जिणगेहो सेससाहतिदयम्हि । आदरअणादराणां जक्खकुलुत्थाणमावासा ।।६४९।।

जंबूतरुदलमाणा जंबूरुक्खस्स कहिदपरिवारा । आदरअणादराणं परिवारावासभूदा ते ।।६५०।।

सीतोदावरतीरे णिसहसमीवे सुरद्दिणेरिदिए । देवकुरुम्हि मणोहररुप्पथले सामली सपरिवारो ।।६५१।।
जंबुसमवण्णणो सो दक्खिणसाहम्हि जिणगिहं सेसे । दिससाहतिए गरुडवइवेणूवेणादिधारिगिहं ।।६५२।।
कुरुओ हरिरम्मगभू हेमवदेरण्णवदखिदी कमसो । भोगधरा वरमज्झिमवराय कम्मावणी सेसा ।।६५३।।
णीलणिसहादु गत्ता सहस्समुभए तडे वरणईणं । दुगदुगसेला पुव्वो चित्तो अवरो विचित्तक्खो ।।६५४।।
जमगो मेघो वट्टा पंचसयंतरठिया तदुदयधरा । वदणं सहस्समद्धं गिरिणामसुरा वसंति गिरिकूडे ।।६५५।।
गमिय तदो पंचसयं पंचसरा पंचसयमिदंतरिया । कुभद्दसालमज्झे अणुणदिदीहा हु पउमदहसरिसा ।।६५६।।
णीलुत्तरकुरुचंदा एरावदमल्लवंतणिसहा य । देवकुरुसूरसुलसाविज्जू सीदुदुगदहणामा ।।६५७।।
णइणिग्गम्मदारजुदा ते तप्परिवारवण्णणं चेसिं । पउमव्व कमलगेहे णागकुमारीउ णिवसंति ।।६५८।।
दुतडे पण पण कंचणसेला सयसयतदद्धमुदयतियं । ते दहमुहा णगक्खा सुरा वसंतीह सुगवण्णा ।।६५९।।
दहदो गंतूणग्गे सहस्सदुगणउदिदोणि बे च कला । णदिदारजुदा वेदी दक्खिणउत्तरगभद्दसालस्स ।।६६०।।
कुरुभद्दसालमज्झे महाणदीणं च दोसु पासेसु । दो द्दो दिसागइंदा सयतत्तियतद्दलुदयतिया ।।६६१।।
तण्णामा पुव्वादी पउमुत्तरणीलसोत्थियंजणया । कुमुदपलासवतंसयरोचणमिह दिग्गजिंदसुरा ।।६६२।।
मल्लव महसोमणसो विज्जुप्पह गंधमादणिभदंता । ईसाणादो वेलुरियरुप्पतवणीयहेममया ।।६६३।।
णीलणिसहे सुरद्दिं पुट्ठा मल्लवगुहादु सीता सा । विज्जुप्पहगिरिगुहदो सीतोदाणिस्सरित्तु गया ।।६६४।।
उभयंतगवणवेदिय मज्झगवेभंगणदितियाणं च । मज्झगवक्खारचऊ पुव्ववरबिदेहविजयद्धा ।।६६५।।
तण्णामा सीदुत्ततीरादो पढमदो पदक्खिणदो । चेत्तादिकूडपउमादिमकूडा णलिण एगसेलगगो ।।६६६।।
गाहदहपंकवदिणदी तिकूडवेसवणअंजणप्पादि । अंजणगो तत्तजला मत्तजलुम्मत्तजल सिंधू ।।६६७।।
सद्दावं विजडावं आसीविस सुहवहा य बक्खारा । खारोदा सीतोदा सोदोवाहिणि णदी मज्झे ।।६६८।।
तो चंदसूरणागादिममाला देवमाल वक्खारा । गंभीरमालिणी फेणमालिणी उम्मिमालिणी सरिदा ।।६६९।।
हेममया वक्खारा वेभंगा रोहिसरिसवण्णणगा । तासिं पवेसतोरणगेहे णिवसंति दिक्कण्णा ।।६७०।।
वीसदिवक्खाराणं सिहरे तत्तद्विसेसणामसुरा । चिट्ठंति तण्णगाणं पुह कंचणवेदियावणेहिं जुदा ।।६७१।।
पव्ववरविदेहंते सीतदु दुतडेसु देवरण्णाणि । चारि लवणुवहिपासे तव्वेदी भद्दसालसमा ।।६७२।।
जंबीरजंबुकेलीकंकेल्लीमल्लिवल्लिपहुदीहिं । बहुदेवसरोवावीपासादगिहेहिं जुत्ताणि ।।६७३।।
देसे पुह पुह गामा छण्णउदीकोडि णयरखेडा य । खव्वड मडंव पट्टण दोणा संवाह दुग्गडवी ।।६७४।।
छव्वीसमदो सोलं चउवीसचउक्कमव अडदालं । णवणउदीचोद्दस अडवीसं कमसो सहस्सगुणा ।।६७५।।
वइ चउगोउरसालं णदिगिरिणगवेढि सपणसयगामं । रयणपदसिंधुवेलावलइय णगुवरिट्ठियं कमसो ।।६७६।।
छप्पण्णंतरदीवा छब्बीससहस्स रयणआयरया । रयणाण कुक्खिवासा सत्तसयं उवसमुद्दम्हि ।।६७७।।
सीतासीतोदाणदितीरसमीवे जलम्हि दीवतियं । पुव्वादी मागहवरतणुप्पभासामराण हवे ।।६७८।।
वरसंति कालमेहा सत्तविहा सत्त सत्त दिवसवही । वरिसाकाले धवला बारस दोणाभिहाणब्भा ।।६७९।।
देसा दुब्भिक्खीदीमारिकुदेववण्णलिंगिमदहीणा । भरिदा सदावि केवलिसलागपुरिसिद्धिसाहूहिं ।।६८०।।

तित्थद्धसलयचक्की सट्ठिसयं पुह वरेण अवरेण । वीसं वीसं सयले खेत्ते सत्तरिसयं वरदो ।।६८१।।

चुलसीदिलक्ख भद्दिभ रहा हया बिगुणणवयकोडीओ । णवणिहि चोद्दसरयणं चक्कित्थीओसहस्सछण्णउदी ।।६८२।।

For the welfare of the Cakravartī there are eighty-four lac elephants, eighty-four lac chariots, two times nine crore horses, nine treasures, fourteen gems, and ninety-six thousand wives. //6.682//

चक्रवर्तीके कल्याणरूप चौरासी लाख हाथी, चौरासी लाख रथ, द्विगुण नवकोटि अर्थात् १८ करोड़ घोड़े, नवनिधियाँ, चौदह रत्न और ९६ हजार स्त्रियाँ होती हैं।।६८२।।

अण्णे सगदविठिया सेणागणवणिजदंडवइमंती । महयरतलयरवण्णा चउरंगपुरोहमच्चमहमच्चा ।।६८३।।

इदि अट्ठारससेढीणहिओ राजो हवेज्ज मउडधरो । पंचसयरायसामी अहिराजा तो महाराजो ।।६८४।।

तह अद्धमंडलीओ मंडलिओ तो महादिमंडलिओ । तियछक्खंडाणहिवा पहुणो राजाण दुगुणदुगुणाणं ।।६८५।।

Other kings are situated on their own ranks. The king was called as the master of eighteen classes of the commander, accountant-chief, merchant-chief, penal-chief, minister, the glorious, police officer, four castes, four divisions of army, priest, councillor and prime minister. They are with crown. Similarly, the master of five hundred kings is called a supreme king (mahārāja), and the Ardhamaṇḍalīka, Maṇḍalīka, Mahāmaṇḍalīka, Trikhaṇḍādhipa (Ardha Cakrī) and Saṭkhaṇḍādhipa (Cakaravartī) are served by twice as many kings successively.// 6.683-685//

अन्य राजा अपनी अपनी पदवीपर स्थित हैं। वहाँ सेनापति, गणकपति, वणिकूपति, दण्डपति, मन्त्री, महत्तर, तलवर (कोतवाल), चार वर्ण, चतुरंग सेना, पुरोहित, अमात्य और महामात्य इन अठारह श्रेणियोंके स्वामीको राजा कहते हैं। यही मुकुटधारी होते हैं। ऐसे ही पाँच सौ राजाओंके स्वामीको अधिराजा और हजार राजाओंके स्वामीको महाराजा कहते हैं, तथा अर्धमण्डलीक, मण्डलीक, महामण्डलीक, त्रिखण्डाधिप (अर्धचक्री) और षट्खण्डाधिप (चक्रवर्ती) ये सभी दूने दूने राजाओंसे सेवित होते हैं।।६८३-६८५।।

सयलभुवणेक्कणाहो तित्थयरो कोमुदीव कुंदं वा । धवलेहिं चामरेहिं चउसट्ठिहि विज्जमाणो सो ।।६८६।।

One who is an unparalleled lord (nātha) of the whole universe, and fanned by sixty-four flappers which are like the moon-light and flower of Jessmine is the ford-founder (Tīrthaṅkara). // 6.686//

जो सकललोकका एक अद्वितीय नाथ है तथा चाँदनी एवं कुन्दके पुष्प सदृश चौसठ चमरोंसे जो वीज्यमान है, वह तीर्थंकर है।।६८६।।

कच्छा सुकच्छा महाकच्छा चउत्थी कच्छकावदी । आवत्ता लांगलावत्ता पोक्खला पोक्खलावदी ।।६८७।।

वच्छा सुवच्छा महावच्छा चउत्थी वच्छकावदी । रम्मा सुरम्मगा चेव रमणेज्जा मंगलावदी ।।६८८।।

पम्मा सुपम्मा महापम्मा चउत्थी पम्मकावदी । संखा च णलिणी चेव कुमुदा सरिदा तहा ।।६८९।।

वप्पा सुवप्पा महावप्पा चउत्थी वप्पकावदी । गंधा खलु सुगंधा च गंधिला गंधमालिणी ।।६९०।।

विजयं पडिवेयड्ढो गंगासिंधुसमदोण्णिदोण्णि णई । तेहिं कया छक्खंडा विदेह बत्तीस विजयाणं ।।६९१।।

ते पुव्वावरदीहा जणवयमज्झे गुहादु पुव्वं वा । गंगादु णीलमूलगकुंडा रत्तदुग णिसहणिस्सरिदा ।।६९२।।

दसदसपणोत्ति पण्णं तीसं दसयं च रूप्पगिरिवासा । खयराभिजोग सेढी सिहरे सिद्धादिकूलं तु ।।६९३।।

सोहम्मआभिजोग्गगमणिचित्तपुराणि बिदियसेढिम्हि । वेयड्ढकुमारवई सिहरतले पुण्णभद्दक्खे ।।६६४।।

पणवण्णं पणवण्णं विदेहवेयड्ढपढमभूमिम्हि । णयराणि पण्ण सट्ठी जंबूउभयंतवेयड्ढे ।।६६५।।

सेलायामे दक्खिणसेढीए पण्णमुत्तरे सट्ठी । तण्णामा पुव्वादी किंणामिद किंणरगीदं ।।६६६।।

णरगीदं बहुकेदू पुंडरियं सीहसेदगरुडधजं । सिरिपहधरलोहग्गलमरिंजयं वज्जअग्गलड्ढपुरं ।।६६७।।

होइ विमोइ पुरंजय सयडचदुव्वहुमुही य अरजक्खा । विरजक्खा रहणूपुर मेहलअग्गपुर खेमचरी ।।६६८।।

अवराजिद कामादीपुप्फं गगणत्तरि विणयचरि सुक्कं । तो संजयंतिणगरं जयंति विजया वइजयंती य ।।६६९।।

खेमंकर चंदाहं सूराहं चित्तकूड महकूडं । हेमतिमेहविचित्तयकूडं वेसवणकूडमदो ।।७००।।

सूरपुर चंदपुरणिच्चुज्जोदिणि विमुहिणीच्चवाहिणियो । सुमुही चरिमा पच्छिमभागादो अज्जुणी अरुणी ।।७०१।।

केलास वारुणीपुरि विज्जुप्पह किलिकिलं च चूडादि । मणि ससिपह बंसालं पुप्फादी चूलमिह दसमं ।।७०२।।

तत्तोवि हंसगब्भं बलाहगं तेरसं सिवंकरयं । सिरिसोध चमरसिवमंदिर वसुमक्का वसुमदी य ।।७०३।।

सिद्धत्थं सत्तुंजय धयमालसुरिंदकंत गयणादि । णंदणमवि वीदादिमसोगो अलगा तदो तिलगा ।।७०४।।

अंबरतिलगं मंदर कुमुदं कुंदं च गयणवल्लभयं । तो दिव्वतिलय भूमीतिलयं गंधव्वणयरमदो ।।७०५।।

मुत्ताहारं णेमिसमग्गिमहज्जालसिरिणिकेदवुरं । जयवह सिरिवासं मणिवज्जं भद्दस्सपुरं धणंजययं ।।७०६।।

गोखीरफेणमक्खोभं गिरिसिहरं च धरणि धारिणियं । दुग्गं दुद्धरणयरं सुदंसणं तो महिंदविजयपुरं ।।७०७।।

णगरी सुगंधिणी वज्जद्धतरं रयणपुव्वआयरयं । रयणपुरं चरिमंते रयणमया राजधाणीओ ।।७०८।।

पायारगोउरट्टलचरियासरवण विराजिया तत्थ । विज्जाहरा तिविज्जा वसंति छक्कम्मसंजुत्ता ।।७०९।।

सत्तरिसयवसहगिरी मज्झगयमिलेच्छखंडबहुमज्झे । कणयमणिकंचणुदयति भरिया गयचक्किणामेहिं ।।७१०।।

सत्तरिसयणयराणि य उवजलधिगअज्जखंडमज्झम्हि । चक्कीण णवय बारस वासायामेण होंति कमे ।।७११।।

खेमा खेमपुरी चेवरिट्ठारिट्ठपुरी तहा । खग्गा य मंजुसा चेव ओसही पुंडरीकिणी ।।७१२।।

सुसीमा कुंडला चेव पराजिद पहंकरा । अंका पउमावदी चेव सुभा रयणसंचया ।।७१३।।

अस्सपुरी सींहपुरी महापुरी तह य होदि विजयपुरी । अरया विरया चेव असोगया वीदसोगा य ।।७१४।।

विजया च वइजयंती जयंत अवराजिदा य बोद्धव्वा । चक्कपुरी खग्गपुरी होदि अयोज्झा अबज्झा य ।।७१५।।

रयणक्वाडवरावर सहस्सदलदार हेमपायारा । बारसहस्सा वीही तत्थ चउप्पह सहस्सेक्कं ।।७१६।।

णयराण बहिं परिदो वणाणि तिसदं ससट्ठि पुरमज्झे । जिणभवणा णरवइजणगेहा सोहंति रयणमया ।।७१७।।

थिरभोगावणिमज्झे णाभिगिरीओ हवंति वीसाणि । वट्टा सहस्सतुंगा मूलुवरिं तत्तिया रुंदा ।।७१८।।

सड्ढावं विजडावं पउमगंधवण्णाम सुक्किला सिहरे । सक्कदुगणुचर सादीचारणपउमप्पहास वाणसुरा ।।७१९।।

एक्कारसट्ठणवणव अट्ठेक्कारस हिमादिकूलाणि । वेयड्ढाणं णवणव पुव्वगकूलम्हि जिणभवणं ।।७२०।।

कमसो सिद्धायदणं हिमवं भरहं इला य गंगा य । सिरिकूडरोहिदस्सा सिंधु सुरा हेमवदय वेसवणं ।।७२१।।

पढमे जिणिंदगेहं देवीओ जुवदिणामकूडेसु । सेसेसु कूडणामा वेंतरदेवावि णिवसंति ।।७२२।।

वट्टा सव्वे कूडा रयणमया सगणगस्स तुरियुदया । तत्तियभूवित्थारा तदद्धवदणा हु सव्वत्थ ।।७२३।।

तो सिद्ध महाहिमवं हेमवदं रोहिदा हिरीकूडं । हरिकंता हरिवरिसं वेलुरियं पच्छिमं कूडं ।।७२४।।
सिद्धं णिसहं च हरिवरिसं पुव्वविदेह हरिधिदीकूडं । सीतोदा णाममदो अवरविदेहं च रुजगंतं ।।७२५।।
सिद्धं णीलं पुव्वविदेहं सीदा य कित्ति णरकंता । अवरविदेहं रम्मगमपदंसणमंतिमं णीले ।।७२६।।
सिद्धं रुम्मी रम्मग णारी बुद्धी य रुप्पकूलक्खा । हेरण्णं कूडमदो मणिकंचणमट्ठमं होदि ।।७२७।।
सिद्धं सिहरि य हेरण्णं रसदेवी तदो य रत्तक्खा । लच्छी सुवण्ण रत्तवदी गंधवदीय कूडमदो ।।७२८।।
एरावदमणिकंचणकूडं सिहरिम्हि सव्वसेलाणं । मूले सिहरेवि हवे दहेवि वणसंडमेदस्स ।।७२९।।
गिरिदीहो जोयणदलवासो वेदी दुकोसतुंगजुदा । धणुपणसयवासा णगवणणदिदहपहुदिएसु समा ।।७३०।।
तिसदेक्कारससेले णउदीकुडे दहाण छब्बीसे । तावदिया मणिवेदी णदीसु सगमाणदो दुगुणा ।।७३१।।

In the Jambū island there are three hundred eleven mountains, ninety wells and twenty-six lakes. These have the same numbers of altars, and whatever is the number of rivers, as many twice the number is that of the altars full of gems. //6.731//

जम्बूद्वीपमें तीन सौ ग्यारह पर्वत, ९० कुण्ड और छब्बीस ह्रद हैं। इनकी इतनी इतनी ही मणिमय वेदियाँ हैं तथा नदियोंका जितना प्रमाण है, मणिमय वेदियाँ उससे दूने प्रमाण वाली हैं। (क्योंकि नदियोंके दोनों पार्श्व भागोंमें वेदियाँ होती है)।।७३१।।

सिद्धं दक्खिणअद्धादिमभरहं खंडयप्पवादमदो । तो पुण्णभद्द वेयड्ढकुमारं माणिभद्दक्खं ।।७३२।।
तामिस्सगुहगमुत्तरभारहकूडं च वेसवण चरिमं । सिद्धुत्तरद्धतामिस्सादिमगुहगं च माणिभद्दमदो ।।७३३।।
तो वेयड्ढकुमारं पुण्णादीभद्द खंडयपवादं । दक्खिणरेवतअद्धं वेसवणं पुव्वदो दुवेयड्ढे ।।७३४।।
कंचणमयाणि खंडप्पवादए णट्टमाल तामिस्से । कदमालो छक्कूडे वसंति सगणामवाणसुरा ।।७३५।।
कोसायामं तद्दलवित्थारं तुरियहीणकोसुदयं । जिणगेहं कुडुवरिं पुव्वमुहं संठियं रम्मं ।।७३६।।
णवसत्तय णवसत्तय ईसाणदिसा दुदंतसेलाणं । वक्खाराणं चउचउकूडं तण्णाममणुकमसो ।।७३७।।
सिद्धं मल्लवमुत्तरकउरव कच्छं च सागरं रजदं । पुण्णादिभद्द सीदा हरिसहकूडं हवे णवमे ।।७३८।।
तो सिद्धं सोमणसं कूडं देवकुरु मंगलं विमलं । कंचण वसिट्ठमंते सिद्धं विज्जुप्पहं तत्तो ।।७३९।।
देवकुरु पउम तवणं सोत्थियकूडं सदज्जलं तत्तो । सीतोदा हरि चरिमं तो सिद्धं गंधमादणयं ।।७४०।।
उत्तरकुरु गंधादीमालिणि तो लोहिदक्खफलिहंते । आणंदं सायरदुग तिया सुभोगा य भोगमालिणिया ।।७४१।।
विमलदुगे वच्छादीमित्त सुमित्ता य वारिसेण बला । तवणदुगे भोगंकर भोगवदी फलिहलोहिदे देवी ।।७४२।।
सिद्धं वक्खारक्खं हेट्ठुवरिमदेसणामकूडदुगं । दुगणव पण सोलं दुगकला य वक्खारदीहत्तं ।।७४३।।
कुलगिरिसमीवकूडे दिक्कण्णाओ वसंति सेसेसु । वाणा कूडपमाहिद णगदीहो कूडअंतरयं ।।७४४।।

On the neighbouring peaks of the family-mountains (Kulācalas) the directional-virgins reside and on the remaining peaks the Vyantara deities reside. The interval between one peak from another is obtained on dividing own mountain's length by their measure of peaks as are in those mountains. // 6.744//

कुलाचलोंके समीपवर्ती कूटोंपर दिक्कुमारियाँ और शेष कूटोंपर व्यन्तर देव निवास करते हैं। जिन पर्वतोंपर जितने कूट हैं, उन कूटोंके प्रमाणसे अपने अपने पर्वतोंकी लम्बाईके प्रमाणको भाजित करनेपर एक कूटसे दूसरे कूटका अन्तर प्राप्त होता है।।७४४।।

वक्खारसयाणुदओ कुलगिरिपासम्हि चउसयं णुड्ढा । णइमेरुस्स य पासे पंचसया तत्थ जिणगेहा ।।७४५।।

The total number of Vakṣāra mountains is one hundred. Their height in the lateral parts of the family-mountains is four hundred yojanas. Ahead of this, increasing gradually with sequential increase, near the Sītā, Sītodā, and in the lateral portions of the Meru, they are five-hundred yojanas high and there are Jina temples on them. //6.745//

(पंचमेरु सम्बन्धी गजदन्त सहित) वक्षार पर्वतोंका कुल प्रमाण १०० है। कुलाचलोंके पार्श्व भागोंमें उनकी ऊँचाई ४०० योजन है। इसके आगे क्रमिक वृद्धिसे युक्त होते हुए सीता सीतोदाके निकट और मेरुके पार्श्व भागोंमें ५०० योजन ऊँचे हैं और उनपर जिन मन्दिर हैं।।७४५।।

गिरितुरियं पढमंतिमकूडुदओ उभयसेसमवहरिदं । वेगपदेण चयो सो इट्ठगुणो मुहजुदो इट्ठं ।।७४६।।

The height of the first and the last peaks is one fourth part of those of the Vakṣāra mountains. The measure of decreasing common-difference is obtained on dividing the difference between the height of the last peak and that of the first peak by number of terms as reduced by unity. On adding the measure of the top in the product of this decreasing common-difference and the chosen peak, the height of the chosen peak is obtained. //6.746//

वक्षार पर्वतोंका चौथाई भाग प्रथम और अन्तिम कूटोंकी ऊँचाई होती है। अन्तिम कूटकी ऊँचाईके प्रमाणमें से प्रथम कूटकी ऊँचाई घटानेपर जो अवशेष रहे उसको एक कम पदसे भाजित करनेपर हानिचयका प्रमाण प्राप्त होता है। इस हानिचयके प्रमाणमें इष्ट (विवक्षित) कूटका गुणाकर मुख प्रमाण जोड़ देनेसे इष्ट कूटकी ऊँचाईका प्रमाण प्राप्त होता है।।७४६।।

भरहइरावदसरिदा विदेहजुगले च चोद्दससहस्सा । णइपरिवारा तत्तो दुगुणा हरिरम्मगखिदित्ति ।।७४७।।

बादालसहस्सं पुह कुरुदुणदी दुगदुपासजादणदी । चोद्दसलक्खडसदरी विदेहदुगसव्वणइसंखा ।।७४८।।

लक्खतियं बाणउदीसहस्स बारं च सव्वणइसंखा । भरहेरावदपहुदी हरिरम्मगखेत्तओत्ति णादव्वा ।।७४९।।

सत्तरसं बाणउदी णभणवसुण्णं णईण परिमाणं । गंगासिंधुमुखाणं जंबूदीवप्पभूदाणं ।।७५०।।

गिरिभद्दसालविजयावक्खारविभंगदेवरण्णाणं । पुव्वावरेण वासा एवं जंबूविदेहम्हि ।।७५१।।

गिरिपहुदीणं बासं इट्ठूणं सगगुणेहि गुणिय जुदं । अवणिय दीवे सेसं इट्ठगुणोवट्टिदे दु तव्वासं ।।७५२।।

दसबाबीससहस्सा बारसबावीस सत्तअट्ठकला । कमसो पणसय पणघण बावीसुगुतीसमंककमो ।।७५३।।

चउणउदिसयं णवसत्तडसत्तिगिलक्खमट्ठपणसत्तं । पण्णरसं बेलक्खा खुल्ले तं भद्दसालदुगे ।।७५४।।

तियणभछण्णव तिण्णट्ठमं तु चउणदिसत्तणउदेक्कं । जोयणचउत्थभागं दुदीपविजयाण विक्खंभो ।।७५५।।

सरिसादगजदंता णवणभदुगसुण्णतिण्णि छच्चकला । तिघणदुगछक्कपणतिय णवपणकदिणवयछप्पण्णं ।।७५६।।

सोलेकट्ठिविसट्ठिगि णवेक्कदुगदोण्णिदुकदिणभदोण्णि । देउत्तरकुरुचावं जीवा बाणं च जाणेज्जो ।।७५७।।

The four elephant-teeth in Jambū island are similar and their length is thirty thousand two hundred nine yojanas and six out of nineteen parts of a yojana. The length of two elephant-teeth in Dhātakīkhaṇḍa is three lac fifty-six thousand two hundred twenty-seven yojanas and the length of the remaining two elephant teeth is five lac sixty-nine thousand two hundred fifty-nine yojanas. The two elephant-teeth in Puṣkarārdha has a length of sixteen lac twenty-six thousand one hundred sixteen yojanas and that of the remaining two elephant teeth is twenty lac forty-two thousand two hundred nineteen yojanas. The measures of the arc, chord and arrow of the Devakuru and Uttarakuru should also be known as detailed ahead. //6.756-757//

जम्बूद्वीपस्थ चारों गजदन्त समान हैं और इनका आयाम तीस हजार दो सौ नौ योजन और एक योजनके उन्नीस भागोंमें से छह भाग प्रमाण है। धातकीखण्ड स्थित दो गजदन्तोंका आयाम तीन लाख छप्पन हजार दो सौ सत्ताईस योजन और शेष दो गजदन्तोंका आयाम पाँच लाख उनहत्तर हजार दो सौ उनसठ योजन है, तथा पुष्करार्ध सम्बन्धी दो गजदन्तोंका आयाम सोलह लाख छब्बीस हजार एक सौ सोलह योजन और अवशेष दो गजदन्तोंका आयाम बीस लाख बयालिस हजार दो सौ उन्नीस योजन है। देवकुरु, उत्तरकुरुका चाप, जीवा और बाणका प्रमाण भी आगे कहे अनुसार जानना चाहिए।।७५६-७५७।।

वक्खारवास विरहिय पढमे दुगुणिदे जुदे मेरुं । जीवा कुरुस्स चावं गजदंतायाममेलिदे होदि ।।७५८।।

The chord of the Kurukṣetra is obtained on subtracting the diameter of Vakṣāra (elephant-tooth) from the first Bhadraśāla forest's diameter, making the remainder twice and adding to the diameter of the Meru. When the twice remainder is added to the length of both elephant-teeth, the arc of the Kurukṣetra is obtained. //6.758//

वक्षार (गजदन्त) के व्यासको प्रथम भद्रशाल वनके व्यासमें से घटाकर दूना करना तथा जो लब्ध आवे उसे मेरु व्यासमें जोड़ देनेसे कुरुक्षेत्रकी जीवाका प्रमाण होता है और दोनों गजदन्तोंका आयाम मिला देनेसे कुरुक्षेत्रका चाप होता है।।७५८।।

मेरुगिरिभूमिवासं अवणीय विदेहवस्सवासादो । दलिदे कुरुविक्खंभो सो चेव कुरुस्स बाणं च ।।७५९।।

From the diameter of Videha region the base-diameter of Meru mountain is subtracted and then halved giving the diameter of the Kurukṣetra. This is also the measure of arrow of Kurukṣetra. //6.759//

विदेहक्षेत्रके व्यासमें से मेरुगिरिका भूव्यास घटाकर आधा करने पर कुरुक्षेत्रके विष्कम्भका प्रमाण होता है, और यही कुरुक्षेत्रके बाणका प्रमाण है।।७५९।।

इसुहीणं विक्खंभं चउगुणिदिसुणा हदे दु जीवकदी । बाणकदिं छहिं गुणिदे तत्थ जुदे धणुकदी होदि ।।७६०।।

On multiplying the diameter of circle as reduced by the arrow by four times the arrow the square of the chord is obtained. When six times the square of arrow [height of segment] is added to that square of the chord (jīvā), than the square of the bow (dhanuṣa) is obtained. //6.760//

बाण (इषु) से हीन वृत्त विष्कम्भको चौगुणे बाणसे गुणित करनेपर जीवाकी कृति होती है, तथा छहगुणी बाणकृति उस जीवाकृतिमें मिलानेसे धनुष कृति होती है।।७६०।।

इसुवग्गं चउगुणिदं जीवावग्गम्हि पक्खिवित्ताणं । चउगुणिदिसुणा भजिदे णियमा वट्टस्स विक्खंभो ।।७६१।।

The four times of square of arrow (bāṇa) is added to the square of chord, and then divided by four times the arrow, the result is the measure of diameter of circular area as per rule. //6.761//

चौगुणे बाणके वर्गमें जीवाका वर्ग मिलाकर चौगुणे बाणके प्रमाणसे भाजित करनेपर नियमसे वृत्त क्षेत्रके विष्कम्भका प्रमाण प्राप्त होता है।।७६१।।

जीवाहदइसुपादं जीवाइसुजुददलं च पत्तेयं । दसकरणिबाणगुणिदे सुहुमिदरफलं च धणुखेत्ते ।।७६२।।

When the fourth part of arrow is multiplied by chord, then squared and multiplied by ten, the square-root of the result gives the five area of the bow-area (dhanuṣa kṣetra). When the half of the sum of the chord and the arrow is multiplied by arrow, then the gross area of the bow-area is obtained. // 6.762//

जीवा द्वारा गुणित बाणका चतुर्थपाद तथा जीवा और बाणके योगका अर्धभाग इनमेंसे एकका वर्गकर दशगुणित करनेपर और दूसरेको बाणके प्रमाणसे गुणित करनेपर क्रमसे धनुष क्षेत्रका सूक्ष्म और स्थूल क्षेत्रफल प्राप्त होता है।।७६२।।

दुगुणिसु कदिजुद जीवावग्गं चउबाणभाजिए वट्टं । जीवा धणुकदिसेसो छब्भत्तो तप्पदं बाणं ।।७६३।।

The twice of square of arrow is added by the square of chord, the sum is divided by four times the arrow, resulting in the diameter of the circle. The square of the chord is subtracted from the square of bow, the remainder is divided by six. The square root of the quotient so obtained gives the measure of the arrow of Kurukṣetra. //6.763//

दुगुण बाणके वर्गमें जीवाका वर्ग जोड़नेसे जो लब्ध प्राप्त हो उसको चौगुणे बाणके प्रमाणसे भाजित करने पर वृत्तविष्कम्भका प्रमाण होता है तथा जीवाकी कृतिको धनुषकी कृतिमें से घटाकर अवशेषको ६ से भाजितकर वर्गमूल निकालनेपर जो प्रमाण प्राप्त हो वही कुरुक्षेत्रके बाणका प्रमाण है।।७६३।।

जीवाविक्खंभाणं वग्गविसेसस्स होदि जम्मूलं । तं विक्खंभा सोहय सेसद्धमिसुं विजाणाहि ।।७६४।।

The square-root of the remainder obtained on subtracting the square of chord from the square of circle diameter, is subtracted from the diameter of the circle. The remainder when halved gives the measure of the arrow. //6.764//

वृत्त विष्कम्भके वर्गमें से जीवाका वर्ग घटानेपर जो अवशेष रहे उसका वर्गमूल निकालना तथा उस वर्गमूलको वृत्त विष्कम्भके प्रमाणमें से घटाकर अवशेषका आधा करने पर जो प्रमाण प्राप्त हो वही बाणका प्रमाण है।।७६४।।

दुगुणिसुहिदधणुवग्गो बाणोणो अद्धिदो हवे वासो । वासकदिसहिद धणुकदिदलस्स मूलेवि वासमिसुसेसं ।।७६५।।

The square of bow is divided by twice the arrow. From this quotient the arrow is subtracted. The remainder is halved giving the diameter of the circle-width. When the square of bow is added to the square of circle-diameter and then halved, then the square-root of the result is taken out and reduced by the measure of circle-diameter giving the measure of arrow. //6.765//

धनुषके वर्गको दुगुणे बाणका भाग देनेपर जो लब्ध प्राप्त हो उसमेंसे बाणके प्रमाणको घटाकर अवशेषका आधा करनेपर वृत्त विष्कम्भके व्यासका प्रमाण प्राप्त होता है तथा वृत्त व्यासके वर्गमें धनुषका वर्ग जोड़नेपर जो लब्ध प्राप्त हो उसका आधाकर वर्गमूल निकालना और इस वर्गमूलके प्रमाणमें से वृत्त व्यासका प्रमाण घटा देनेपर बाणका प्रमाण प्राप्त हो जाता है।।७६५।।

इसुदलजुदविक्खंभो चउगुणिदिसुणा हदे दु धणुकरणी । बाणकदिं छहिं गुणिदं तत्थूणे होदि जीवकदी ।।७६६।।

In the measure of the circle-width, the half of arrow is added. The result is multiplied by four times the arrow, giving the measure of the square of the bow. On subtaracting six times the arrow from the square of bow gives the measure of square of chord. //6.766//

वृत्त विष्कम्भके प्रमाणमें बाणका अर्ध प्रमाण जोड़नेपर जो लब्ध प्राप्ते हो उसको बाणके चौगुणे प्रमाणसे गुणित करनेपर धनुषकी कृतिका प्रमाण प्राप्त होता है। तथा बाणकी कृतिको छह गुणितकर धनुषकी कृतिमें से घटा देने पर जीवा की कृति का प्रमाण प्राप्त होता है।।७६६।।

रूप्पगिरिहीणभरहव्वासदलं दक्खिणड्ढभरहइसू । णगजुद णगसरमुत्तरभरहजुदं भरहखिदिबाणो ।।७६७।।

From the diameter of the Bharata region, the diameter of Rūpya mountain (Vijayārdha) is subtracted. The remainder is halved and to it are added the arrow of half-south Bharata region and also the diameter of the Vijayārdha, giving the measure of the arrow of Vijayārdha. When arrow of this Vijayārdha is added by that of north Bharata region, the arrow of the whole Bharata region or arrow of north Bharata is obtained. //6.767//

भरतक्षेत्रके व्यासमें से रूप्यगिरि (विजयार्ध) का व्यास घटाकर अवशेषको आधा करनेपर अर्ध दक्षिण भरत क्षेत्रके बाणका प्रमाण तथा इसी प्रमाणमें विजयार्धका व्यास जोड़ देनेसे विजयार्धके बाणका प्रमाण प्राप्त होता है और इस विजयार्धके बाणमें उत्तर भरत क्षेत्रका प्रमाण जोड़ देनेसे सम्पूर्ण भरत क्षेत्र अर्थात् उत्तर भरतके बाणका प्रमाण प्राप्त होता है।।७६७।।

हिमणगपहुदीवासो दुगुणो भरहूणिदो य णिसहोत्ति । ससबाणा णिसहसरो सविदेहदलो विदेहस्स ।।७६८।।

The diameter of the Himavat [width] etc. is doubled, and then the width of the Bharata region is subtracted from it, resulting in their-own arrows upto the Niṣadha. On adding half the width in the arrow of the Niṣadha, the measure of the arrow of half Videha region is obtained. //6.768//

हिमवत् पर्वत आदिकोंके व्यासको दूना करके उसमेंसे भरतका व्यास घटा देनेसे निषध पर्यन्त अपना अपना बाण अर्थात् अपने अपने पर्वत एवं क्षेत्रोंके बाणका प्रमाण प्राप्त हो जाता है तथा निषधके बाणमें विदेहका अर्ध व्यास जोड़ देनेसे अर्ध विदेहके बाणका प्रमाण प्राप्त होता है।।७६८।।

दक्खिणभरहे जीवा अहचउसगणवय होंति बारकला । चापं छछक्कसगसयणवयसहस्सं च एक्ककला ।।७६९।।

The chord in the south Bharata region is nine thousand seven hundred forty-eight yojanas and twelve parts out of nineteen parts of a yojana. The chord of it is nine thousand seven hundred sixty-six yojanas and one part out of nineteen parts of a yojana. //6.769//

दक्षिण भरतक्षेत्रमें जीवा नौ हजार सात सौ अड़तालीस योजन और एक योजनके १९ भागोंमें से १२ भाग (९७४८ $\frac{१२}{१९}$ यो.) प्रमाण है तथा उसीके चाप (धनुष) का प्रमाण नौ हजार सात सौ छ्यासठ योजन और १९ कलाओंमें से एक कला अर्थात् ९७६६ $\frac{१}{१९}$ योजन प्रमाण है।।७६९।।

वेयड्ढंते जीवा णभदुगसगदहसहस्सेगारकला । तेदालसगणभेक्कं पण्णरसकला य तच्चावं ।।७७०।।

At the end of Vijayārdha, the chord is ten thousand seven hundred twenty yojanas and eleven parts out of nineteen parts of a yojana, and the arc is ten thousand seven hundred forty-three yojanas and fifteen parts out of nineteen parts of a yojana. //6.770//

विजयार्धके अन्तमें जीवा दस हजार सात सौ बीस योजन और ग्यारह कला (१०७२० $\frac{११}{१९}$ यो.) प्रमाण तथा चाप दस हजार सात सौ तैतालीस योजन पंद्रह कला (१०७४३$\frac{१५}{१९}$) प्रमाण है।।७७०।।

भरहस्संते जीवा इगिसगचउचोद्दसं च पंचकला । चावं अडदुगपणचउरेक्कं एक्कारसकला य ।।७७१।।

At the end of Bharata region the chord is fourteen thousand four hundred seventy-one yojanas and five parts out of nineteen parts of a yojana. The arc of the same is fourteen thousand five hundred twenty-eight yojanas and eleven parts out of nineteen parts of a yojana. //6.771//

भरत क्षेत्रके अन्तमें जीवा चौदह हजार सात सौ इकहत्तर योजन और पाँच कला (१४४७१ $\frac{५}{१९}$ यो.) प्रमाण है तथा उसीका चाप चौदह हजार पाँच सौ अट्ठाईस योजन और ग्यारह कला (१४५२८ $\frac{११}{१९}$ यो.) प्रमाण है। ।७७१।।

हिमवण्णगंत जीवा दुगतिगणवचउदुगं कला चूणा । चावं णभतियदुगपणवीससहस्सं च चारिकला ।।७७२।।

At the end of the Himavat mountain the chard is twenty-four thousand nine hundred thirty-two yojanas and slightly less than one part out of nineteen parts of a yojana. The chord of the same is twenty five thousand two hundred thirty yojanas and four parts out of ninteen parts of a yojana.//6.772//

हिमवत् पर्वतके अन्तमें जीवा चौबीस हजार नौ सौ बत्तीस योजन और कुछ कम एक कला (२४९३२ $\frac{१}{१९}$ यो.) प्रमाण है तथा उसीका चाप पच्चीस हजार दो सौ तीस योजन चार कला (२५२३० $\frac{४}{१९}$ यो.) प्रमाण है।।७७२।।

हेमवदंतिमजीवा चउसगछस्सगति ऊणसोलकला । धणुहं णभचउसगअडतिण्णि विसेसहियदसयकला ।।७७३।।

At the end of the Haimavat region, the chord is thirty-seven thousand six hundred seventy-four yojanas and slightly less than sixteen parts out of nineteen parts of a yojana, and its bow is thirty-eight thousand seven hundred forty yojanas and slightly greater than ten parts out of nineteen parts of a yojana. //6.773//

हैमवत् क्षेत्रके अन्तमें जीवा सैंतीस हजार छह सौ चौहत्तर योजन और कुछ कम सोलह कला (३७६७४ $\frac{१६}{१९}$ यो.) प्रमाण है, तथा धनुष अड़तीस हजार सात सौ चालीस योजन और कुछ अधिक दस कला (३८७४० $\frac{१०}{१९}$ यो.) प्रमाण है।।७७३।।

महहिमवचरिमजीवा इगतिणवत्तिदयपंच छक्ककला । तच्चां तियणवदुगसगवण्णसहस्स दसयकला ।।७७४।।

At the end of the Mahāhimavat mountain, the chord is fifty-three thousand nine hundred thirty-one yojanas and six parts out of nineteen parts of a yojana. Its arc is fifty-seven thousand two hundred ninety-three yojanas and ten parts out of nineteen parts of a yojana. //6.774//

महाहिमवत् पर्वतके अन्तमें जीवा त्रेपन हजार नौ सौ इकतीस योजन और छह कला (५३९३१ $\frac{६}{१९}$ यो.) प्रमाण है तथा चाप सत्तावन हजार दो सौ तेरान्नवे योजन और दस कला (५७२९३ $\frac{१०}{१९}$ यो.) प्रमाण है।।७७४।।

हरिजीवा इगिणभणवतियसत्तयमिह कलावि सत्तरसा । चावं सोलसणमचउसीदिसहस्सं च चारिकला ।।७७५।।

In the Hari region, the chord is seventy-three thousand nine hundred one yojanas and seventeen parts out of nineteen parts of a yojana. Its arc is eighty-four thousand sixteen yojanas and four parts out of nineteen parts of a yojana. //6.775//

हरिक्षेत्रमें जीवा तिहत्तर हजार नौ सौ एक योजन और सत्रह कला (७३९०१ यो. $\frac{१७}{१९}$) प्रमाण है, तथा चाप चौरासी हजार सोलह योजन और चार कला (८४०१६ $\frac{४}{१९}$ यो.) प्रमाण है।।७७५।।

णिसहावसाणजीवा छप्पणइगिचारिणवयदोण्णिकला । धणुपुट्ठं छादालतिचउवीसेक्कं च णवयकला ।।७७६।।

At the end of the Niṣadha mountain, the chord is ninety-four thousand one hundred fifty-six yojanas and two parts out of nineteen parts of a yojana. Its chord is one lac twenty-four thousand three hundred forty-six yojanas and nine parts out of nineteen parts of a yojana. //6.776//

निषध पर्वतके अन्तमें जीवा ९४१५६ $\frac{२}{१९}$ योजन प्रमाण है तथा चाप एक लाख चौबीस हजार तीन सौ छियालीस योजन और नौ कला १२४३४६ $\frac{९}{१९}$ योजन प्रमाण है।।७७६।।

जीवदु विदेहमज्झे लक्खा परिहिदलमेवमवरद्धे । माहवचंदुद्धरिया गुणधम्मपसिद्ध सव्वकला ।।७७७।।

At the centre of the Videha the chord and arc, both these are respectively, one lac yojanas and half of the circumference of the Jambū island. This similarly be known about the Airāvata etc. regions and half the Jambū island. The whole part of the bow (dhanuṣa) and chord (guṇa) as related earlier are Mādhava (nine) and candra (one), i.e. nineteen parts. //6.777//

विदेहके मध्यमें जीवा और धनुष ये दोनों क्रमसे एक लाख योजन और जम्बूद्वीपकी परिधिके अर्धभाग प्रमाण हैं ऐरावतादि क्षेत्रों और अर्ध जम्बूद्वीपमें भी ऐसा ही जानना, तथा पूर्वोक्त कही हुई गुण अर्थात् जीवा और धर्म अर्थात् धनुषके प्रमाणकी सम्पूर्ण कला माधव अर्थात् ९ और चद्र = १ अर्थात् १९ भाग रूप है।।७७७।।

पुव्ववरजीवसेसे दलिदे इह चूलियात्ति णाम हवे । धणुदुगसेसे दलिदे पासभुजा दक्खिणुत्तरदो ।।७७८।।

The difference between the former and latter chord in the south north is halved resulting in its peak (cūlikā). The half of the difference between the former and latter are gives the lateral side (pārśva bhujā). //6.778//

दक्षिणोत्तरमें पूर्वापर जीवाको (परस्पर में) घटाकर अवशेषको आधा करनेपर जो लब्ध प्राप्त हो उसका चूलिका यह नाम होता है और पूर्वापर धनुषको परस्पर घटा कर अवशेषको आधा करनेपर जो लब्ध प्राप्त हो उसका नाम पार्श्व भुजा है।।७७८।।

भरहेसुरेवदेसु य ओसप्पुस्सप्पिणित्ति कालदुगा । उस्सेधाउबलाणं हाणीवड्ढी य होंतित्ति ।।७७९।।

सुसमसुसमं च सुसमं सुसमादी अंतदुस्समं कमसो । दुस्समममतिदुस्समम्मिदि पढमो बिदियो दु विवरीयो ।।७८०।।

चदुतिदुगकोडकोडी बादालसहस्सवासहीणेक्कं । उदधीणं हीणदलं तत्तियमेत्तट्ठिदी ताणं ।।७८१।।

तत्थादि अंत आऊ तिदुगेक्कं पल्लपुव्वकोडी य । वीसहियसयं वीसं पण्णरसा होंति वासाणं ।।७८२।।

तिदुगेक्कोसमुदयं पणसयचावं तु सत्त रदणी य । दुगमेक्कं चय रदणी छक्कालादिम्हि अंतम्हि ।।७८३।।

At the beginning and end of those six periods, the heights of human beings are respectively, given by three kośas, and two kośas, two kośas and one kośa, one kośa and five hundred dhanuṣa, five hundred dhanuṣa and seven hands, seven hands and two hands, as well as two hands and one hand. // 7.783//

उन्हीं छह कालोंके आदि और अन्तमें मनुष्योंके शरीरकी ऊँचाई क्रमसे तीन कोश और दो कोश, दो कोश और एक कोश, एक कोश और ५०० धनुष, ५०० धनुष और ७ हाथ, ७ हाथ और दो हाथ, तथा दो हाथ और एक हाथ प्रमाण है।।७८३।।

उदयरवी पुण्णिंदू प्रियंगुसामा य पंचवण्णा य । लुक्खसरीरावण्णे धूमसियामा य छक्काले ।।७८४।।

The colour of the bodies of human beings during the six periods are respectively, like those of the sun, the whole moon, the green-black the five colours without lustre, five colours and smoke black at the ending period. //6.784//

छहों कालवर्ती मनुष्योंके शरीरका वर्ण क्रमसे उदित होते हुए सूर्यके सदृश, सम्पूर्ण चन्द्र सदृश, हरित श्याम सदृश, पाँचों वर्णोंके सदृश, कान्तिहीन पाँचों वर्णोंके सदृश, और अन्तिम कालमें धूम सदृश श्याम होता है।।७८४।।

अट्ठमछट्ठचउत्थेणाहारो पडिदिणेण पायेण । अतिपायेण य कमसो छक्कालणरा हवंतित्ति ।।७८५।।

The human beings of the six periods take their food respectively, after eighth belās or three days, sixth belās or two days, four belās or one day, every day, heavy or enough and quite enough. //6.785//

छह कालके मनुष्य क्रमसे अष्टम बेला अर्थात् तीन दिनके बाद, षष्ठ बेला अर्थात् दो दिनके बाद, चतुर्थ बेला अर्थात् एक दिन बाद, प्रतिदिन, प्रचुरतासे और अतिप्रचुरतासे भोजन करते हैं।।७८५।।

वदरक्खामलयप्पमकप्पदुमदिण्णदिव्वआहारा । वरपहुदितिभोगभुमा मंदकसाया विणीहारा ।।७८६।।

तूरंगपत्तभूसणपाणाहारंगपुप्फजोइतरु । गेहंगा वत्थंगा दीवंगेहिं दुमा दसहा ।।७८७।।

दप्पणसम मणिभूमी चउरंगुलसुरसगंधमउगतणा । रवीरुच्छुतोय महुघदपरीदवावीदहाइण्णा ।।७८८।।

जादजुगलेसु दिवसा सगसग अंगुट्ठलेहरंगिदए । अथिरथिरगदि कलागुणजोवणदंसणगहे जांति ।।७८९।।

तद्दंपदीणमादिमसंहदिसंठाणमज्जणामजुदा । सुलहेसुवि णो तित्ती तेसिं पंचक्खविसएसु ।।७९०।।

चरमे खुदजंभवसा णरणारि विलीय सरदमेघं वा । भवणतिगामी मिच्छा सोहम्मदुजाइणो सम्मा ।।७९१।।

पल्लट्ठमं तु सिट्ठे तदिए कुलकरणरा पडिस्सुदिओ । सम्मदिखेमंकरधर सीमंकरधर विमलादिवाहणवो ।।७९२।।

चक्खुम्मजसस्सी अहिचंदो चंदाहओ मरुदेओ । होदि पसेणजिदंको णाभी तण्णंदणो वसहो ।।७९३।।

वरदाणदो विदेहे बद्धणराऊय खइयसंदिट्ठि । इह खत्तियकुलजादा केइज्जाइब्भरा ओही ।।७९४।।

अट्ठारस तेरस अडसदाणि पणुवीसहीणयाणि तदो । चावाणि कुलयराणं सरीरतुंगत्तणं कमसो ।।७९५।।

आऊ पल्लदसंसो पढमे सेसेसु दसहि भजिदकमं । चरिमे दु पुव्वकोडी जोगे किंचूण तण्णवमं ।।७९६।।

The age or longevity of first Kulakara was tenth part of a palya, and that of the remaining Kulakaras was successively tenth of his predecessor. The longevity of the last Kulakara was Pūrvakoṭi. The sum of the ages of all is obtained to be slightly less than the ninth part of a palya. //6.796//

प्रथम कुलकरकी आयु पल्यके दशवें भाग प्रमाण थी तथा शेष कुलकरोंकी दशसे भाजित अर्थात् पूर्व पूर्व कुलकरोंकी आयुको दशसे भाजित करनेपर अपर अपर कुलकरोंकी आयुका प्रमाण प्राप्त होता है। अन्तिम कुलकरकी आयु पूर्वकोटि प्रमाण थी। (इसके विना) सम्पूर्ण आयुका योग करनेपर कुछ कम पल्यका नवमाँ भाग प्राप्त होता है।।७९६।।

पल्लासीदिममंतरमादिममवसेसमेत्थ दसभजिदा । जोगे बावत्तरिमं सयलजुदे अट्ठमं हीणं ।।७९७।।

Out of the intervals of the Kulakaras, the first interval was the eightieth part of a palya. The remaining interval was successively the tenth part of its preceding. The total of the intervals is one upon seventy-two of a palya, and the sum of all the intervals and age is slightly less than one upon eight palya. //6.797//

कुलकरोंके अन्तरालोंमें से प्रथम अन्तर, पल्यका ८०वाँ भाग था। शेष अन्तर उत्तरोंत्तर दशवें भाग प्रमाण था। इन सम्पूर्ण अन्तरालोंका जोड़ $\frac{१}{७२}$ पल्य और सम्पूर्ण अन्तराल एवं आयुका जोड़ कुछ कम $\frac{१}{८}$ पल्य प्रमाण होता है।।७६७।।

हा हामा हामाधिक्कारा पणपंच पण सियामलया । चक्खुम्मदुग पसेणाचंदाहो धवलसेस कणयणिहा ।।७६८।।
इणससितारासावदविभयं दंडादिसीमचिण्हकदिं । तुरगादिवाहणं सिसुमुहदंसणणिब्भयं वेंत्ति ।।७६६।।
आसीवादादिं ससिपहुदिहि केलिं च कदिचिदिणओत्ति । पुत्तेहिं चिरंजीवण सेदुवहित्तादि तरणविहिं ।।८००।।
सिक्खंति जराउछिदिं णाभिविणासिंदचावतडिदादिं । चरिमो फलअकदोसहिभुत्तिं कम्मावणी तत्तो ।।८०१।।
पुरगामवट्टणादी लोहियसत्थं च लोयववहारो । धम्मो वि दयामूलो विणिम्मिया आदिबम्हेण ।।८०२।।
चउवीसबारतिघणं तित्थयरा छत्तिखंडभरहवई । तुरिए काले होंति हु तेवट्ठिसलागपुरिसा ते ।।८०३।।
धणु तणुतुंगो तित्थे पंचसयं पण्ण दसपणूणकमं । अट्ठसु पंचसु अट्ठसु पासदुगे णवयसत्तकरा ।।८०४।।
तित्थाऊ चुलसीदीविहत्तरीसट्ठि पणसु दसहीणं । बिगि पुव्वलक्खमेत्तो चुलसीदि बिहत्तरी सट्ठी ।।८०५।।
तीसदसएक्कलक्खा पणणवदीचदुरसीदिपणवण्णं । तीसं दसिगिसहस्सं सय बावत्तरिसमा कमसो ।।८०६।।
उवहीण पण्णकोडी सतिवासडमासपक्खया पढमं । अंतरमेत्तो तीसं दस णव कोडी य लक्खगुणा ।।८०७।।
दसदसभजिदा पंचसु तो कोडी सायराण सदहीणा । छव्वीससहस्ससमा छावट्ठीलक्खएणावि ।।८०८।।
चउवण्णतीसणवचउजलहितियं पल्लतिण्णिपादूणं । पल्लस्स दलं पादो सहस्सकोडीसमाहीणो ।।८०६।।
वस्सा कोडिसहस्सा चउवण्णछपंचलक्खवस्साणि । तेसीदिसहस्समदो सगसयपण्णाससंजुत्तं ।।८१०।।
सदलबिसदं समातिय पक्खडमासूणमंतिमं तत्तु । मोक्खंतरं सगाउगहीणं तमिणं जिणंतरयं ।।८११।।
वीसजिणतित्थकालो इगिवीससहस्सवास दुस्समगो । इह सो तेत्तियमेत्तो अइदुस्समगोवि मिलिदव्वो ।।८१२।।
तदिए तुरिए काले तिवासअडमासपक्खपरिसेसे । वसहो वीरो सिद्धो पुव्वे तित्थेयराउस्सं ।।८१३।।
पल्लतुरियादि चय पल्लंतचउत्थूण पादपरकालं । ण हि सद्धम्मो सुविधीदु संति अंते सगंतरए ।।८१४।।
चक्की भरहो सगरो मघव सणकुमार संतिकुंथुजिणा । अरजिण सुभोममहपउमा हरिसेणजयब्रह्मदत्तक्खा ।।८१५।।
भरहदु वसहदुकाले मघवदु धम्मदुगअंतरे जादा । तिजिणा सुभोमचक्की अरमल्लीणंतरे होदि ।।८१६।।
मल्लिदुमज्झे णवमो मुणिसुवव्वयणमिजिणंतरे दसमो । णमिदुविहरे जयक्खो बम्हो णेमिदुग अंतरगो ।।८१७।।
सव्वे सुवण्णवण्णा तद्देहुदओ धणूण पंचसयं । पण्णासूणं सदलं बादालिगिदालयं तालं ।।८१८।।
पणतीस तीस अडदुखवीसं पण्णरसगाउ चुलसीदि । बावत्तरिपुव्वाणं पणतिगिवासाणमिह लक्खा ।।८१६।।
संवच्छरा सहस्सा पणणउदी चउरसीदि सट्ठी य । तीसं दसयं तिदयं सत्तसया बम्हदत्तस्स ।।८२०।।
कालमहकालमाणवपिंगलणेसप्पपउमपांडु तदो । संखो णाणारयणं णवणिहिओ देंति फलमेदं ।।८२१।।
उडुजोग्गकुसुमदामप्पहुदिं भाजणमाउहाभरणं । गेहं वत्थं धण्णं तूरं बहुरयणमणुकमसो ।।८२२।।
सेणिगिहथवदि पुरहो गयहयजुवई हवंति वेयड्ढे । सिरिगेहे कागिणिमणिचम्माउहगेसिदंडछत्तमरी ।।८२३।।

मघवं सणक्कुमारो सणकुमारं सुभोम बम्हा य । सत्तम पुढविं पत्ता मोक्खं सेसट्ठचक्कहरा ।।८२४।।

तिविट्ठदुविट्ठसयंभू पुरिसुत्तमपुरिससिंहपुरिसादी । पुंडरियदत्त णारायण किण्हो अद्धचक्कहरा ।।८२५।।

सेयादिपणसु हरिपण छट्ठरदुगविरह मल्लिदुगमज्झे । दत्तो अट्ठम सुव्वयदुगविरहे णेमिकालजो किण्हो ।।८२६।।

बलदेवा विजयाचलसुधम्मसुप्पहसुदंसणा णंदी । तो णंदिमित्त रामा पउमा उवरिं तु पडिसत्तू ।।८२७।।

अस्सग्गीओ तारय मेरयय णिसुंभ कइडहंत महू । बलि पहरण रावणया खचरा भूचर जरासंधो ।।८२८।।

देहुदओ चापाणं सीदी तिसु दसयहीण पणदालं । णवदूगवीसं सोलं दस बलकेसव ससत्तूणं ।।८२९।।

सम चुलसीदि बहत्तरि सट्ठी तीसं दस लक्ख पणसट्ठी । बत्तीसं बारेकं सहस्समाउस्समद्धचक्कीणं ।।८३०।।

सगसीदि दुसु दसूणं सगतीसं सत्तरससमा लक्खा । सगसट्ठितीस सत्तर सहस्स बारसयमाउ बले ।।८३१।।

पढमो सत्तमिमण्णे पण छट्ठी पंचमिं गदो दत्तो । णारायणो चउत्थीं कसिणो तदियं गुरुयपावा ।।८३२।।

णिरयं गया पडिरिवो बलदेवा मोक्खमट्ठ चरिमो दु । बम्हं कप्पं किण्णे तित्थयरे सोवि सिज्झेहि ।।८३३।।

भीम महभीम रुद्दा महरुद्दो कालओ महाकालो । तो दुम्मुह णिरयमुहा अहोमुहो णारदा एदे ।।८३४।।

कलहप्पिया कदाइं धम्मरदा वासुदेवसमकाला । भव्वा णिरयगदिं ते हिंसादोसेण गच्छंति ।।८३५।।

भीमावलि जिदसत्तू रुद्द विसालणयण सुप्पदिट्ठचला । तो पुंडरीय अजिदंधर जिदणाभीय पीड सच्चइजो ।।८३६।।

उसहदुकाले पढमदु सत्तण्णे सत्त सुविहिपहुदीसु । पीडो संतिजिणिंदे वीरे सच्चइसुदो जादो ।।८३७।।

पणसय पण्णूणसयं पंचसु दसहीणमट्ठ चउवीसं । तक्कायधणुस्सेहो सच्चइतणयस्ससत्तकरा ।।८३८।।

तेसीदिगिसत्तरि बिगि लक्खा पुव्वाणि वास लक्खाओ । चुलसीदि सट्ठि दसु दसहीणदलिगि वस्सणवसट्ठी ।।८३९।।

पढमदु माघविमण्णे पण मघवि अट्ठमो दु रिट्ठमहिं । दो अंजणं पवण्णा मेघं सच्चइतणू जादो ।।८४०।।

विज्जाणुवादपढणे दिट्ठसंजमा भव्वा । कदिचि भवे सिज्झंति हु गहिदुज्झियसम्ममहिमादो ।।८४१।।

जिणसमकोट्टद्ववविदा समकाले सुण्णहेट्ठिमे रचिदा । उहयजिणंतरजादा सण्णेया चक्कहररुद्दा ।।८४२।।

पण्णर जिण खदु तिजिणा सुण्णदु जिण गगणजुगल जिण खदुगं । जिण खं जिण खं दुजिणा इदि चोत्तीसालया णेया ।८४३।।

चक्किदु तेरस सुण्णा छच्चक्की गयणतिदय चक्की खं । चक्की णभदुग चक्की गयणं चक्कहर सुण्णदुगं ।।८४४।।

दसगयणपंचकेसवछस्सुण्णा पउमणाभणभविण्हू । गयणति केसव सुण्णदु मुरारि सुण्णत्तियं कमसो ।।८४५।।

रुद्दुगं छस्सुण्णा सत्त हरा गयणजुगलमीसाणो । पण्णर णभाणि तत्तो सच्चइतणओ महावीरे ।।८४६।।

पउमप्पहवसुपुज्जा रत्ता धवला हु चंदपहसुविही । णीला सुपासपासा णेमीमुणिसुव्वया किण्हा ।।८४७।।

सेसा सोलस हेमा वसुपुज्जो मल्लिणेमिपासजिणा । वीरो कुमारसवणा महवीरो णाहकुलतिलओ ।।८४८।।

पासो दु उग्गवंसो हरिवंसा सुव्वओ वि णेमीसो । धम्मजिणो कुंथु अरा कुरुजा इक्खाउया सेसा ।।८४९।।

पणछस्सयवस्सं पणमास जुदं गमिय वीरणिव्वुइदो । सगराजो तो कक्की चदुणवतियमहियसगमासं ।।८५०।।

The Śaka king was born six hundred five years five months after the accomplishment of Lord Vardhmāna, and three hundred ninety-four years seven months after this, the kalkī was born. //6.850//

श्रीवीर प्रभुके मोक्ष जानेके छह सौ पाँच वर्ष पाँच माह बीत जानेपर शक राजा उत्पन्न हुआ था। और इसके तीन सौ चौरानवें वर्ष सात माह बीत जाने पर कल्कि की उत्पत्ति हुई थी।।८५०।।

सो उम्मग्गाहिमुहो चउम्मुहो सदरिवासपरमाऊ । चालीस रज्जओ जिदभूमी पुच्छइ समंतिगणं ।।८५१।।

अम्हाणं के अवसा णिग्गंथा अत्थि केरिसायारा । णिद्धणवत्था भिक्खाभोजी जहसत्थमिदिवयणे ।।८५२।।

तप्पाणिउडे णिवडिद पढमं पिंडं तु सुक्कमिदिगेज्झं । इदि णियमे सचिवकदे चत्ताहारा गया मुणिणो ।।८५३।।

तं सोढुमक्खमो तं णिहणदि वज्जाउहेण असुरवई । सो भुंजदि रयणपहे दुक्खग्गाहेक्कजलरासिं ।।८५४।।

तब्भयदो तस्स सुतो अजिदंजयसण्णिदो सुरारिं तं । सरणं गच्छइ चेलयसण्णाए सह समहिलाए ।।८५५।।

सम्मद्दंसणरयणं हिययाभरणं च कुणदि सो सिग्घं । पच्चक्खं दट्टूणिह सुरकयजिणधम्ममाहप्पं ।।८५६।।

इदि पडिसहस्सवस्सं वीसे कक्कीणदिक्कमे चरिमो । जलमंथणो भविस्सदि कक्की सम्मग्गमत्थणओ ।।८५७।।

इह इंदरायसिस्सो वीरंगद साहु चरिम सव्वसिरी । अज्जा अग्गिल सावय वरसाविय पंगुसेणावि ।।८५८।।

पंचमचरिमे पक्खडमासतिवासोवसेसए तेण । मुणिपढमपिंडगहणे सण्णसणं करयि दिवसतियं ।।८५९।।

सोहम्मे जायंते कत्तियअमवास सादि पुव्वण्हे । इगिजलहिठिदी मुणिणो सेसतिए साहियं पल्लं ।।८६०।।

तव्वासरस्स आदीमज्झंते धम्मराय अग्गीणं । णासो तत्तो मणुसा णग्गा मच्छादिआहारा ।।८६१।।

पोग्गलअइरुक्खादो जलणे धम्मे णिरासएण हदे । असुरवइणा णरिंदे सयलो लोओ हवे अंधो ।।८६२।।

एत्थ मुदा णिरयदुगं णिरयतिरक्खादु जणणमेत्थ हवे । थोवजलदाइ मेहा भू णिस्सारा णरा तिव्वा ।।८६३।।

संवत्तयणामणिलो गिरितरुभूपहुदि चुण्णणं करिय । भमदि दिसंतं जीवा मरंति मुच्छंति छट्ठंते ।।८६४।।

खगगिरिगंगदुवेदी खुद्दबिलादिं विसंति आसण्णा । णेंति दया खचरसुरा मणुस्सजुगलादिबहुजीवे ।।८६५।।

छट्ठमचरिमे होंति मरुदादी सत्तसत्त दिवसवही । अदिसीदखारविसपरुसग्गीरजधूमवरिसाओ ।।८६६।।

तेहिंतो सेसजणा णस्संति विसग्गिवरिसदड्ढमही । इगिजोयणमेत्तमधो चुण्णीकिज्जदि हु कालवसा ।।८६७।।

उस्सप्पिणीयपढमे पुक्खरखीरघदमिदरसा मेघा । सत्ताहं वरसंति य णग्गा मत्तादि आहारा ।।८६८।।

उण्हं छंडदि भूमी छविं सणिद्धत्तमोसहिं धरदि । वल्लिलदागुम्मुतरु वड्ढेदि जलादिवरसेहिं ।।८६९।।

णदितीरगुहादिठिया भूसीयलगंधगुणसमाहूया । णिग्गमिय तदो जीवा सव्वे भूमिं भरंति कमे ।।८७०।।

उस्सप्पिणीयबिदिए सहस्ससेसेसु कुलयरा कणयं । कणयप्पहरायद्धयपुंगव तह णलिण पउम महपउमा ।।८७१।।

तस्सोलसमणुहि कुलायाराणलपक्कपहुदिया होंति । तेवट्ठिणरा तदिए सेणियचर पढमतित्थयरो ।।८७२।।

महपउमो सुरदेवो सुपासणामो सयंपहो तुरियो । सव्वप्पभूद देवादीपुत्तो होहि कुलपुत्तो ।।८७३।।

तित्थयरुदंक पोट्ठिल जयकित्ती मुणिपदादिसुव्वदओ । अरणिप्पावकसाया विउलो किण्हचरणिम्मलओ ।।८७४।।

चित्तसमाहीगुत्तो सयंभु अणिवट्ठओ य जय विमलो । तो देवपाल सच्चइपुत्तचरोऽणंतविरियंतो ।।८७५।।

पढमजिणो सोलससयवस्साऊ सत्तहत्थदेहुदओ । चरिमो दु पुव्वकोडीआऊ पंचसयधणूतुंगो ।।८७६।।

चक्की भरहो दीहादिमदंतो मुत्तगूढदंता य । सिरिपुव्वसेणभूदी सिरिकंतो पउम महपउमा ।।८७७।।

तो चित्तविमलवाहण अरिट्ठसेणो बलो तदो चंदो । महचंद चंदहर हरिचंदा सीहादिचंद वरचंदा ।।८७८।।

तो पुण्णचंदसुहचंदा सिरिचंदो य केसवा णंदी । तं पुव्वमित्तसेणा णंदी भूदी यचलणामा ।।८७९।।

महअइबला तिविट्ठो दुविट्ठ पडिसत्तुणो य सिरिकंठो । हरिणीलअस्ससुसिहिकंठा अस्स हयमोरगीवा य ।।८८०।।

एसो सव्वो भेओ परूविदो बिदियतदियकालेसु । पुव्वं व गहीदव्वो सेसो तुरियादिभोगमही ।।८८१।।
पढमादो तुरियोत्ति य पढमो कालो अवट्ठिदो कुरवे । हरिरम्मगे य हेमवदेरण्णवदे विदेहे य ।।८८२।।
भरह इरावद पण पण मिलेच्छखंडेसु खयरसेढीसु । दुस्समसुसमादीदो अंतोत्ति य हाणिवड्ढी य ।।८८३।।
पढमो देवे चरिमो णिरए तिरिए णरेवि छक्काला । तदियो कुणरे दुस्समसरिसो चरिमुवहिदीवद्धे ।।८८४।।
चउगोउरसंजुत्ता भूमिमुहे बार चारि अट्ठुदया । सयलरयणप्पया ते बेकोसवगाढया भूमिं ।।८८५।।
वज्जमयमूलभागा वेलुरियकयाइरम्मसिहरजुदा । दीवोवहीणमंते पायारा होंति सव्वत्थ ।।८८६।।
पायाराणं उवरिं पुह मज्झे पउमवेदिया हेमी । बेकोसपंचसयधणुतुंगा वित्थारया कमसो ।।८८७।।
तिस्से अंतो बाहिं हेमसिलातलजुदं वणं रम्मं । वावी पासादोवि य चित्ता अत्थंति तहिं वाणा ।।८८८।।
तरमज्झजहण्णाणं वावीणं चाव विसद वित्थारा । पण्णासूणं कमसो गाढा सगवासदसभागो ।।८८९।।
वासुदयादीहत्तं जहण्णपासादयस्स चाबाणं । पण्णपणसदरिसयमिह दारे छव्वार चउगाढो ।।८९०।।
मज्झिमउक्कस्साणं बिगुणा तिगुणा कमेण वासादी । दोद्दोदारा मणिमय णट्टणकीडादिगेहावि ।।८९१।।
विजयं च वैजयंतं जयंत अपराजियं च पुव्वादी । दारचउक्काणुदओ अडजोयणमद्धवित्थारा ।।८९२।।
तोरणजुददारुवरिं दुगवास चउक्कतुंग पासादो । बारसहस्सायददलवासं विजयपुरमुवरि गयणतले ।।८९३।।
एवं सेसतिठाणे विजयादिठिदी दु साहियं पल्लं । जगदीमूले बारस दाराणि णदीण णिग्गम्मणे ।।८९४।।
पायारंतब्भागे वेदिजुदं जोयणद्धवास वणं । दारूणपरिहितुरियो विजयादीदारअंतरयं ।।८९५।।
लवणे दिसविदिसंतरदिसासु चउ चउ सहस्स पायाला । मज्झुदयं तलवदणं लक्खं दसमं तु दसमकमं ।।८९६।।

There are lower regions (pātālas) given respectively, by four, four and one thousand in respectively, four directions, four sub-directions and eight intervals of the intermediate circumference of the Lavaṇa sea. The diameter of the central part of rise of lower regions corresponding to directions is one lac yojanas, the height of the whole lower reign is one lac yojana, the diameter of the bottom is tenth part of height and the top diameter is also the tenth part of the height.

The tenth part of the diameter etc. of the lower regions corresponding to directions is the sequential of the lower regions corresponding to sub-directions, and the tenth part of the lower regions corresponding to sub-directions is sequential to the lower regions corresponding to intervals. //6.896//

लवण समुद्रकी मध्यम परिधिकी चार दिशाओं, चार विदिशाओं और आठ अन्तरालोंमें क्रमसे चार चार और १००० पाताल हैं। दिशा सम्बन्धी पातालोंके उदयके मध्यभागका व्यास एक लाख योजन, सम्पूर्ण पातालका उदय (ऊँचाई) एक लाख योजन, तल व्यास उदयका दसवाँ भाग और मुख व्यास भी उदयका दसवाँ भाग है। दिशा सम्बन्धी पातालोंके व्यासादिकका दसवाँ भाग विदिशा सम्बन्धी पातालोंका अनुक्रम है। और विदिशा सम्बन्धी पातालोंके व्यासादिकका दसवाँ भाग अन्तराल सम्बन्धी पातालोंका अनुक्रम है।।८९६।।

बडवामुहं कदंबगपायालं जूवकेसरं वट्टा । पुव्वादिवज्जकुड्डा पणसय बाहल्ल दसम कमा ।।८९७।।

Baḍavāmukha, Kadambaka, Pātāla and Yūpakesarī, are the names of the lower regions corresponding to eastern etc. directions respectively. All the lower regions are composed of round and diamond-like wells. The thickness of the wells of the lower regions corresponding to directions is five hundred dhanuṣas. The thickness of the subsequent two types of wells is successively the tenth part of the preceding. //6.897//

बड़वामुख, कदम्बक, पाताल और यूपकेशर ये क्रमशः पूर्वादि दिशा सम्बन्धी पातालोंके नाम हैं। सर्व पाताल गोल और वज्रमयी कुण्डोंसे संयुक्त है। दिशा सम्बन्धी पातालोंके कुण्डोंका बाहुल्य (मोटाई) पाँच सौ धनुष है। इनसे विदिग्गत पातालोंके कुण्डोंका बाहुल्य दशवें भाग तथा इनसे भी अन्तर दिग्गत पातालोंके कुण्डोंका बाहुल्य १०वें भाग प्रमाण है।।८९७।।

हेट्ठुवरिमतियभागे णियदं वादं जलं तु मज्झम्हि । जलवादं जलवड्ढी किण्हे सुक्के य वादस्स ।।८९८।।

There is air, as per rule, in the low parts of those lower regions (pātālas), water in the upper part and water as well as air in the middle part. In the dark fortnight there is increase in water and in the white fortnight there is increase in air. //6.898//

उन पातालोंके अधस्तन भागोंमें नियमसे वायु है तथा उपरिम भागमें जल और मध्यम भागमें जल, वायु दोनों है। कृष्ण पक्षमें जलकी और शुक्ल पक्षमें वायुकी वृद्धि होती है।।८९८।।

तम्मज्झिमतियभागे लवणसिहा चरिमपणसहस्से य । पण्णरदिणेहि भजिदे इगिदिण ~~जलवादवड्ढि~~ जलवड्ढी ।।८९९।।

When the intermediate third part of those lower regions (pātālas) is divided by fifteen days, the increase of water [for every day of the dark fortnight), and the increase of air [for every day of the white fortnight] is obtained. When the last five thousand yojanas of the top of the Lavaṇa sea is divided by fifteen, the increase of water for every day in the top of the Lavaṇa sea is obtained. //6.899//

उन पातालोंके मध्यम त्रिभागको पन्द्रह दिनोंसे भाजित करने पर (कृष्ण पक्षके प्रत्येक दिनकी जलवृद्धिका और (शुक्ल पक्षके प्रत्येक दिनमें) वायु वृद्धिका प्रमाण प्राप्त होता है तथा लवण समुद्रकी शिखाके अन्तिम पाँच हजार योजनोंको पन्द्रहसे भाजित करनेपर लवण समुद्रकी शिखामें प्रतिदिन जल वृद्धिका प्रमाण प्राप्त होता है।।८९९।।

पुण्णदिणे अमवासे सोलक्कारससहस्स जलउदओ । वासं मुहभूमीए दसयसहस्सा य बेलक्खा ।।९००।।

In the middle of the Lavaṇa sea, the water of sea rises sixteen thousand yojanas high on the full moon day, and rises eleven thousand high on the last day of the half dark (amāvaśyā). The basic diameter of water with height of sixteen thousand is two lac yojanas and the top diameter is ten thousand yojanas. //6.900//

लवण समुद्रके मध्यमें समुद्रका जल पूर्णिमाको सोलह हजार ऊँचा और अमावस्याको ग्यारह हजार ऊँचा होता है। सोलह हजार ऊँचाई वाले जलका भूव्यास दो लाख योजन और मुख व्यास दश हजार योजन प्रमाण है।।९००।।

मुरवायारो जलही हाणिदलं सोदयेण संगुणियं । विसमुद्दचारमंबुहिजंबूचंदरवि अंतरयं ।।९०१।।

The Lavaṇa sea is in the shape of a drum. When its decrease measure is halved and multiplied by own height of the moon and sun, and the product reduced by orbital region corresponding to the sea, the oblique interval from the moon and sun of the water of Lavaṇa sea is obtained. //6.901//

लवण समुद्र मुरजाकार है। इसकी हानिके प्रमाणको आधा कर $\left(\frac{१५०००}{१६०००}\right)$ चन्द्र, सूर्यकी अपनी अपनी ऊँचाईके प्रमाणसे गुणा करनेपर जो लब्ध प्राप्त हो उसमेंसे समुद्र सम्बन्धी चार क्षेत्र घटा देनेपर लवण समुद्रके जलका चन्द्र सूर्यसे तिर्यगन्तरका प्रमाण प्राप्त हो जाता है।।९०१।।

मज्झिमपरिधिचउत्थं विवरहमुहं तंवि मज्झमुहमद्धं । सयगुणपणघणहीणं तं सयछव्वीसभाजिदे विरहं ।।९०२।।

The fourth part of the intermediate circumference of Lavaṇa sea defines the distance from the top end of the lower region to the top end of other lower region in the same direction. When the middle diameter of the lower regions is subtracted, the interval of the middle part from one lower region to another (pātāla) is obtained. From this middle-interval, the top-diameter of that very lower region is subtracted resulting in the interval of tops. Half the difference between this interval and the top diameters of sub-directional lower regions gives the intervals of the tops of the lower regions (pātālas) corresponding to four directions and four non-cardinal directions (vidiśās). When, from this interval, one hundred times the cube of five is subtracted and the remainder so obtained is divided by one hundred twenty-six, the interval between the lower regions corresponding to the directions and non-cardinal directions, and the interval between the tops of the directional lower regions are obtained. //6.902//

लवण समुद्रकी मध्यम परिधिका चतुर्थभाग ($\frac{१००००००}{४}$) दिशा सम्बन्धी एक पातालके मुखके अन्तसे दिशागत दूसरे पातालके मुखके अन्त तकके क्षेत्रका प्रमाण होता है। इसमेंसे पातालोंका मध्य व्यास घटा देनेपर एक पातालका दूसरे पातालके मध्यभागका अन्तर प्राप्त होता है। तथा इस मध्यम अन्तरके प्रमाणमें से उसी पातालका मुख व्यास घटा देनेपर मुखसे मुखका अन्तर प्राप्त होता है, इस अन्तरके प्रमाणमें से विदिग्गत पातालोंका मुख व्यास घटाकर उसे आधा करनेपर जो प्रमाण प्राप्त हो वह दिशा सम्बन्धी पातालों और विदिशा सम्बन्धी पातालोंके मुखका अन्तर प्राप्त होता है। इस अन्तरके प्रमाणमें से सौगुणा पाँचका घन अर्थात् बारह हजार पाँच सौ घटाकर अवशेषको एक सौ छब्बीसका भाग देनेपर दिशा विदिशा सम्बन्धी पातालोंके मुखसे अन्तर दिग्गत पातालोंके मुखका अन्तर प्राप्त होता है।।६०२।।

बेलंधर भुजगविमाणाण सहस्साणि बाहिरे सिहरे । अंते बावत्तरि अडवीसं बादालयं लवणे ।।६०३।।
दुतडादो सत्तसयं दुकोसअहियं चं होइ सिहरादो । णयराणि हु गयणतले जोयणदसगुणसहस्सवासाणि ।।६०४।।
वडवामुहपहुदीणं पासदुगे पव्वदा हु एक्केक्का । पुव्वे कोत्थुभसेलो इय बिदियो कोत्थुभासो दु ।।६०५।।
तहि तण्णामदुवाणा दक्खिणदो उदगउदगवासणगा । इहसिवसिवदेवसुरा संखमहासंखगिरिदु पच्छिमदो ।।६०६।।
तत्थुदयुदवासमरा दगदगवासद्दिजुगलमुत्तरदो । लोहिदलोहिदअंका तहिं वाणा विविहवण्णणया ।।६०७।।
धवला सहस्समुग्गय सव्वणगा अद्धघडसमायारा । उभयतडादो गत्ता बादालसहस्समत्थंति ।।६०८।।
तडदो गत्ता तेत्तियमेत्तियवासा हु विदिस अंतरगा । अडसोलस ते दीवा वट्टा सूरक्खचंदक्खा ।।६०९।।
तडदो बारसहस्सं गंतूणिह तेत्तियुदयवित्थारो । गोदमदीओ चिट्ठदि वायव्वदिसम्हि वट्टुलओ ।।६१०।।
बहुवण्णणपासादा वणवेदीसहिय तेसु दीवेसु । तस्सामी वलंधरणागा सगदीवणामा ते ।।६११।।
मागहतिदेवदीवत्तिदयं संखेज्जजोयणं गत्ता । तीरादो दक्खिणदो उत्तरभागेवि होदित्ति ।।६१२।।
दिसिविदिसंतरगा हिमरजताचलसिहरिरजदपणिधिगया । लवणदुगे पल्लठिदी कुमणुसदीवा हु छण्णउदी ।।६१३।।
दसगुण पण्णं पण्णं पणवण्णं सट्ठिमुवहिमहिगम्म । सय पणवण्णं पण्णं पणुवीसं वित्थडा कमसो ।।६१४।।
इगिगमणे पणणउदिमतुंगो सोलगुणमुवरि किं पयदे । दुगजोगे दीउदओ सवेदिया जोयणुग्गया जलदो ।।६१५।।

On entering one yojana in Lavaṇa sea from the shore, the depth of water as multiplied by sixteen gives the height above, as sixteen out of ninety-five parts of a yojana, then what will it be at desired distance ? The sum of both, the depth and height is the rise of the island (udaya of dvīpa) and is one yojana higher from the water of the island with altar. //6.915//

(तटसे लवण समुद्रमें) एक योजन प्रवेश करनेपर जलकी गहराई $\frac{१}{६५}$ योजन और सोलहसे गुणित अर्थात् $\frac{१६}{६५}$ योजन ऊपर ऊँचाई है, तो प्रकृत दूर जानेपर कितनी होगी? गहराई और ऊँचाई दोनोंका योग द्वीपका उदय है तथा वेदिका सहित द्वीप जलसे एक योजन ऊँचा है।।६१५।।

एगुरुगा लांगलिगा वेसणगा भासगा य पुव्वादी । सक्कुलिकण्णा कण्णप्पावरणा लंबकण्ण ससकण्णा ।।६१६।।
सिंहस्ससाणमहिसवराहमुहा वग्घूघूयकपिवदणा । झसकालमेसगोमुहमेघमुहा विज्जुदप्पणिभवदणा ।।६१७।।
अग्गिदिसादी सक्कुलिकण्णादी सिंहवदणणरपमुहा । एगूरुगसक्कुलिसुदिपहुदीणं अंतरे णेया ।।६१८।।
गिरिमत्थयत्थदीवा पुव्वुत्ता सगणगस्स पुव्वदिसि । पच्छा भणिदा पच्छिमभागे अत्थंति ते कमसो ।।६१९।।
एगोरुगा गुहाए वसंति जेमंति मिट्ठतरमट्टिं । सेसा तरूतलवासा कप्पद्दमदिण्णफलभोजी ।।६२०।।
चउवीसं चउवीसं लवणदुतीरेसु कालदुतडेवि । दीवा तावदियंतरवासा कुणरा वि तण्णामा ।।६२१।।
जिणलिंगे मायावी जोइसमंतोवजीवि धणकंखा । अइगउरवसण्णजुदा करंति जे परविवाहंपि ।।६२२।।
दंसणविराहया जे दोसं णालोचयंति दूसणगा । पंच्चग्गितवा मिच्छा मोणं परिहरिय भुंजंति ।।६२३।।
दुब्भावअसुचिसूदगपुप्फवईजाइसंकरादीहिं । कयदाणा वि कुवत्ते जीवा कुणरेसु जायंते ।।६२४।।
चउरिसुगारा हेमा चउकूड सहस्सवास णिसहुदया । सगदीववासदीहा इगिइगिवसदी हु दक्खिणुत्तरदो ।।६२५।।
कुलगिरिवक्खारणदीदहवणकुंडाणि पुक्खरदलोत्ति । ओवेधुस्सेहसमा दुगुणा दुगुणा दु वित्थिण्णा ।।६२६।।
सयलुद्धिणिभा वस्सा दिवड्ढदीवम्हि तत्थ सेलाओ । अंते अंकमुहाओ खुरप्पसंठाणया बाहिं ।।६२७।।

In the one and half islands, the regions are like the shape of spokes of wheels of a cart, and the interior shapes of the Kulācalas are like bolted mouths and the exterior shape are like the scrapers. //6.927//

द्व्यर्धद्वीपे अर्थात् डेढ़ द्वीपमें स्थित क्षेत्रोंका आकार तो शकटोद्धिका अर्थात् गाड़ीके पहियेके सदृश है तथा वहाँके कुलाचलोंका अभ्यन्तर आकार अंक मुख एवं बाह्य आकार क्षुरप्रसंस्थान सदृश है।।६२७।।

दुगचउरट्ठडसगइगि दुकला चउरडछपंचपणतिण्णि । चउकलमगरुद्धधरा जाणादिममज्झचरिमपरिहिं च ।।६२८।।

The areas occupied by the mountains of Dhātakīkhaṇḍa are given by the number in decimal notation as two, four, eight, eight, seven, one and two parts out of nineteen parts of a yojana. The areas occupied by the mountains of Puṣkarārdha are given by decimal numerals, four, eight, six, five, five, three yojanas, and four parts out of nineteen parts of a yojana. Oh ! disciple! know the initial, intermediate and external circumferences of these islands in order to know the diameters of Bharata etc. regions of these islands. //6.928//

धातकीखण्ड स्थित पर्वतों द्वारा दो, चार आठ, आठ, सात, एक और दो कला अर्थात् १७८८४२ $\frac{२}{१९}$ योजन क्षेत्र अवरुद्ध किया गया है और पुष्करार्धस्थ पर्वतों द्वारा चार, आठ, छह, पाँच, पाँच, तीन और चार कला अर्थात् ३५५६८४ $\frac{४}{१९}$ योजन क्षेत्र अवरुद्ध किया गया है। अब इन द्वीपोंमें स्थित भरतादि क्षेत्रोंका व्यास ज्ञात करने के लिए हे शिष्य! तू इन द्वीपोंकी आदि, मध्य और बाह्य परिधिको जान।।६२८।।

भरहइरावदवस्सा विदेहवस्सोत्ति चउबिगुणा वस्सा । गिरिविरहियपरिहीणं हारो बिण्णिसयबारं च ।।९२९।।

The regions from Bharata region upto Videha region and those from Airāvata region to Videha have their width four times sequentially, whose logos sum up to one hundred six. In order to take up both the parts, these are doubled, hence the two hundred twelve logos become the diviser of the circumference without the mountains. //6.929//

भरतक्षेत्रसे विदेहक्षेत्र पर्यन्त और ऐरावतसे विदेह पर्यन्त क्षेत्रोंका विष्कम्भ क्रमसे चौगुणा है जिनकी शलाकाओंका योग १०६ है। दोनों भागोंका ग्रहण करने के लिए इन्हें दूना किया। अर्थात् (१०६ x २) = २१२ शलाकाएँ हुईं। यही २१२ शलाकाएँ पर्वत रहित परिधिका भागहार है।।९२९।।

गिरि जुद दु भद्दसालं मज्झिमसूइम्हि धणरिणे सूई । पुव्ववरमेरुबाहिर अब्भंतरभद्दसालअंतस्स ।।९३०।।

The diameter of Meru mountain and double the width of both external Bhadrasāla forests are added to the intermediate linear width of the Dhātakīkhaṇḍa, giving the external linear width of the two Bhadraśāla forests of east-west Meru mountains [towards the Kālodaka]. From that very middle linear width, the diameter of Meru and the twice width of the Bhadraśāla forests are subtracted, resulting in the internal linear width of both the Bhadraśāla forests [towards the Lavaṇa sea]. //6.930//

मेरु पर्वतका व्यास और दोनों बाह्य भद्रशाल वनोंके दुगुने व्यासको धातकीखण्डके मध्यम सूची व्यासमें जोड़ देनेपर पूर्व पश्चिम मेरु पर्वतोंके दो भद्रशाल वनोंका (कालोदककी ओर) बाह्य सूची व्यासका प्रमाण प्राप्त होता है और उसी मध्यम सूची व्यासमें से मेरुका व्यास और भद्रशाल वनोंका दुगुना व्यास घटा देनेपर दोनों भद्रशाल वनोंका (लवण समुद्रकी ओर) अभ्यन्तर सूची व्यासका प्रमाण प्राप्त होता है।।९३०।।

गिरिरहिदपरिहिगुणिदं अडकदिणाविसयबारसेहि हिदं । णदिहीणदलं दीहं कच्छादिमगंधमालिणी अंते ।।९३१।।

The length of the Gandhamālinī land is obtained on multiplying the mountain-less internal circumference of the Bhadraśāla by square of eight, dividing by two hundred twelve and reducing the width of [Sītodā] river from the result and then halving it. Similarly, the langth of the Kaccha land is obtained on multiplying the mountain less external circumfernce of the Bhadraśāla by square of eight, dividing by two hundred twelve, and subtracting the width of Sītā river from the result and then on halving it. //6.931//

अभ्यन्तर भद्रशालकी पर्वत रहित परिधिको आठकी कृतिसे गुणितकर दो सौ बारहका भाग देनेपर जो लब्ध प्राप्त हो उसमेंसे नदी (सीतोदा) का व्यास घटाकर शेषको आधा करने पर गन्धमालिनी देशकी लम्बाईका प्रमाण प्राप्त होता है और बाह्य भद्रशालकी पर्वत रहित परिधिको आठकी कृतिसे गुणित कर दो सौ बारहका भाग देने पर जो लब्ध प्राप्त हो उसमेंसे सीता नदीका व्यास घटा कर अवशेषको आधा करनेपर कच्छदेशके आयामका प्रमाण प्राप्त होता है।।९३१।।

विजयावक्खाराणं विभंगणदिदेवरण्ण परिहीओ । बिण्णिसयवारभजिदा बत्तीसगुणा तहिं वड्ढी ।।९३२।।

सगसगवड्ढी णियणियपढमायामम्हि संजुदा मज्झे । दीहो पुणरवि सहिदो तिरिए णियचरिमदीहत्तं ।।९३३।।

The circumference of Videha, Vakṣāra, Vibhaṅga river and devāraṇya is multiplied by thirty-two and divided by two hundred twelve, resulting in the increase there. When the own amount of increase is added to one's own first length, the intermediate length and on adding it to the intermediate length, the one's own last length is obtained. // 6.932-933//

विदेह, वक्षार, विभंगा नदी और देवारण्यकी परिधिको बत्तीससे गुणितकर दो सौ बारहका भाग देनेपर वहाँ वहाँकी वृद्धिका प्रमाण प्राप्त होता है तथा अपनी अपनी वृद्धिका प्रमाण अपने अपने प्रथम आयाममें जोड़ देनेपर मध्यम आयाम और मध्यम आयाममें जोड़ देनेपर अपने अपने अंतिम आयामका प्रमाण प्राप्त होता है।।६३२-६३३।।

धादइपुक्खरदीवा धाइदपुक्खरतरूहिं संजुत्ता । तेसिं च वण्णणा पुण जंबूदुमवण्णणं व हवे ।।६३४।।

धादइगंगारत्तदु हिमसिहरिणगोवरि उजुं जादि । णवणभतिणविगि चलणं जंबू व पुक्खरे दुगुणं ।।६३५।।

मेरुणरलोयबाहिरसेलागाढं सहस्सपरिमाणं । सेसाणं सगतुरियं सव्वुवहीणं सहस्सं तु ।।६३६।।

अंते टंकच्छिण्णो बाहिं कमवड्ढिहाणि कणयणिहो । णदिणिग्गमपहचोद्दसगुहाजुदो माणुसुत्तरगो ।।६३७।।

मणुसुत्तरुदयभूमुहमिगिवीसं सगसयं सहस्सं च । बावीसहियसहस्सं चउवीसं चउसयं कमसो ।।६३८।।

तण्णगसिहरे वेदी चावाणं चदुस्सहस्सतुंगजुदा । सोहइ वलयायारा चरणण्णिदकोसवित्थारा ।।६३९।।

णइरिदिवायव्वदिसं वज्जिय छस्सुवि दिसासु कूडाणि । तियतियमावलियाए ताणब्भंतरदिसासु चउवसई ।।६४०।।

अग्गीसाणछकूडे गरुडकुमारा वसंति सेसे दु । दिग्गयबारसकूडे सुवण्णकुलदिक्कुमारीओ ।।६४१।।

पणदाललक्खमाणुसखेत्तं परिवेढिऊण सो होदि । उदयचउत्थोगाढो पुक्खरबिदियद्धपढमम्हि ।।६४२।।

कुंडलगो दसगुणिओ पणसदरिसहस्स तुंगओ रुजगे । चउरासीदिसहस्सा सव्वत्थुभयं सुवण्णमयं ।।६४३।।

चउ चउ कूडा पडिदिसमिह कुंडलपव्वदस्स सिहरिम्मि । ताणब्भंतरदिग्गय चत्तारि जिणिंदकूडाणि ।।६४४।।

वज्जं तप्पह कणयं कणयप्पह रजदकूड रजदाहं । सुमहप्पह अंकंकप्पह मणिकूडं च मणिपहयं ।।६४५।।

रुजगरुजगाह हिमवं मंदरमिह चारि सिद्धकूडाणि । अत्थंति सेसि कूडे कूडक्खसुरा कदावासा ।।६४६।।

On the top of this Kuṇḍalagiri there are four peaks in every one of the directions. In the four directions towards the interior, each of the four peaks correspond to Lord Jina with sixteen peaks, named as vajra, vajraprabha, kanaka, kanaka-prabha, rajata kūṭa, rajatābha, suprabha, mahāprabha, aṅka, aṅkaprabha, maṇikūṭa, maṇiprabha, rucaka, rucakābha, himavata, and mandara. The other four are accomplished peaks where there are Jina temples, In the remaining sixteen peaks, deities with names of their own peak resids.// 6.944-946//

इस कुण्डलगिरिके शिखरपर एक एक दिशामें चार कूट हैं। इनके अभ्यन्तरकी ओर चारों दिशाओंमें (एक एक) चार कूट जिनेन्द्र भगवान सम्बन्धी हैं उनके नाम- १. वज्र, २. वज्रप्रभ, ३. कनक ४. कनकप्रभ, ५. रजतकूट ६. रजताभ, ७. सुप्रभ, ८. महाप्रभ, ९. अंक, १०. अंकप्रभ, ११. मणिकूट, १२. मणिप्रभ, १३. रुचक, १४. रुचकाभ, १५. हिमवत और १६. मन्दर ये सोलह कूट हैं। अन्य चार सिद्धकूट हैं। जिनमें भगवानके चैत्यालय हैं। अवशेष १६ कूटोंमें अपने अपने कूट सदृश नाम वाले देव निवास करते हैं।।६४४-६४६।।

पुव्वादिसु पुह अड अड अंते चउ चारि चारि कूडाणि । रुजगे सव्वब्भंतरचत्तारि जिणिंदकूडाणि ।।६४७।।

कणयं कंचण तवणं सोत्थियकूडं सुमद्दमंजणयं । अंजणमूलं वज्जं तत्थेदा दिक्कुमारी ओ ।।६४८।।

विजयाय वइजयंती जयंति अवरजिदाय णंदेत्ति । णंदवदी णंदुत्तर णामांतो णंदिसेणेत्ति ।।६४९।।

फलिह रजदं व कुमुदं णलिणं पउमं ससीय वेसवणं । वेलुरियं देवीओ इच्छापढमा समाहारा ।।६५०।।

सुपइण्णाय जसोहर लच्छी सेसवदि चित्तगुत्तोत्ति । चरिम वसुंधरदेवी अमोहमह सोत्थियं कूडं ।।६५१।।

तो मंदर हेमवदं रज्जं रज्जुत्तमं च चंदमवि । पच्छिम सुदंसणं पुण इलादिदेवी सुरादेवी ।।९५२।।

पुढवी पउमवदी इगिणासो देवी य णवमिया सीदा । भद्दा तो विजयादी चउकूडं कुंडलं रुजगं ।।९५३।।

तो रयणवंत सव्वादीरयणं उत्तरे अलंबूसा । बिदिया दु मिस्सकेसीदेवी पुण पुंडरीगिणि सा ।।९५४।।

वारुणि आसासच्चा हिरिसरि पुव्वगयदिक्कुमारीओ । भिंगारं धरिदूणिह दक्खिणदेवीउ मुकुरुंदं ।।९५५।।

पश्चिमगा छत्ततयं उत्तरगा चामरं पमोदजुदा । तित्थयरजणणिसेवं जिणजणिकाले पकुव्वंति ।।९५६।।

पुव्वे विमलं कूलं णिच्चालोयं सयंपहं अवरे । णिच्चुज्जोदं देवी कमसो कणया सदादिदहा ।।९५७।।

कणयादिचित्त सोदामणि सव्वदिसप्पसण्णदं देंति । तित्थयरजम्मकाले कूलं वेलुरियरुजगमदो ।।९५८।।

मणिकूडं रज्जुत्तममिह रुजगा रुजगकित्ति रुजगादी । कंता रुजगादिपहा जिणजादयकम्मकदिकुसला ।।९५९।।

सव्वेसिं कूडाणं जोयणपंचसय भूमिवित्थारो । पणसयमुदओ तद्दलमुहवासो कुण्डले रुजगे ।।९६०।।

जंबूदीवे वाणो अणादरो सुट्ठिदो य लवणेवि । धादइखंडे सामी पभासपियदंसणा देवा ।।९६१।।

कालमहकाल पउमा पुंडरियो माणुसुत्तरे सेले । चक्खुमसुचक्खुमा सिरिपहधर पुक्खरुवहिम्हि ।।९६२।।

वरुणो वरुणादिपहो मज्झो मज्झिमसुरो य पंडुरओ । पुप्फादिदंत विमला विमलप्पह सुप्पहा महप्पहओ ।।९६३।।

कणय कणयाह पुण्णा पुण्णप्पहा देवगंधमहागंधा । तो णंदी णंदिपहो भद्दसुभद्दा य अरुण अरुणपहा ।।९६४।।

ससुगंध सव्वगंधो अरुणसमुद्दम्हि इदि पहू दो द्दो । दीवसमुद्दे पढमो दक्खिणभागम्हि उत्तरे बिदियो ।।९६५।।

आदीदो खलु अट्ठमणंदीसरदीववलयविक्खंभो । सयसमहियतेवट्ठीकोडी चुलसीदिलक्खा ये ।।९६६।।

Begining from the Jambū island, the width of the ring of the eighth island, the Nandīśvara, is one hundred sixty-three crore eighty-four lac yojanas. // 6.966//

जम्बूद्वीपसे प्रारम्भकर आठवें नन्दीश्वरद्वीप पर्यन्तका वलयव्यास एक सौ त्रेसठ करोड़ चौरासी लाख योजन प्रमाण है।।९६६।।

एक्कचउक्कट्ठंजणदहिमुहरइयरणगा पडिदिसम्हि । मज्झे चउदिसवावीमज्झे तब्बाहिरदुकोणे ।।९६७।।

In the centre of every direction of Nandīśvara island, there is one, and in the centre of the tanks there are four corresponding to four directions, then out of the tanks in each of the two corners, there are the eight mountains respectively, called as the Añjana, the dadhimukha and the ratikara.// 6.967//

नन्दीश्वर द्वीपकी प्रत्येक दिशाके मध्यमें एक, चारों दिशा सम्बन्धी बावड़ियोंके मध्यमें चार और बावड़ियोंके बाह्य दो दो कोनोंमें एक एक अर्थात् ८ क्रमशः अंजन, दधिमुख और रतिकर नामके पर्वत हैं।।९६७।।

अंजणदहिकणयणिहा चुलसीदिदहेक्कजोयणसहस्सा । वट्टा वासुदएणय सरिसा बावण्णसेलाओ ।।९६८।।

The three mountains Añjana, Dadhimukha and the ratikara have coluors simlar to collyrium, curd and gold. These are eighty-four thousand, ten thousand and one thousand yojanas respectively. Their height and diameter are equal. Their shape is circular, and they are fifty-two mountains. // 6.968//

अंजन, दधिमुख और रतिकर पर्वत यथाक्रम अंजन, दधि और स्वर्ण सदृश वर्ण वाले हैं। ये क्रमशः चौरासी हजार, दस हजार और एक हजार योजन प्रमाण वाले हैं। इनका उदय (ऊँचाई) और व्यास सदृश है। आकार गोल है। इस प्रकार ये वावन पर्वत हैं।।९६८।।

णंदा णंदवदी पुण णंदुत्तर णंदिसेण अरविरया । गयवीदसोगविजया वईजयंती जयंती य ॥६६९॥

अवराजिदा य रम्मा रमणीया सुप्पभा य पुव्वादी । रयणतडा लक्खपमा चरिमा पुण सव्वदोभद्दा ॥९७०॥

In the eastern etc. four directions, these are tanks of one lac yojanas, in measure with shores full of gems, named as Nandā, Nandāvatī, Nandottara, Nandiṣeṇa, Arajā, Virajā, Gataśoka, Vītaśoka, Vijaya, Vaijayanta, Jayanta, aparājit, Ramyā, Ramaṇīyā, Suprabhā and Sarvatobhadrā.// 6.969-970//

पूर्वादि चारों दिशाओंमें क्रमशः नन्दा, नन्दवती, नन्दोत्तरा, नन्दिषेणा, अरजा, विरजा, गतशोका, वीतशोका, विजया, वैजयन्ती, जयन्ती, अपराजिता, रम्या, रमणीया, सुप्रभा और सर्वतोभद्रा रत्नमय तटसे युक्त ये सर्व वापिकायें एक लाख योजन प्रमाण वाली हैं॥९६९-९७०॥

सव्वे समचउरस्सा टंकुक्किण्णा सहस्समोगाढा । वेदियचउवण्णजुदा जलयरउम्मुकजलपुण्णा ॥९७१॥

All these tanks are cuboid made out of stone, with depth of one thousand yojanas, with four forests for each, without water-bios, and full of water. // 6.971//

वे सर्व वापिकाएँ समचतुरस्र, टंकोत्कीर्ण, एक हजार योजन अवगाह युक्त, चार चार वनोंसे सहित, जलचर जीवोंसे रहित और जलसे परिपूर्ण हैं॥९७१॥

वावीणं पुव्वादिसु असोयसत्तच्छदं च चंपवणं । चूदवणं च कमेण य सगवावीदीहदलवासा ॥९७२॥

In the eastern etc. directions of those tanks long similar to the length of their own tank respectively, and with width half of the langth are the forests of Aśoka, Saptacchada, compaka and Āmra. // 6.972//

उन वापिकाओंकी पूर्वादि दिशाओंमें क्रमशः अपनी वापीकी दीर्घताके सदृश लम्बे (१००००० यो.) और लम्बाईके अर्धप्रमाण चौड़े (५०००० यो.) अशोक, सप्तच्छद, चम्पक और आम्रके वन हैं॥९७२॥

तब्बावण्णणगेसुवि बावण्णजिणालया हवंति तहिं । सोहम्मादी बारसकप्पिंदा ससुरभवणतिया ॥९७३॥

गयहरकेसरिवसहे सारसपिकहंसकोकगरुडे य । मयरसिहिकमलपुप्फयविमाणपहुदिं समारूढा ॥९७४॥

दिव्वफलपुप्फहत्था सत्थाभरणा सचामराणीया । बहुधयतूरारावा गत्ता कुव्वंति कल्लाणं ॥९७५॥

पडिवरिसं आसाढे तह कत्तियफग्गुणे य अट्ठमिदो । पुण्णदिणोत्ति यभिक्खं दो द्दो पहरं तु ससुरेहिं ॥९७६॥

On those fifty-two mountains there are fifty-two jina temples. On those mountainous temples, the Saudharma etc. indras of twelve kalpas, with other deities, the kalpavāsī and the bhavanatrika, riding on the elephant, horse, lion, bull, stork, cuckoo, swan, ruddy goose, large heron, crocodile, peacock, lotus, puṣpaka celestial planes, with divine fruits and flowers in hands, in gracious ornament, whiskers, armies, flags and musical instruments and notes, go to the Nandīśvara island on the Aṣāḍha, Kārtikā, Phālguna months of every year from the white eighth to the full moon, continuously for six hours each, worship various kalyāṇa, aindradvaja etc. worships. //6.973-976//

उन बावन पर्वतोंपर बावन ही जिनालय हैं। उनमें अन्य कल्पवासीदेवों और भवनत्रिकदेवों सहित सौधर्मादि बारह कल्पोंके इन्द्र, हाथी, घोड़ा, सिंह, बैल, सारस, कोयल, हंस, चकवा, गरुड़, मगर, मोर, कमल और पुष्पक विमान आदिपर समारूढ़ हो (अपने परिवार देवों सहित) हाथोंमें दिव्य फल और दिव्य पुष्प धारणकर प्रशस्त आभरणों, चामरों, सेनाओं, ध्वजाओं एवं वादित्रोंके शब्दोंसे संयुक्त होते हुए, नन्दीश्वरद्वीप जाकर प्रत्येक वर्षकी आषाढ, कार्तिक और फाल्गुन मासकी अष्टमीसे प्रारम्भकर पूर्णिमा पर्यन्त निरन्तर दो दो पहर तक कल्याण अर्थात् ऐन्द्रध्वज आदि पूजन करते हैं॥९७३-९७६॥

सोहम्मो ईसाणो चमरो वइरोचणो पदक्खिणदो । पुव्ववरदक्खिणुत्तरदिसासु कुव्वंति कल्लाणं ।।६७७।।

Saudharmedra, Īśānendra, Cāmara and Verocana worship in the east, south, west and north directions in circumambulating form. // 6.977//

सौधर्मेन्द्र, ईशानेन्द्र, चमर और वैरोचन ये प्रदक्षिणा रूपसे पूर्व, दक्षिण, पश्चिम और उत्तर दिशाओंमें पूजा करते हैं।।६७७।।

आयामदलं वासं उभयदलं जिणघराणमुच्चत्तं । दारुदयदलं वासं आणिद्दाराणि तस्सद्धं ।।६७८।।

वरमज्झिमअवराणं दलक्कमं भद्दसालणंदणगा । णंदीसरगविमाणगजिणालया होंति जेट्ठा हु ।।६७६।।

सोमणसरुजगकुंडलवक्खारिसुगारमाणुसुत्तरगा । कुलगिरिगा वि य मज्झिम जिणालया पांडुगा अवरा ।।६८०।।

जोयणसय आयामं दलगाढं सोलसं तु दारुदयं । जेट्ठाणं गिहपासे आणिद्दाराणि दो द्दो दु ।।६८१।।

वेयड्ढजंबुसामलिजिणभवणाणं तु कोस आयामं । सेसाणं सगजोग्गं आयामं होदि जिणदिट्ठं ।।६८२।।

चउगोउरमणिसालति वीहिं पडि माणथंभ णवथूहा । वणधयचेदियभूमी जिणभवणाणं च सव्वेसिं ।।६८३।।

जिणभवणे अट्ठसया गब्भगिहा रयणथंभवं तत्थ । देवच्छंदो हेमो दुगअडचउवासदीहुदओ ।।६८४।।

सिंहासणादिसहिया विणीलकुंतल सुवज्जमयदंता । विद्दुमअहरा किसलयसोहारहत्थपायतला ।।६८५।।

दसतालमाणलक्खणभरिया पेक्खंत इव वदंता वा । पुरुजिणतुंगा पडिमा रयणमया अट्ठअहियसया ।।६८६।।

चमरकरणागजक्खगबत्तीसंमिहुणगेहि पुह जुत्ता । सरिसीए पंतीए गब्भगिहे सुट्ठु सोहंति ।।६८७।।

सिरिदेवी सुददेवी सव्वाण्हसणक्कुमारजक्खाणं । रूवाणि य जिणपासे मंगलमट्ठविहमवि होदि ।।६८८।।

भिंगारकलसदप्पणवीयणधयचामरादवत्तमहा । सुवइट्ठ मंगलाणि य अट्ठहियसयाणि पत्तेयं ।।६८६।।

मणिकणयपुप्फसोहियदेवच्छंदस्स पुव्वदो मज्झे । वसईए रूप्पकंचणघडासहस्साणि बत्तीसं ।।६६०।।

महदारस्स दुपासे चउवीससहस्समत्थि धूवघडा । दारबहिं पासदुगे अट्ठसहस्साणि मणिमाला ।।६६१।।

तम्मज्झ हेममाला चउवीसं वदणमंडवे हेमा । कलसामाला सोलस सोलसहस्साणि धूवघडा ।।६६२।।

महुरझणझणणिणादा मोत्तियमणिणिम्मिया सकिंकिणिया । बहुविहघंटाजाला रइदा सोहंति तम्मज्झे ।।६६३।।

वसईमज्झगदक्खिणउत्तरतणुदारगे तदद्धं तु । तप्पुट्ठे मणिकंचणमालडचउवीसगसहस्सं ।।६६४।।

जिणगिहवासायामो तप्पुरदो सोलसोच्छिओ होदि । मुहमंडओ तदग्गे पिक्खण चउरस्स मंडवओ ।।६६५।।

सदवित्थारो साहियसोलुदओ हेमपीडियं पुरदो । चउरस्सं जोयणदुगसमुच्छयं सीदिवित्थारं ।।६६६।।

तम्मज्झे चउरस्सो मणिमय चउविंदवास सोलुदओ । अट्ठाणमंडओ तप्पुरदो तालुदयथूवमणिपीढं ।।६६७।।

तं पुण चउगोउरजुदबारंबुजवेदियाहि संयुत्तं । मज्झे मेहलतियजुद चउघणदीहुदयवास बहुरयणो ।।६६८।।

थूहो जिणविंबचिदो णवण्हमेवं कमेण तप्पुरदो । वासायामसहस्सं बारसवेदिजुद हेममयपीठं ।।६६६।।

तहिं चउदीहिगिवासक्खंधा बहुमणिमया ससालतिया । बारहजोयण आयदचउमहसाहा अणेयतणुसाहा ।।१०००।।

बारहजोयणवित्थडसिहरा सिद्धत्थचेत्तणामतरू । णाणादलपुप्फफला पंचहियापउमपरिवारा ।।१००१।।

मूलगपीठणिसण्णा चउद्दिसं चारि सिद्धजिणपडिमा । तप्पुरदो महकेदू पीठे चिट्ठंति विविहवण्णणगा ।।१००२।।

सोलुदय कोसवित्थड कणयत्थंभग्गगा हु रयणमया । चित्तवडछत्ततिदया बहुगा जणणयणमणरमणा ।।१००३।।
तप्पुरदो जिणभवणं तच्चउदिस विविहकुसुम चउ दहगा । दसगाढसयदलायदवासा मणिकणयवेदिजुदा ।।१००४।।
पुरदो सुरकीडणमणिपासादद्दु होंति वीहिपासदुगे । पण्णुदयं दलवासो तप्पुरदो तोरणं होदि ।।१००५।।
तं मणिथंभग्गठियं मुत्ताघंटासुजाल पण्णुदयं । तद्दलजोयणवासं जिणबिंबकदंवरमणिज्जं ।।१००६।।
पुरदो पासाददुगं फलिहादिमसालदारपासदुगे । अब्भंतरे सदुदयं दलवासं रयणसंघडियं ।।१००७।।
जं परिमाणं भणिदं पुव्वगदारम्हि मंडवादीणं । दक्खिणउत्तरदारे तदद्धमाणं गहीदव्वं ।।१००८।।
वंदणभिसेयणच्च णसंगीयवलोयमंडवेहिं जुदा । कीडणगुणणगिहेहि य विसालवरपट्टसालेहिं ।।१००९।।
सिहगयवसहगरुडसिहिंदिणहंसारविंदचक्कधया । पुह अट्ठसया चउदिसमेक्केक्के अट्ठसय खुल्ला ।।१०१०।।
चउवणमसोयसत्तच्छदचंपयचूदमेत्थ कप्पतरू । कणयमयकुसुमसोहा मरमयमयविविहपत्तड्ढा ।।१०११।।
वेलुरियफला विद्दुमविसालसाहा दसप्पयारा ते । पल्लंकपाडिहेरग चउदिसमूलगय जिणपडिमा ।।१०१२।।
सालत्तयपीढत्तयजुत्ता मणिसाहपत्तपुप्फफला । तच्चउवणमज्झगया चेदियरुक्खा सुसोहंति ।।१०१३।।
णंदादीय तिमेहल तिवीढया भंति धम्मविहवावि । पडिमाधिट्ठियमुड्ढा वणभूचउवीहिमज्झम्हि ।।१०१४।।

अथप्रशस्तिः

जिणसिद्धाणं पडिमा अकिट्टिमा किट्टिमा दु अदिसोहा । रयणमया हेममया रूप्पमया ताणि वंदामि ।।१०१५।।
कोडी लक्ख सहस्सं अट्ठय छप्पण्ण सत्तणउदी य । चउसदमेगासीदी गणणगए चेदिए वंदे ।।१०१६।।
तिहुवणजिणिदगेहे अकिट्टिमे किट्टिमे तिकालभवे । वणकुमरविडंगामरणरखेचरवंदिए वंदे ।।१०१७।।
इदि णेमिचंदमुणिणा अप्पसुदेणभयणंदिवच्छेण । रइयो तिलोयसारो खमंतु तं बहुसुदाइरिया ।।१०१८।।

टीकाकारवक्तव्यम्

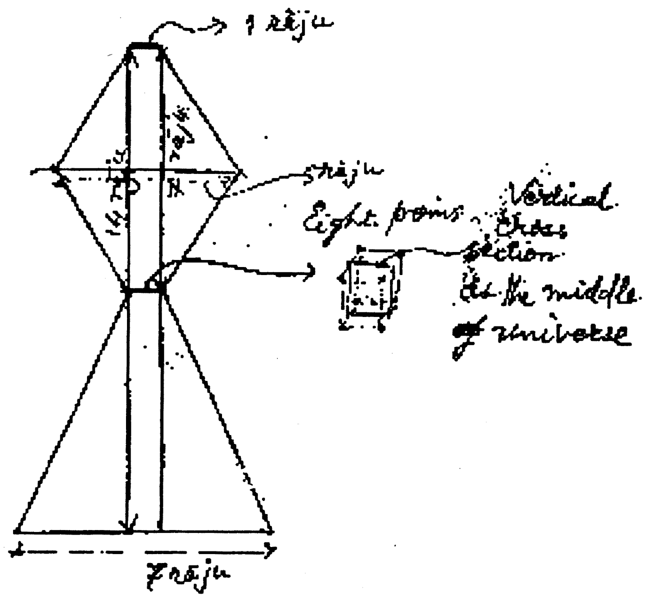
गुरुणेमिचंदसम्मदकदिवयगाहा तहिं तहिं रइदा । माहवचंदतिविज्जेणिणमणसरणिज्जमज्जेहिं ।।१।।
अरहंतसिद्ध आइरियुवज्झयासाहु पंचपरमेट्ठी । इय पंचणमोक्कारो भवे भवे मम सुहं दिंतु ।।२।।

***

TRILOKSĀRA

(v.1.3)

In the very central portion of the whole space which has 16 kha kha kha space-points, is the universe having L^3 number of space points where L is the universe line. In the central most of the universe are eight points, in the shape of the sucklings of a cow. The L^3 is an even number, hence the middle point is the set of two points, the cube of which given eight points.



At the centre of the universe, there is the mountain Sudarśana meru, whose centre lies on these eight points, forming a Des certes frame, defined for locating the position of any object, moving or stationary, as they show the cardinal directions. When the Arihanta omniscient performs extrication (samudghāta), the eight central points of the universe and eight central points of the omniscient are coincident.

Fredrick kohl has given various shaoes for there eight points in his doctoral thesis, 'Das physikalische and biologische weltbild dar Indischen Jaina-Sekte, Aligarh,1956, P. 26.

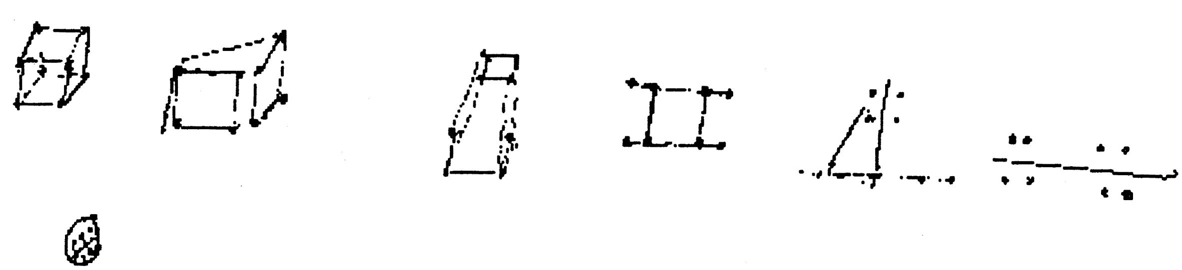


figure 1.1- A

There are eleven types of infinities described in the Dhavalā, 2.2.2, book 3, p.11, given as nāmānanta (infinite denomination) sthāpanānanta (established as infinite), dravyānanta (fluent-infinite), sāsvatānanta (ever-lasting infinite), gaṇanānanta (calculation-infinite), apradesikānanta (infinite as single ultimate particle), ekānanta (monodirectional infinite), ubhayānanta (two directional infinite), vistārānanta (extension-inifinite), sarvānanta (infinite in cube form), and bhāvānanta (infinite in phase). Here sarvānanta which is acceptable in the context of space, denotes the cube whose sides in the directions are infinite.

The word "Pradeśa" is derived from 'Pradiśyante' meaning an ultimate particle (SVS, 2/38). The space occupied by an ultimate particle of matter (pudgala) is called a pradeśa (point) (TVR, 2/8).

In a bios, according to bond ab-aeterno there are eight central points (TVR, 5/24). Which form the eight points of a cube on its corners.

(v.1.4)

The universe has been said to be non-artificial, ab-aeterno, naturally functioning, containing or accommodating the bios and non-bios classes, a part of the whole space, and eternal.

(v.1.5)

The universe contains the six fluents-space, time, dharma (motion-causality continum), adharma (rest-causality continum), matter (fusion-fission) and bios.

(v.1.6 et seq.)

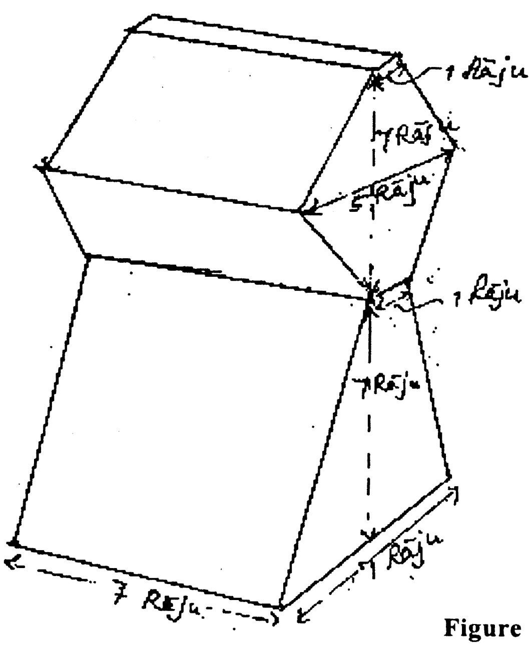


Figure 1. 2

This is the required shape of the universe. The volume is L^3 where one rāju = $\frac{L}{7}$. Total height is 14 rājus The upper universe is formed of two wedges, one up and other below, each one a base recatangle with 7 rāju length and 5 rāju breadth. Each has a height of $3\frac{1}{2}$ rāju.

The lower universe is also a wedge shaped or a trapezoid shaped solid with length and breadth of 7 rāju as base and top 1 rāju by 7 rāju as shown in the figure. This is finite volume measuring 343 cubic rāju in all or $L^3 = 343$ or $(7 \text{ rāju})^3 = 343$ cubic rāju. ....(1.1)

Numerical Symbolism

The rāju is one seventh part of jagaśreṇī (universe-line) let the numerical symbol for jagaśreṇī be based on that of palya as followed by the commentator, Mādhavacandra Traividya. Let 16 denote the measure of palya and innumerate be donoted by 2, let the cubic finger (ghanāṅgula) be denoted by

$$2^{2^5} \times 2^{2^4} \quad \text{or} \quad \left[2^{2^4}\right]^3 \quad \text{or} \quad [655.36]^3 .$$

Now the relation between jagaśreṇī and ghanāṅgula is given by

$$\text{jagaśreṇī} = [\text{ghanāṅgula}]^{\frac{\log_2 \text{palya}}{A}} \qquad ......(1.2)$$

Here, placing the numerical symbolism, we have

$$\text{jagaśreṇī} = [(65536)^3]^{\frac{\log_2 16}{2}} = [(65536)^3]^{\frac{4}{2}} = [(65536)^3]^2 \qquad .....(1.3)$$

$$\text{or} \quad \text{jagaśreṇī} = [(65536)^2 \times (65536)^4] \qquad ....(1.4)$$

$$\text{or} \quad \text{jagaśreṇī} = 2^{2^5} \times 2^{2^6} \qquad ....(1.5)$$

Here 2^{2^4} is paṇṇaṭṭhī, or 65536

2^{2^5} is called bādāla or 4294967296

and 2^{2^6} is called ekaṭṭhī or 18446744073709551616.

Similarly,

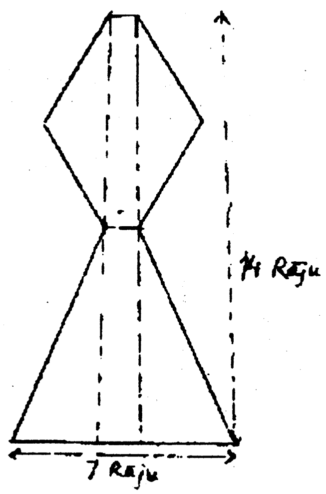
$$\text{sūcyaṅgula} = [\text{Palya}]^{\log_2 p} = [16]^{\log_2 16} = [16]^4 = 2^{2^4}$$

$$= 65536. \qquad ......(1.6)$$

Thus ghanāṅgula $= (\text{sūcyaṅgula})^3 = (65536)^3$ ......(1.7)

It may be further noted that, before Vīrasenācārya, the universe was assumed to be formed from the frustrums of three cones, as below:

Figure 1.3



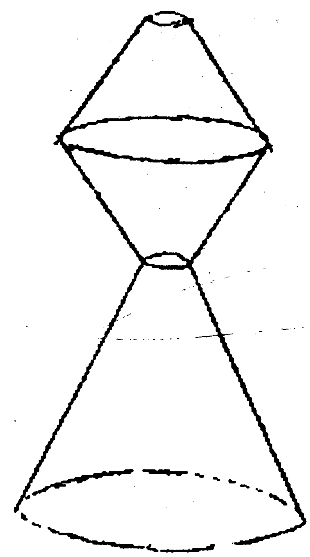


Figure 1.4

Universe inform of a drum

Drum shaped Universe as before Vīrasenācārya

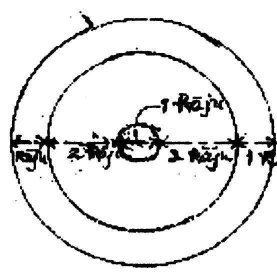
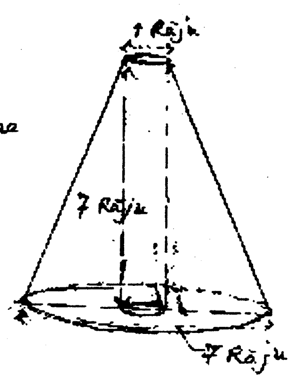


Figure 1.5

Plan of the drum shaped universe

Figure 1.6



Vīrasenācārya, through the method of tearing, exhausion and integration found the total volume of the three frustra. Dr. A.N.Singh has given the following details for finding out the volume of the frustrum of the cone. He has followed the commentary of SKG, the DVL, to find the volume of the lowest frustrum (fig. 1.6), where

Diameter of base	=	7 units
Diameter of face	=	1 unit
Height	=	7 units

Dr. A.N. Singh translates the commentary as follows* of this; the horizontal circular boundary at the face having the uni-dimensional thickness has (its) circumference (of length) this : $\frac{355}{113}$. Half of this multiplied by half of the diameter becomes this: $\frac{355}{452}$. Now, we want to find out (the volume of the lower portion. (The above obtained area) being multiplied by seven will yield $5\frac{225}{452}$ for the volume of the hollowed space. (i.e. the volume of the cylinder which we take out.(fig.1.6)

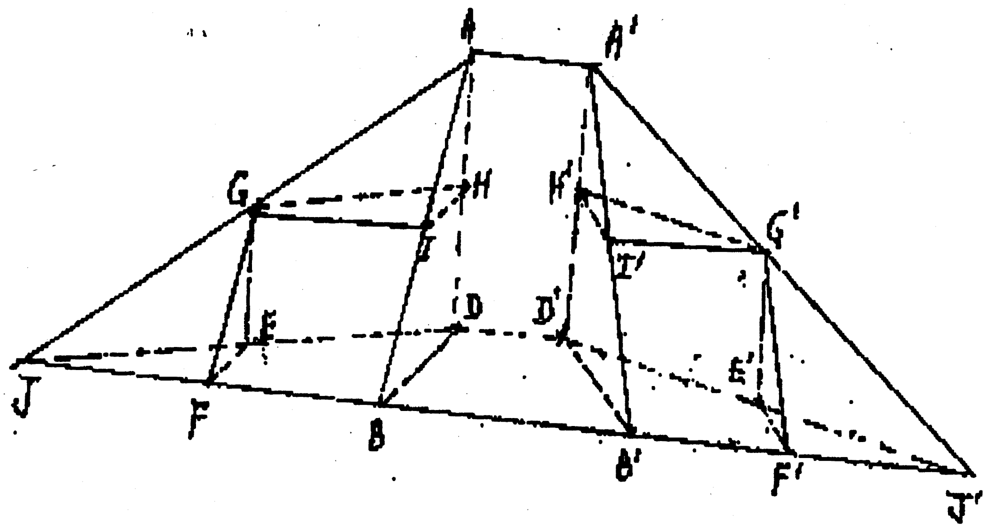


Figure 1.7

Now dividing the needle-less (cylinder less) volume which is fourteen units deep into two parts, then taking the lower part (see figure 1.4), cutting it from the top (downwards) and spreading it yields a volume like a winnowing pan: Of this the face length is this $\frac{355}{113}$. Dts base length is this $21\frac{112}{113}$. Here, cutting it from the face-ends downwards are obtained two triangular volumes and one volume on a rectangular base (see figure 1.7).

* cf. The Jain Antiquary, vol.XVI, no. II, December, 1950, Arrah (India), pp.53-69.

Now we find out the volume of the middle part. Its height is seven units, and its length is this $35\frac{355}{113}$. In the face the breadth is uni-dimensional (i.e. zero), and at the base the thickness is three units. So the face length multiplied by seven and (also) by half the thickness of the base, the volume of the middle part will be this $32\frac{225}{226}$.

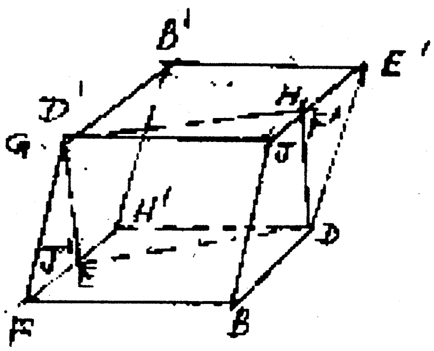


Figure 1.8

Now, of the remaining two volumes (tetrahedrons) of height seven units, since the length of the arms is forty-eight parts of one hundred thirteen parts of a unit and nine units (i. e. $9\frac{48}{113}$ units). Bases and arms correspond to hypoteneuses. Taking the hypoteneuses, both of them, and cutting from the middle in both (horizontal and vertical) directions gives rise to three volumes (in each tetrahadron). (See fig. 1.7)

Then in respect of two of the volumes, the height (HD and H'J' each) is three and a half units; the length (FB and F'B' each) being 161 parts out of 226 parts of a unit increased by 4 units (i.e. $4\frac{161}{226}$ units); The thickness on the right (B'D') and left (BD) bottom sides (each) being 3 units; on the right and left sides in the top and the bottom the respective thickness being one and a half units, and in the remaining two corners the thickness is uni-dimensional (i.e., zero). Elsewhere gradually incresing thickness having been obtained, (so) when the second body after reversing it is placed on the first body there will be produced a body of uniform thickness of 3 units. (see fig.4) The length of this multiplied by the height and then multiplied by the thickness will be this : $49\frac{217}{452}$.

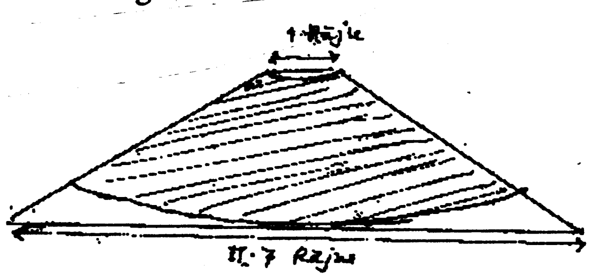
(Now) the remaining four bodies have three and half units height, and heve arms of length 161 parts out of 226 parts of unity increased by four units it. ($4\frac{161}{226}$ units). Their hypotenueses being taken and they being cut in both (horizontal and vertical) directions from the middle yield four volumes on quadrilateral bases and eight volumes on triangular bases.

Here the (total) volume of the four bodies on quadrilateral bases will be one fourth of the (total) volume of the two (similar) aforesaid bodies. The four bodies taken together, two at a time (as before) and they being placed together in respect of thickness, produce a thickness of 3 units, (and) the length and height are found to be half of the length and height of the volume mentioned before. How is the thickness of the solid obtained by joining the four together is 3 units? (Because) the length of the present solid is half of the length etc. of the solid mentioned before, and the height (also) is seen to be half as compared to the height of the presious solid.

Now, cutting the remaining eight volumes (tetra hedrons) as before, there (are obtained) sixteen tetrahedrons with heights, lengths, thicknesses etc. half of those of the previous ones; removing these (sixteen tetrahedrons) the combined volumes of the (remaining) eight volumes on quadrilateral bases is one fourth of that of the four (such) volumes before.

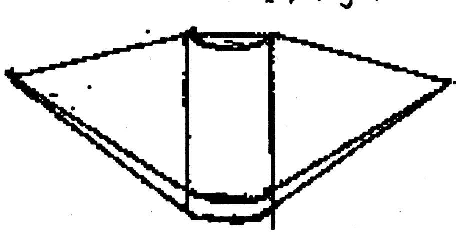
In this way, being sixteen, thirty-two, sixty-four and so on, step by step, are obtained volumes on quadrilatral bases with (combined) volumes being one fourth of the preceeding; this goes on till the step of further indivisibility is reached.

Now, we describe the method of finding the total of the unlimited volumes (bodies) so produced. It is thus: the volumes obtained are in succession four-fold, there fore; there the last volume multiplied by four and divided by that minus one, (i.e., by 3) will give this: $65\frac{110}{113}$. (There fore) the total volume of the lower universe is this $104\frac{207}{452}$. Some more illustrative figures aie as foll



The lower universe stretched after tear. (plan)

Figure 1.9



The plan of the lower universe, as it is

Figure 1.10

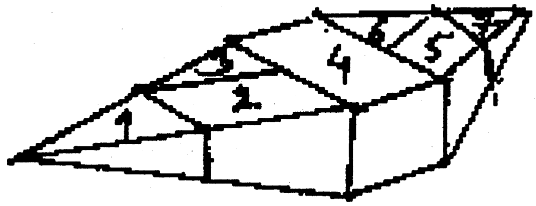
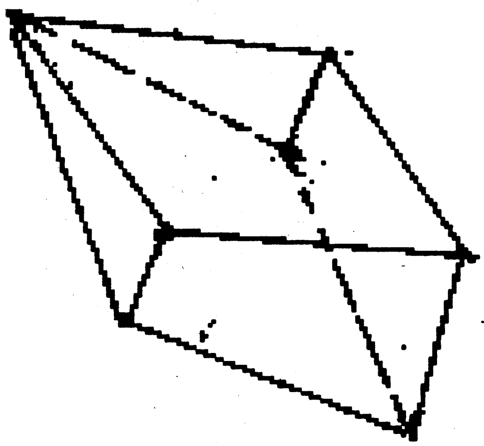


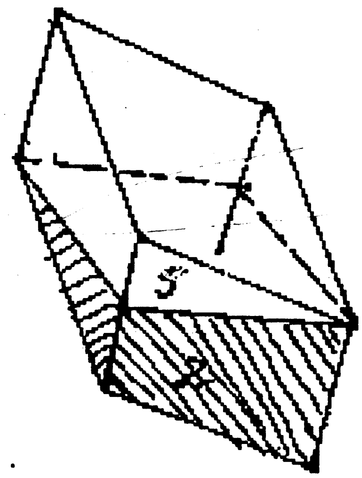
Figure 1.11

The teared portion of the lower universe, as in parts plan.



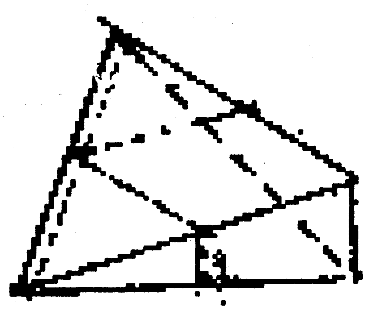
parts no. 2 and 5 as they seem

Figure 1.12



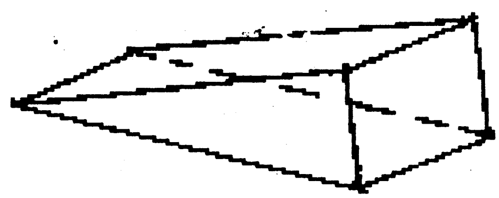
The figure appearing after 5 is placed over part 2

Figure 1.13



Parts 1, 3, 6, 7, as they appear in trangleand rectangular parts,

Figure 1.14



Part in the middle, no. 4 as it seems

Figure 1.15

Then Dr. A.N. Singh shows the main items of interest in the above, from the point of view of History of Mathematics:

(i) It has been assumed that a body with curved boundaries can be deformed into another with plane boundaries in such a way that its volume remains unchanged. In particular, if the hollowed out cone of figure (2) is deformed into the figure (3) which has plane boundaries then the volume remains unchanged.

(ii) The principle of construction for the purpose of demonstration or proof has been assumed to hold true. In particular,, this principle has been used to find the volume of the tetrahedrons ABCD and A'B'C'D'.

(iii) The formula $S = \frac{a}{1 - r}$, $r < 1$, for the sum of the geometric series $S = a + a r + a r^2 + \ldots\ldots + a r^n + \ldots\ldots$ has been assumed.

(iv) The value of π has been taken to be $\pi = \frac{355}{115}$.

Reconstruction of proofs of Mensuration formulae

1. **Rectangle :** The area of a rectangle is equal to its length and breadth.

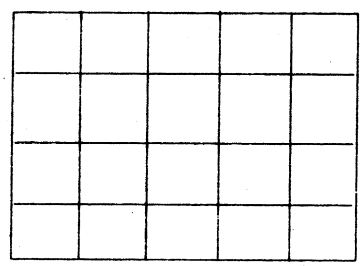
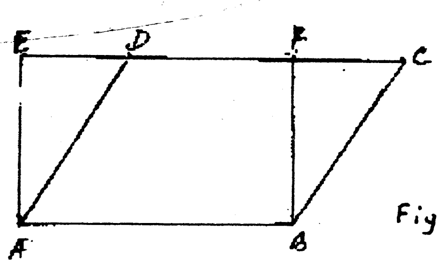


Figure 1.16

2. **Parallelogram :** The area of a parallelogram is equal to the length of its base multiplied by its height.



Construction: Cut the portion BCF (BF CD) and take it to the other side (AED). The resulting figure is a rectangle, hence the theorem.

Figure 1.17

First Principle of Deformation: If one of the sides of a parallelogram is moved along itself, the area of the parallelogram remains unchanged.

In the figure ABCD; CD sliding in its own line is moved to the position FE giving the rectangle of equal area.

3. Triangle : The area of a triangle is equal to half the length of its base multiplied by its height.

This result is true because a triangle is half of a parallelogram on the same base and of the same height.

Second Principle of Deformation. If the vertex of a triangle is moved parallel to the base, the area of the triangle remains unchanged.

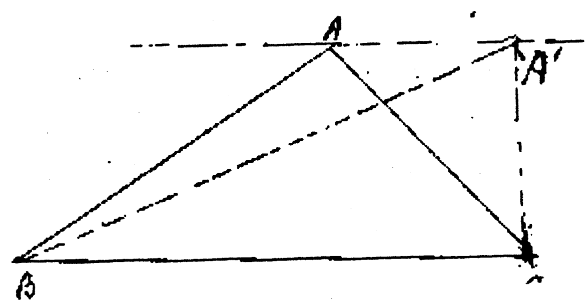
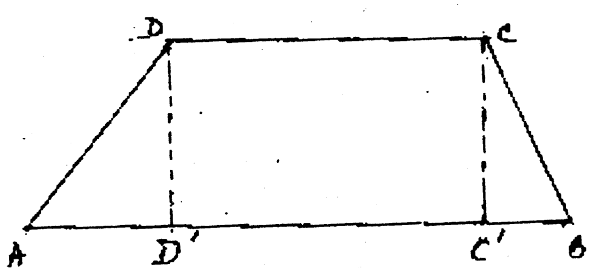


Figure 1.18

4. Trapezium: The area of a trapezium is equal to half the sum of the length of its base and face multiplied by its height.



The result follows from the construction shown in the figure. The principle of deformation holds true in the case of a trapezium also, ie. the area of the trapezium is unaffected by a deformation brought about by moving one of the parallel sides in its own line.

Figure 1.19

5. Sector of a circle- The area of a sector of a circle is equal to half the length of its arc multiplied by its radius.

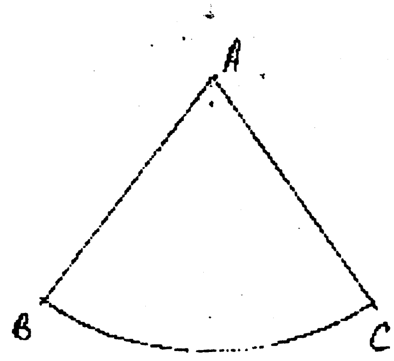


Figure 1.20

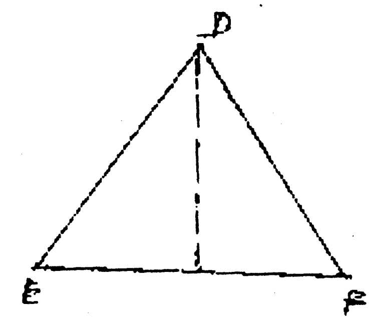


Figure 1.21

Construction : Divide the sector ABC (fig. 1.20) into a large number of smaller sectors (which may be equal), so that the arc of these sub-sectors are so small that they differ little from straight lines. The sector is thus divided into a large number of triangles.

Now, place these triangles with their bases abutting on one another on the line BC (fig.1.21), and move the verticles so that, they all come to A. The area of the sector is thus seen to be the same as the area of the triangle ABC whose base BC is equal to the length of the arc BC and whose height is equal to the radius of the sector.

Third Principle of Deformation

If a sector of a circle is deformed into a triangle whose base is equal in length to the arc of the sector and whose height is equal to the radius, the area remains unaltered.

The deformation is brought about by keeping the bisector of the angle at the centre fixed and then making the circular arc straight.

6. Circle: The area of a circle is equal to half the length of its circumference multiplied by its radius.

Construction:

Cut the circle along a radius and spread it out into a triangle. The area of the circle is equal to the area of this triangle whose base is equal to the circumference and whose height is equal to the radius of the circle. Hence the result.

Corollary : The area of the figure bounded by two conentric circles of radie a and b, and two radie is equal to the area of the trapezium whose parallel sides are equal to the length of the two arcs and whose height is equal to the difference between the radio of the circles.

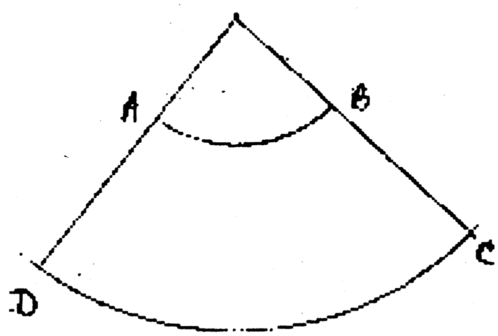


Figure 1.22

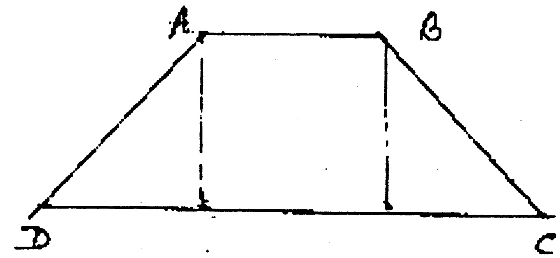


Figure 1.23

7. The volume of a cylinder (of uniform cross-sections) is equal to the area of its base multiplied by its height.

8. The volume of a tetrahedron is equal to one-third the area of its base multiplied by its height.

A prism on a triangular base can be divided into three equal tetra hedrons, hence this result.

An alternative method of finding the volume of a tetrahedron has been given in the demonstration quoted above.

9. The volume of a pyramid is equal to one-third the area of its base multiplied by its height.

Construction: The pyramid can be cut into a number of tetrahedrons. The result follows.

10. The volume of a right cone is equal to one-third the area of its base multiplied by its height.

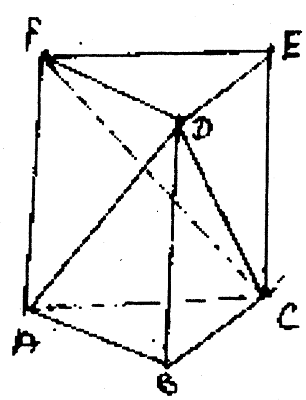


Figure 1.24

Construction:

Cut the cone along a radius of the base vertically up to the vertex. Then spread it out so that the base is deformed into a triangle as in section C. The cone is deformed into a tetrahedron of equal volume by virtue of the third principle of deformation. The volume of this tetra hedron is equal to one third the area of the base multiplied by its height, hence the result.

By the forth principle of deformation the result is true for any cone, right circular or not.

11. The volume of the frustrum of a cone should be found out by subtraction, for the frustrum is obtained by cutting the cone by a plane parallel to the base. The frustrum being given, the original cone by cutting which the frustrum has been obtained must be found out. Instead of doing that, the author of the Dhavalā finds the volume of the frustrum directly taking recourse to construction and the principles of deformation, which we have attempted to reconstruct.

Let a and b to the radie of the base and face of the frustrum of the cone whose height is h. Then extracting out a cylinder of radius b and height h, and performing construction and deformation one obtains the body in figure (1.7)

$$AA' = BB' = 2\pi b$$

$$BD = B'D' = a - b$$

$$BC = B'C' = \pi (a - b)$$

$$AD = A'D' = h$$

This body is then cut into three parts by vertical planes passing through A and A'. We get the prism ABDD' B'A', and two equal tetrahedrons ABDC and A'B'D'C'. The volume of ABDD' B'A', Which is a prism of height 2π b on a triangular base ABD, is $\frac{1}{2}$ BD $\times$ AD $\times 2\pi$ b

$$= \frac{1}{2} (a - b) \times h \times 2\pi b \quad = \pi b h (a - b) \qquad ......(1.8)$$

The volume of the two tetrahedrons together is

$$= 2. \frac{1}{3} . \frac{1}{2} . BD \times BC \times AD$$

$$= \frac{1}{3} (a - b) \times (a - b) \pi \times h = \frac{1}{3} \pi (a - b)^2 \times h \qquad ....(1.9)$$

The volume of the frustrum is, therefore,

$$\pi b^2 h + \pi bh (a - b) + \frac{1}{3} \pi (a - b)^2 h$$

$$= \frac{1}{3} \pi h \{ 3b^2 + 3ab - 3b^2 + a^2 + b^2 - 2ab \}$$

$$= \frac{1}{3} \pi h \{ a^2 + b^2 - 2ab \},$$ which is the well known formula

.........(1.10).

An infinite process

The volume of the two tetrahedrons has been directly found out. Each tetrahedron is cut into three parts by drawing horizontal and vertical planes through the middle point G (G') of A B (A'B') (see figure 1.8). The bodies BDHEGJF and B'D'H'G'J'F' being placed one on the other produce a parallelopiped of height $\frac{h}{2}$ on a rectangular base with sides

$$BD = (a - b) \quad \text{and} \quad BF = \frac{1}{2} \pi (a - b).$$

Let K denote the volume of this parallelopiped, i.e.,

$$K = \frac{1}{2} \pi (a - b)^2 , \cdot \frac{1}{2} h = \frac{1}{4} \pi (a - b)^2 . h$$

Now cut the four tetrahedrons produced in the above construction, each into three parts, by horizontal and vertical planes drawn before through the middle points of the sides. This produces eight tetrahedrons and four bodies like BDHEGJF. These four being placed together produce a rectangular parallelopiped whose volume is one-fourth the volume of the previous one, i.e., the volume of this is $\frac{1}{4}$ K. Continuing the process we get successively, volumes as below:

$$K, \frac{1}{4} K, \frac{1}{(4)^2} K, \frac{1}{(4)^3} K \text{ .... whose sum is } \frac{4k}{3} \qquad \text{......(1.11)}$$

Putting the value of K as $\frac{1}{4} \pi (a - b)^2$, already found.

The sum $\frac{4k}{3} = \frac{1}{3} \pi (a-b)^2 h$ = the volume of the two tetrahedrons ......(1.12)

Continued construction as above reduces the volume of tetrahedrons, so that they are reduced to points when the construction is continued indefinitely. The tetrahedrons, as has been rightly remarked by the author of the Dhavalā are reduced to points and so contribute nothing to the volume. The volume of each of the tetrahedron ABCD and A'B'C'D; is therefore

$$= \frac{1}{6} \pi, (a-b)^2 . h = \frac{1}{3} . \frac{1}{2} \pi (a-b)(a-b) . h$$

$$= \frac{1}{3} \text{ area of base} \times \text{height} \qquad ......(1.13)$$

The main points tobe noted in the above are

(i) the actual use of an infinite sequence of constructions and

(ii) the actual use of the formula for the sum of an infinite series. Dr. A.N. Singh further remarks, "We shall perhaps never know how the ancient mathematicions of India justified the use of infinite processes. We content ourselves by stating that the Hindu mathematicions did use infinite processes as early as the 8th or 9th century A.D.

The Value of π : The Jaina School, according to Dr. Singh, $\pi = \sqrt{10}$ used it first. Regarding the value of π, Dr. Singh's remarks are, "This value ($\pi = \sqrt{10}$) became very popular and was used by most of the Hindu astronomers and mathematicians- Brahmagupta (628), Śrīdhara (C.750), Mahāvīra (C.850), Āryabhaṭa II (C.950) etc. Āryabhaṭa I (499) used the value $\pi = \frac{62832}{20000}$. He says: "100 plus, 4, multiplied by 8 and added to 62000. This will be the approximate value of the circumference of a circle of diameter 20000," " Now

$$\frac{62832}{20000} = 3 + \cfrac{1}{7 + \cfrac{1}{16 + \cfrac{1}{11}}} \qquad ......(1.14)$$

The successive convergent are 3, $\frac{22}{7}$ and $\frac{355}{113}$. The value $\frac{22}{7}$ was employed by the Greeks and is known as the Greek value of π. It is the second convergent obtained from Āryabhaṭa's value and has been used in India by Āryabhaṭa II and by Bhāskara II as a "gross value of π "

The value $\pi = \frac{355}{113}$ which is the third convergent has been very rarely used by Hindu mathematicians and astronomers. This value has been called the Chinese value of π as it occurs in the works of Chinese scholars about the 7th century A.D.Vīrasena, the author of the Dhavalā completed his work on 8th october, 816 A.D. He uses the value $\pi = \frac{355}{113}$ and in support quotes the following from a previous author:

Vyāsaṁ ṣoḍaśaguṇitaṁ ṣoḍaśa sahitaṁ tri-rūpa- rūpairbhaktaṁ /

Vyāsaṁ triguṇita sahitaṁ sūkṣmādapi tadhavetsūkṣmaṁ //

The literal translation of the above, according to modern Sanskrit usage, will run as follows:

"The diameter multiplied by sixteen added by sixteen (and) divided by three one-one, together with three times the diameter is fines than the five (value of circumference)."

This gives $C = 3D + \frac{16D + 16}{113}$, ...(1.15)

where C is the circumference and D the diameter of a circle".

Thus, Dr. Singh found that this formula is correct of $+\frac{16}{113}$ is removed, then

$$C = 3D + \frac{16D}{113}$$

$$\text{and} \quad \pi = \frac{355}{113}.$$

He interprets it as follows. "The diameter multiplied by sixteen, (that is) added sixteen times (and) divided by three-one-one together with three times the diameter is finer then the five (value of the circumference). " In this way, he takes Virasenācārya value to be $\frac{355}{113}$ itself. However, much work has been done in Japan recently on Indian values of π, which has been mentioned in the Appendix here.

It may also be noted that, using, the principles of deformation the volume may also be given in a series as follows, for the frustrum of a cone :

$$V = \pi \left(\frac{D_1}{2}\right) h + \pi \left(D_1 h \frac{D_2 - D_1}{2^2}\right)$$

$$+ \pi \left(\frac{D_2 - D_1}{2^2} \cdot \frac{h}{2} \cdot \frac{D_2 - D_1}{2}\right)$$

$$+ \pi \left(\frac{D_2 - D_1}{2^3} \cdot \frac{h}{2^2} \cdot \frac{D_2 - D_1}{2}\right) + \ldots\ldots \infty \qquad \ldots\ldots\ldots (1.16)$$

Where D_1 and D_2 are the diameters of the top and bottom faces respectively, and h is the height of the frustrum. On adding this series one gets the

$$V = \pi h \left[\left(\frac{D_1}{2}\right)^2 + \left(\frac{D_2}{2}\right)^2 + \left(\frac{D_1}{2}\right)\left(\frac{D_2}{2}\right)\right] \qquad \ldots\ldots(1.17)$$

(v.1.9 et seq.)

The measure (māna) or metric is of two types- the univeral (laukika) and the post-universal (lokottara).

The universal measure is of six types

māna: the measure or metric throngh which the or māna measure of graiṇ etc. is performed : as prastha (32 palas) etc.

unmāna: the standard of measure as belance etc. or unmāna

avamāna : The measure as the hollow of palm holding water etc.

gaṇimāna : The measure through counting one, two, three etc.

paḍimāna (pratimāna): the measure of gunjā (a red biack berry) etc.

tatpaḍimāna (tat pratimāna): settling down of price of a horse after observing its limbs.

The post-universal measure is of four types

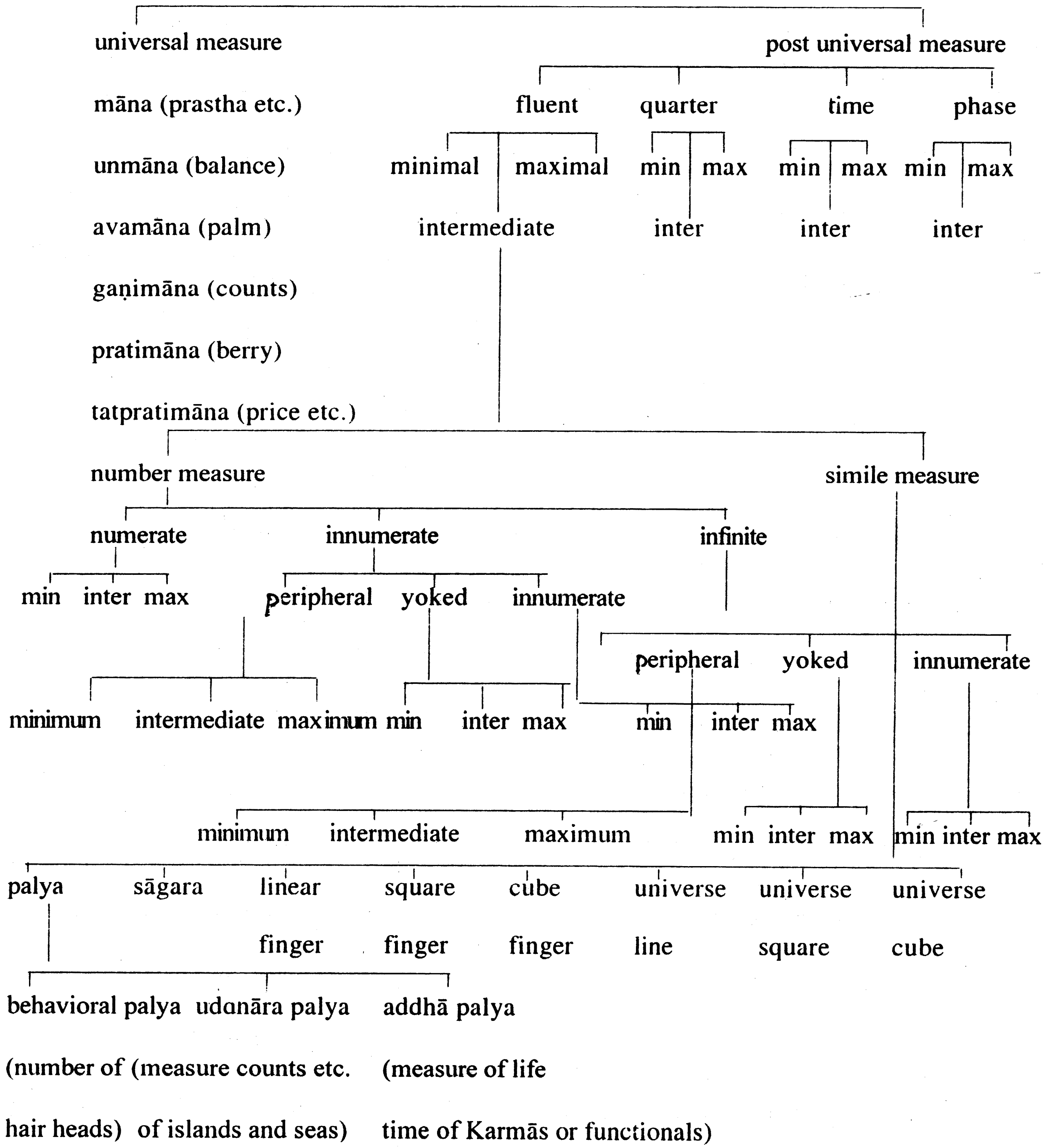
		minimal	maximal
[1]	the fluent measure (dravyamāna)	one ultimate partical (paramāṇu) of matter (pudgala)	all ultimate particles of matter (pudgala) or all fluents
[2]	the quarter measure (kṣetra māna)	one space-point (pradeśa)	all space-points
[3]	the time measure (kāla māna)	one instant (samaya)	instants of all time (past, present and future
[4]	the phase measure (bhāva-māna)	the knowledge called paryāya of fine nigodiyā attainment non-developed bios	the knowledge alone or Omniscience [In both cases the indivisible-corresponding sections (avibhāgī praticched as) are mentioned.

In the above, the fluent (dravya) is that which flows through events (paryāyas).The existent (sat) is possessed by its property of annihilation, generation and eternal existence, and the existent is the character of a fluent. The matter fluent is having form while other fluents are formless. That through which syllable norm or substances are measured or known is called measure. Whatever are the normed-events are taken-events in the past, present and future in a fluent, that measure itself is that fluent. (Dhavalā, Book 3, p.4 and p.6). The present residence is called quarter, and is of two types, the universe space and non-universe space (Dhavalā, Book 4, p.9). Time is of two types, the deterministic and the practical or behavioral (mukhya or niścaya and vyavahāra). The former is the time fluent itself, eternal, lying on every space-point of the universe, each separate from each other as gems set spread. The behavioral time is the time taken by an ultimate particle moving with a minimal velocity (or one moving particle upwards, the other downwards with suitable (tatprāyogya velocity) is called an instant when it crosses another particle, or moves from one space point to the next adjoining point, (Dhavalā, Book 4, p.318 or Book 13, p. 298), [or in crossing another particle].The phase measure (bhāva, māna or pramāṇa) depends on the definition of phase which is sub-characterized or is with its present event or mode. (SVS, 1/5). The knowledge is also called the phase measure (Dhavalā, Book 3, p. 32). For example, the knowledge of the fluent measure, the quarter measure and the time measure is called the phase measure. (ibid., p. 38).

(v.1.13)

The fluent measure is of two types: the number measure and the simile measure (saṁkhyā pramāṇa and upamā pramāṇa). The number measure is of three types: numerate, (saṁkhyāta) innumerate (asaṁkhyāta) and infinite (anant). Each of them is further subdivided broadly as minimal, intermediate and maximal. The innumerate measure is of three types: peripheral (parīta), yoked (yukta) and innumerate (asaṁkhyāta). Similarly, the infinite measure is of three types: peripheral (parīta), yoked (yukta) and infinite. The simile measure is of eight types: the palyopama, the sāgaropama, the linear finger width, the square finger (prataräṅgula), the cube finger (ghanāṅgula), the universe line (Jagaśreṇi), the square universe line (Jagapratara), the cube universe line or universe line cube (Jagaśreṇi ghana or ghana loka or loka).Whereas the instant-sets are the palya and the sāgara, the point sets are the remaining ones. The space-point, as already defined, is the space occupied by an ultimate particle. the time-point or instant has already been defined.

TABLE 1.1 MEASURE



(1.14 et seq.)

The number measure is of three main types- the numerable, the innumerable and the infinite or the numerate, the innumerate and the infinite. In order to construct the numerate measure, four pits (palya) are dug as below:

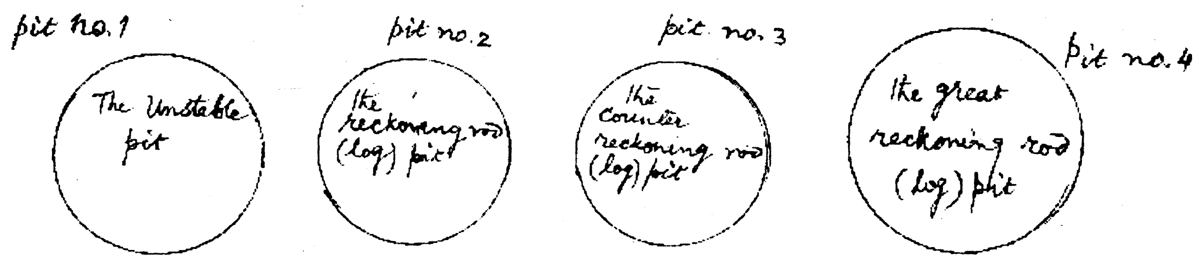


Figure 1.25

The unstable pit: its measure is not stable. It is a cylinder with circular base and top of 1 lac yojanas, but after the process continues twice, thrice, and so on, its diameter goes on increasing as per details given below. The height of every one of the cylinders is 1000 yojanas.

The reckoning rod pit: The pit in which a first mustard seed is dropped after the unstable pit has been filled by hair-fronts once. How many times the unstable pit has been exhausted and refilled is to be known through this pit.

The counter reckoning rod pit: After the reckoning rod pit has been filled full once, and twice etc., one by one a mustard seed is dropped in this pit. Thus, this measures the reckoning rods of the previous pit.

The great reckoning rod pit: After the counter reckoning rod pit has been filled once twice etc. in this pit, every time a mustard seed is dropped for showing the reckoning of rods in the previous pit.

Thus the four cylinders are as depicted-

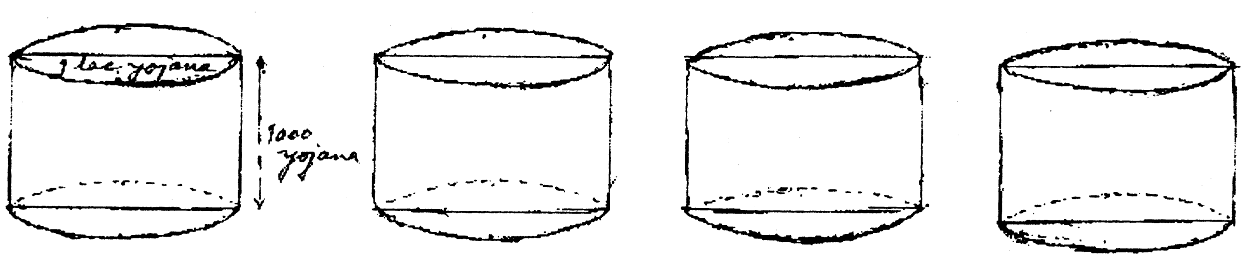


Figure 1.26

It may be noted that at the start of the process of calculation all the pits are equivalent volume. The first choice of numerate is two and not unity or one. The calculation (gaṇanā) is initiated by one the numerate is initiated by two and three is initiated or denominated as construct (kṛti).

The construct (kṛti) set is that number which when squared and from its square (kṛti) is subtracted the original number; the remainder on being squared gives a number greater than the squared number. One and two do not satisfy this criteria hence they are not kṛti. (DVL, Book 9, p.276). Kṛti is the meaning (norm or artha), denomination (abhidhāna) as cause (notion or pratyaya), as they are synonyms.(DVL, book 9, p. 237).

The construct is of seven types: name construct, establishment construct, fluent construct, calculus construct, text construct, operation construct and phase construct. (ibid,p. 237). Here is the concern with calculus construct which is of several types. It may be said

$$x \text{ is a construct calculus, if } x^2 > x \quad \text{or } (x^2 - x)^2 > x^2 \qquad \text{.... (1.18)}$$

One is quasi construct, two is inexpressible (avaktavya) as a quasi construct (no-kṛti). The numerate, the innnumerate, and the infinite are called constructs, when initiated by three. (ibid., 275)

Virasenācārya has related mathematics to be of three types: plus or positive (dhaṇa), minus or negative (ṛṇa), and positive-negative mathematics (dhaṇa ṛṇa gaṇita).

Summation of series (saṁkalanā), square (varga), square after square (vargāvarga), cube (ghana), successive cubing (ghanāghana), sets and the multiplication (guṇakāra), fraction (kalāsavarṇa) types; rules of three sets (trairāśika), rule of five sets (pañca rāśika) etc. instrumental in generating them are all positive mathematics. Difference calculus of series (vyutkalana), division (bhāgahāra), fractions in form of reduction and so formulated numbers etc. are negation mathematics. Finding out motion (gati) and proportionate distribution (kuṭṭikāra) etc. are positive-negative mathematics. (DVL, book 9, p. 276). Vide also GSS for further details).

(v.1.17)

The diameter of the pit is one lac yojanas. When it is multiplied by three, the circumference 3 lac is obtained. When one fourth of the circumference $\frac{100000}{4}$ is multiplied by 3 lac we get the area of the base given by $\frac{100000}{4} \times \frac{300000}{1}$ yojanas.

When the area of the base is multiplied by height, the volume of the pit is obtained as

$\frac{300000}{1} \times \frac{100000}{1} \times 1000$, this is the same as $\pi r^2 h$.

Here the rationale (vāsanā) of the value of π determination through the calculation of the circumference is given as follows, according to the commentary of Mādhavacandra Traividya

The base is circular with a diameter of 100000 yojanas. This should be halved (fig. 1.28) and again halved. (fig.1.29)

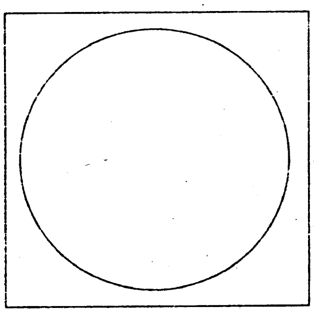


Figure 1.27

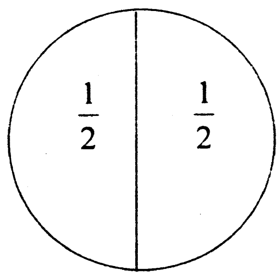


Figure 1.28

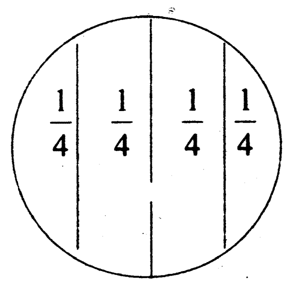


Figure 1.29

On addding the central parts they become $\frac{1}{2}$. On moving upto the sixth part of the circumference, and halving it again, two half portions are obtained. (fig. 1.31)

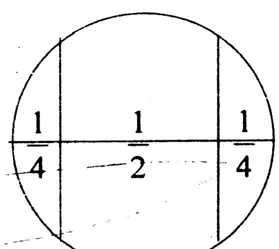


Figure 130

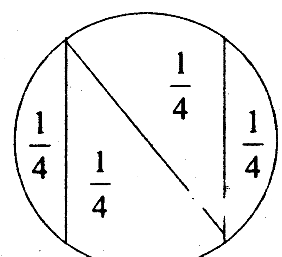


Figure 1.31

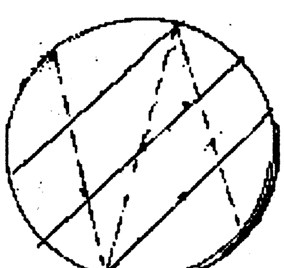


Figure 132

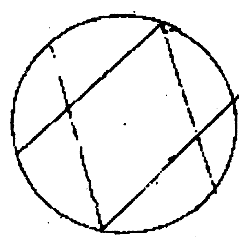


Figure 1.33

Now, out of these, every one is halved again, two parts may be added: (fig. 1.32, 1.33).

Again, similarly, moving upto the sixth part, the process gives six half parts. (fig. 1.34)

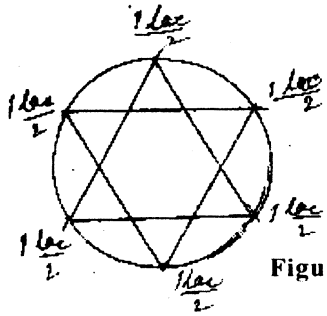


Figure 1.34

On adding the six parts, one gets $\frac{600000}{2}$ or 3 lac. This is how the circumference is grossly proved to be three times the diameter.

Now, the rationale is given as to why the multiplication is done by one fourth.

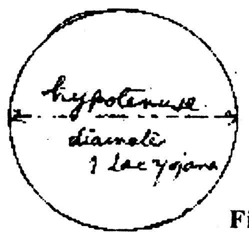


Figure 1.35

The circular shape of the hypotenuse (karaṇa) or the diameter is called the śaṣkuli (fig. 1.35). The diameter of the pit similar to the hypotenuse, is 1 lac yojanas.

If this circle of 1 lac yojanas diameter is teared in the middle and spread extended, then a triangular area is obtained. (fig.1.36) This triangular area is bisected at the height getting the bisected part as $\frac{1}{4}$ lac yojana.

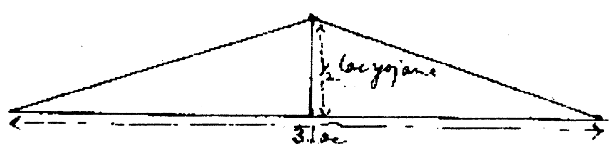


Figure 1.36

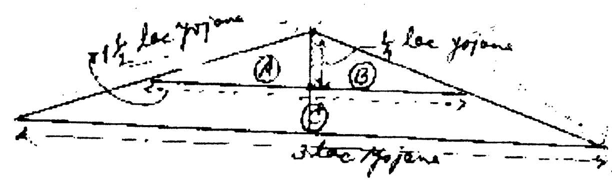


Figure 1.37

On drawing a horizontal bisecting line through the middle point of the height, the area is divided into two parts, as shown (fig. 1.37)

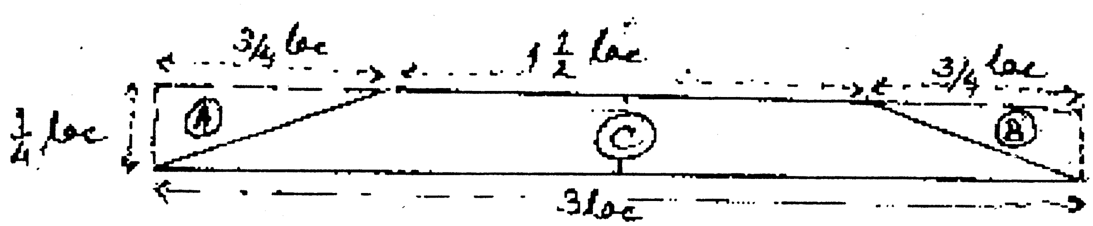


Figure 1.37 A

Both the parts above are denominated as [A] and [B], and the lower part is [C]. Now the [A] and [B] parts are removed and added to the sides, left and right of [C], so that the [C] now becomes a rectangle as shown in figure 1.37. Thus, a rectangle is obtained whose area is $300000 \times \frac{1}{4}$ lac. Thus, the circular area is obtained from the circumference 300000 on multiplying it by one fourth of the diameter.

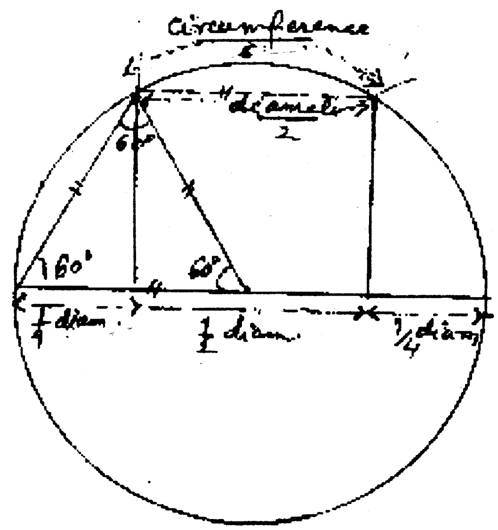


Figure 1.38

The volume is thus $300000 \times \frac{1}{4}$ lac $\times 1000$ cubic yojana and this is the measure of all the four pits. Alternately, the figure may also be dipicted as follows:

Six triangles are thus formed which may be added for getting the area of the base and base $\times$ height then gives the volume of the cylinder. The details have been given in the appendix.

$$\text{Or} \quad \frac{1}{2}\left(6 \times \frac{\text{circumf}}{6}\right) \times \frac{1}{2}\,\text{diameter} \times \text{height} = \text{volume} \quad (1.$$

This is thus the method of exhaustion. Vide also Varṇi Abhinanadana Grantha Sāgar, V.N. 2476, "The Jaina Sources of the History of Indian mathematics" by Dr. A. N Singh (Hindi).

(v. 1.18)

The volume of the first pit and other three pits is given as $300000 \times \frac{100000}{4} \times 1000$ pramāṇa ghana or cubic yojanas. One pramāṇa yojana is equal to 500 vyavahāra yojanas, hence one cubic pramāṇa yojana is equal to $(500)^3$ cubic vyavahāra yojana. In order to have an excess to further conversion, the following table of conversion may be given from TPT, vol. 1, p.102.

(v. 106, pp. 12-13.)

TABLE-1.2

8 avasannāsanna	=	1 sannāsanna molecule (skandha)
8 sannāsanna	=	1 truṭireṇu molecule (skandha)
8 truṭireṇu	=	1 trasareṇu molecule (skandha)
8 trasareṇu	=	1 rathareṇu molecule (skandha)
8 rathareṇu	=	1 hair front of good pleasure land
8 hair fronts of good pleasure land	=	1 hair front of middle pleasure land
8 hair fronts of hair front of middle pleasure land	=	1 hair front of lower pleasure land
8 hair fronts of lower pleasure land	=	1 hair fronts of karma land
8 hair fronts of karma land.	=	1 likha molecule
8 likha	=	1 juṁ molecule
8 juṁ	=	1 jau molecule
8 jau	=	1 aṅgula

Now, aṅgula (figure) is of three types: utsedha aṅgula, pramāna aṅgula, ātmāṅgula. Now 500 utsedha aṅgula make 1 pramāna aṅgula.

The vyavahāra yojana has it measure dependence on the utsedha aṅgula, hence the volume in vyavahāra yojana is given by

$$300000 \times \frac{100000}{4} \times 1000 \times (500)^3 \text{ cubic vyavahāra yojanas.}$$

As per scale detailed in the previous page, this is the same as

$$\frac{300000}{1} \times \frac{100000}{4} \times 1000 \times (500)^3 \times (768000)^3$$

cubic vyavahāra aṅgula. ....(1.39)

Further 8 yava make an aṅgula and 8 mustrd seeds make a yȧva, where the mustard seeds are cube-like. Hence further conversion of (1.39) gives

$$\frac{300000 \times 100000 \times 1000 \times (500)^3 \times (768000)^3 \times (8)^3 \times (8)^3}{4}$$

mustard cubic seed volume. ———(1.40)

If the volume is divided by $\frac{9}{16}$, the measure of the spherical object can be determined. Hence, the number of mustard seeds is

$$\frac{300000 \times 100000 \times 1000 \times (500)^3 \times (768000)^3 \times (8)^3 \times (8)^3 \times 16}{4 \times 9}$$

This has been expressed ——(1.41)

$$4294967296 \times 256 \times 18 \times (10)^{31} \qquad \text{——(1.42)}$$

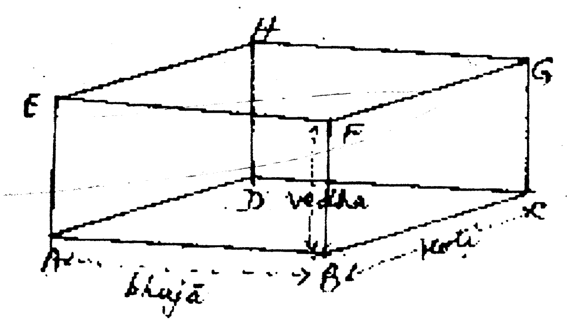
or $$19791209299968 \times (10)^{31} \qquad \text{——(1.42)}$$

In equation (1.42), 4294967296 is or bādāla.

SPECIAL NOTE : Here the Sanskrit commentatory, Mādhavacanda has quoted some formulae, worthy of attention.

1. "bhuja koḍi vedesuṁ pattekkaṁ mukha khidie bindu phalaṁ // (TPT 1.217)

This means that the volume of caturasrākāra (cubic) region is bhujā × koṭi × vedha



or length × breadth × height.

The same formula has been related in GSS as:

"keṣtraphalaṁ vedha guṇaṁ samākhate
Vyavahārikaṁ gaṇitaṁ /
mukhatalayutidalamatha sat saṁkhyāpta
syatsamikaraṇaṁ //8.4//

If it is not rectangular, the half of the sum of two parallel sides have been instructed without any formula.

2. 'muha bhūmi jogadale' has appeared in TPT 1.198-199. This verse is not complete, yet we find in the Dhavalā book 4, P.42, in the following form (vide also JPS 11.108): "muha-tala

samāsa-addhaṁ vussedhaguṇaṁ guṇaṁ ca vedheṇa / ghaṇagaṇidaṁ jānejio vettusaṇa saṁṭhiye khette //

This is for volume of a wedge. Vide also TPT, 1.165 as follows:

muha bhūmi samāsamaddhiya guṇidaṁ puṇa tahaya vedeṇa/ ghaṇa ghaṇidaṁ ṇādavvaṁ vettāsaṇasaṇṇie khette //

3. If the solid has a triangle as a base, or a square or a quadrilateral, it is a sūcī (pyramid) as noted, here, ahead. The base of circular, the sūcī is a cone (śaṅku). In GSS, it is called śraṅgāṭaka (triangular pyramid). The spheres volume is GSS is $\left(\frac{\text{diameter}}{2}\right)^3 \left(\frac{9}{2}\right)$ as a gross value, and fine value is $\left(\frac{\text{diameter}}{2}\right)^3 \left(\frac{9}{2}\right)\left(\frac{9}{10}\right)$. [GSS 8.28 1/2] .

In the above the use of $\frac{9}{16}$ has been used for getting the number of mustard seeds in the pit. We give the different methods and ultimately the method given by Mādhava candra.

(v.1.19)

Method Rationale 1.

$$\text{The volume of a sphere} = \left(\frac{\text{diameter of sphere}}{2}\right)^3 \times \frac{1}{2} \times 9 \qquad \text{......(1.43)}$$

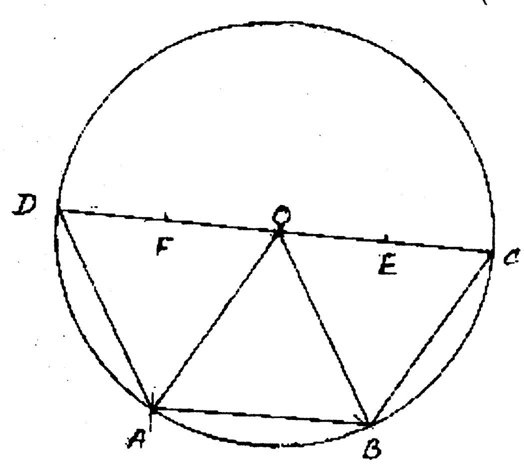


Figure 1.39

The sphere if cut into halves. The section is a circle. This circle has been bisected by the diameter CD. Then the half circle has been further divided into three triangles, in which all the sides. OD, DA, AB, BC arc are equal to $\frac{\text{diameter}}{2}$. Thus, the revolution of a triangle intercepts and sweeps out the area of the circle, when all the Δ s are revolved about CD. Taking the circumference tobe 3 times the diameter, the volume of the sphere

$$= \frac{3}{2}\left[3\left(\frac{\text{diameter}}{2}\right)^2 \cdot \frac{\text{diameter}}{2}\right] \quad ......(1.44)$$

$$= \frac{9}{16}\,(\text{diameter})^3 \quad ......(1.45)$$

Method Rationale :2

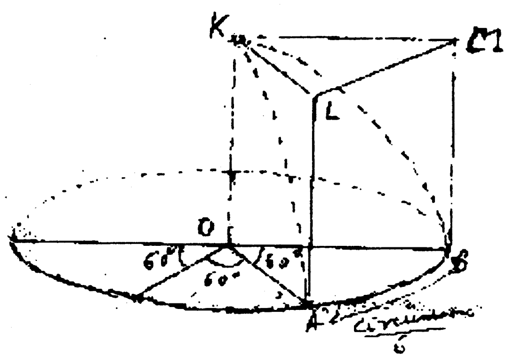


Figure 1.40

After halving the sphere, it is trisected. Taking one part and bisecting it a spherical part KABO is obtained which 12th part of the sphere. If a triangular prism is constructed on the base OAB, then the volume is

$$\frac{1}{2}\left(\frac{\text{circumference}}{6}\right)\left(\frac{\text{diameter}}{2}\right)\left(\frac{\text{diameter}}{2}\right). \quad ......(1.46)$$

If the arcs KA and KB may be taken to be bisecting the areas of Δ s KLA and KMB, then the spherical part may be taken to have volume as $\frac{3}{4}$ th part of the Δ lar prism OABKLM. Thus, the volume of the spherical part may be taken as

$$\frac{3}{4}\left[\frac{1}{2}\left(\frac{\text{circumference}}{6}\right)\left(\frac{\text{diameter}}{2}\right)\left(\frac{\text{diameter}}{2}\right)\right] \quad ....(1.47)$$

If the circumference is now taken to be 3 times the diameter, because the spherical part is $\frac{1}{12}$ th of the whole sphere. Hence the volume of the sphere

$$= 12\left[\frac{3}{4}\left\{\frac{1}{2}\left(\frac{\text{circumference}}{6}\right)\left(\frac{\text{diameter}}{2}\right)\left(\frac{\text{diameter}}{2}\right)\right\}\right] \quad \text{........(1.48)}$$

$$\text{or} \quad = \frac{9\,(\text{diameter})^3}{16} \quad \text{......(1.49)}$$

Method (of Mādhava candra Traivdya) - Rationale 3

The diameter of the sphere is 1. The half diameter is $\frac{1}{2}$ and its cube is $\left(\frac{1}{2}\right)^3$. Half of the cubeof half diameter is $\frac{1}{2}\left(\frac{1}{2}\right)^3$. When this cube is multiplied by 9, we get, the volume of the sphere as $\frac{9}{16}$.

The third part of the area is the area of the line (sūci). When the diameter is 1 and the depth is 1, the sphere is cut into two and one half part has its upper portion, a flat circle. Which is under consideration here. It may be trisected through the radius. Out of them let one of the parts OBC be taken as the third part: It may be bisected (fig. 1.45) and it be placed in such a way as to form a quadrilateral.

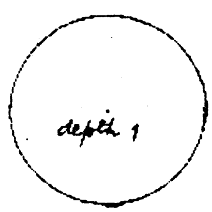


Figure 1.41

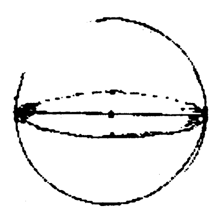


Figure 1.42

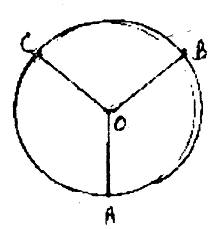


Figure 1.43

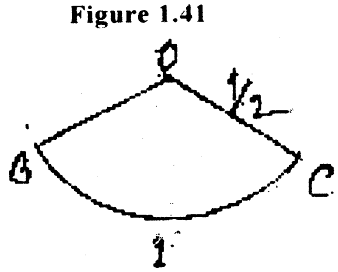


Figure 1.44

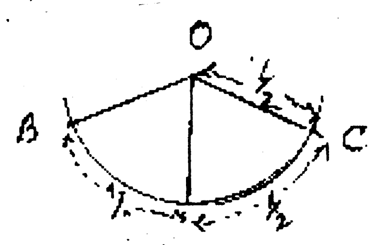


Figure 1.45

Now, in the hemisphere there is the central axis, with depth $\frac{1}{2}$ and the lateral portion below has become less and less. In this decuasing part half of the one fourth or $\left(\frac{1}{2} \times \frac{1}{4}\right)$ may be negatively anti-projected. This gives a plane base. On obiquely sectioning the plane base, and placing it over, and taking out the negative, we get

$$\left[\frac{1}{2} - \left(\frac{1}{2} \times \frac{1}{4}\right) = \frac{1}{2} \times \frac{1}{4}\right] \times \text{height } \frac{1}{2} \times \frac{3}{4}, \text{ as the remainder} \qquad ......(1.50)$$

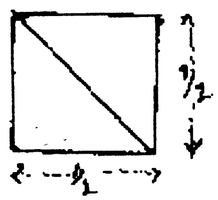


Figure 1.46

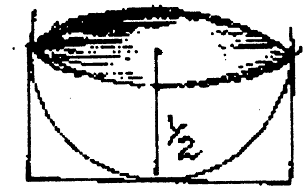


Figure 1.47

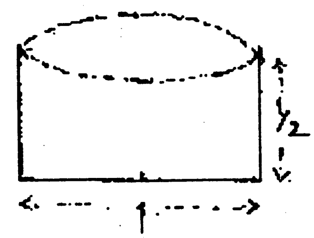


Figure 1.48

The third part of the hemisphere has its arm as $\frac{1}{2}$ and height $\frac{1}{2}$, and on mutual multiplication, $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ is the area obtained in units, if the height for this area = $\frac{1}{2} \times \frac{3}{4} \times \frac{3}{8}$. Here on multiplying the area $\frac{1}{4}$ by $\frac{1}{2} \times \frac{3}{4} \times \frac{3}{8}$ height gives the volume of the one-third part of the hemisphere as $\left(\frac{1}{4} \times \frac{1}{2} \times \frac{3}{4}\right)$. The complete sphere has 6 such parts, whose volume therefore is $6 \times \left(\frac{1}{4} \times \frac{1}{2} \times \frac{3}{4}\right) = \frac{9}{16}$. In what has been said, the area of Δ and the volume has to be obtained with the help of formula "mukha bhūmi jogadale" - that for a trapezium type of figure. The other formula is, "vāso tiguṇopanihi". The linear height as taken one-third is the multiplier, for getting linear are as and volumes.

(v.1.21) In this the number

$19791209299968 \times (10)^{31}$ has been represented by the word-numerals as follows:

vidhu (moon)	= 1
nidhi	= 9
nidhi (of Emperor cakravarti)	= 9
nayana (eyes)	= 2
naga (mountain)	= 7
Bala (Balbhadra)	= 9
ravi (sun) (relative to zodiac)	= 12
ṛddhi (omniattainments)	= 9
nidhi	= 9
nabha (sky)	= 0 (zero)
khara (solid cube)	= 6
hāthī (diggaja)	= 8 (one in each of 8 directions)

The number is written from left to right, and then 31 zeros are required to be written on right side as follows

19791209299968000000000000000000000000000.

(v.1.22)

This verse gives the method for finding out the volume of a cone, alongwith the rationale.

The diameter of the pit is 100000 yojanas, circumference is 300000 yojanas. The 11th part of the circumference is $\frac{3000,00}{11}$ yojanas. This is multiplied by square of $\frac{\text{(circumference)}}{6}$. Thus, the volume of the top (cone) is $\frac{300000}{11} \times \frac{300000}{6} \times \frac{300000}{6}$.

Rationale Three times the diameter is the circumference for finding out the area of the base, the circumference is multiplied by one fourth of diameter, giving $\frac{300000}{1} \times \frac{100000}{4}$ square yojanas. On multiplying it by the height of the top, which is $\frac{300000}{11}$, we get,

$300000 \times \frac{100000}{4} \times \frac{300000}{11}$. According to v.19, and the formula, ' phalatibhāgappiya', its one-third gives the volume of the cone for each of the pit over cone:

$$\frac{300000}{1} \times \frac{100000}{4} \times \frac{300000}{11} \times \frac{1}{3} \qquad ......(1.51)$$

$$\text{Or} \quad \left(\frac{300000}{6}\right)^2 \times \frac{300000}{11} \qquad ......(1.52)$$

This is the gross volume,

$$= \frac{\text{circumference}}{11} \times \left[\frac{\text{circumference}}{6}\right]^2 \qquad ......(1.53)$$

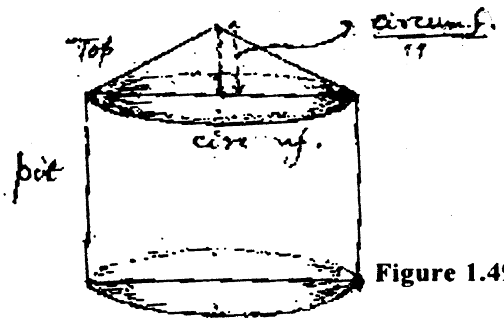


Figure 1.49

If the circumference is taken to be 11 units, the height attained by any type of five grain, mustard, tila, the height will be one unit, to which the cone is raised.

(vv.1.24 et seq.)

The above measure, when divided by 11 gives the number of mustards contained as a cone above the top of the pit in the form

$$\frac{(256)\,(4294967296)\,(18)\,(10)^{33}}{11} \qquad ......(1.54)$$

$$\text{or} \quad (2)^{(2)^3}\,(2)^{(2)^5}\,(18)\,(10)^{33} \div 11 \qquad ......(1.55)$$

Here, 256 is the third tems in the dyadic square sequence (dvirūpa vargadhārā) and the bādāla or $(2)^{(2)^5}$ appears as its 5th term. Hara means rudra who are 11 in number, shown here as the divisor.

The above when solved gives the number in decimal place value notation, stated from left to right, as

$$179920084545163636363636363636363636363636 \frac{4}{11} \qquad ......(1.56)$$

(v.1.26)

Now, the sum of the volumes of pit and cone is given as follows:

$$\text{volume of the pit} = \left[(300000)\left(\frac{100000}{4}\right)\right] 1000 \text{ cubic yojanas} \qquad ......(1.57)$$

$$\text{volume of the cone} = \frac{1}{3}\left[\frac{300000}{11}(300000)\left(\frac{100000}{4}\right)\right] \text{cubic yojanas} \qquad ...(1.58)$$

$$\text{Sum} = (300000)\left(\frac{100000}{4}\right)\left[1000 + \frac{100000}{11}\right]$$

$$= \frac{1}{11}\left[\frac{100000}{2}\right]^2 \times 3\ [(1000)11 + 100000] \text{ cubic yojanas} \qquad ......(1.59)$$

This measure is given in the form of the formula:

$$\text{Sum of volumes of both} = \frac{1}{11}\left(\frac{\text{diameter}}{2}\right)^2 \times 3\left[\{(\text{height})\ 11\} + \text{diameter}\right]$$

$$..........(1.60)$$

$$\text{or} \quad = \frac{1}{2}(100000)\frac{1}{2}(100000)\ 3\left(\frac{111000}{11}\right) \text{cubic yojanas} \qquad ....(1.61)$$

From the above cubic pramāṇa yojana, the cubic vyavahāra yojana, then aṅgula, yava, and spherical mustards be calculated.

(vv.1.29 et. seq.)

Previously, four pits were established to know about the number measure. Out of them, first of all, the first unstable pit with diameter 100000 yojanas and depth of cylinder as 1000 yojanas, is completely filled with mustard seeds and at the end of this process one seed may be placed in the reckoning-rod pit. Then either through intellect or a deity, let mustard seeds, one by one, be taken out and be dropped in successives islands and seas, till the unstable pit is completely exhausted. The last seed is dropped either in an island or a sea (here, as last digit is $6\frac{4}{11}$, it may be thought to fall in a sea. That island or sea, extending from the Sumeru, has an inner or outer diameter upto the whole of which the unstable pit is to be taken and filled with mustard seeds as before, with a cone over it, let the first unstable pit be having m_1 mustard seeds, which becomes number of terms for the second unstable pit whose diameter will be 2^{m_1-1} lac yojana as per summation of geometric progression, in which the widths of each successive island and sea increases, as double that of the preceding. From this the mustard seeds contained in the second unstable pit may be calculated as follows: its diameter is $2^{(m_1-1)}$ lac yojanas and depth every time 1000 yojanas. [After having filled this, second mustard seed should be dropped in the reckoning rod pit]. Now the volume of the pit and the cone above has the volume

$$= \left(\frac{\text{diameter}}{2}\right)^2 . 3\left[\frac{(11\ \text{height}) + \text{diameter}}{11}\right] \qquad \text{......(1.62)}$$

hence, as the volume of first unstable pit is $\frac{1}{44} . 3\,(11 \times \text{height} + 1)$ lac yojanas ...(1.63)

$$\text{and that of the second is } \left(\frac{\text{diameter}}{44}\right)^2 . 3\,(11 \times \text{height} + \text{diameter}) \qquad \text{......(1.64)}$$

the mustard seeds contained in the second unstable pit with diameter 2^{m_1-1} lac yojana is

$$m_1\left[\frac{11 \times \text{height} + 2^{m_1-1}}{11 \times \text{height} + 1}\right](2)^{2m_1-2} \qquad \text{......(1.65)}$$

The above number will be represented by m_2 symbolically. [The difference in this process and that in TPT is that the second seed dropped here is after filling up the unstable pit, and in the TPT, after it has been exhausted. But the reckoning is the same without any difference.]

Now, the above number of m_2 seeds are to be given one by one to successive islands and seas as before, till the last seed drops in the $m_1 + m_2$ th island or sea. The diameter of this island or sea will be $2^{(m_1 + m_2 - 1)}$ lac yojana. and the seeds content of this unstable pit with this diameter will be

$$\left[m_1 \left\{ \frac{11 \times \text{height} + 2^{(m_1 + m_2 - 1)}}{11 \times \text{height}} \right\} \right] 2^{(2m_1 + 2m_2 - 2)} \quad \text{.........(1.66)}$$

This number will be symbolized as m_3. As soon as third pit is filled up, the third seed is to be dropped in the reckoning-rod pit.

Again the process of taking out seeds one by one from m_3 seeds pit and dropping them into successive island and seed is carried out till exhaustion of the m_3 seeds, the last seed being dropped in the $(m_1 + m_2 + m_3)$ th sea or island. The diameter of this island or sea will be $2^{(m_1 + m_2 + m_3 - 1)}$ lac yojanas, and it will contain

$$\left[m_1 \left(2^{(2m_1 + 2m_2 + 2m_3 - 2)}\right. \left\{ \frac{11 \times \text{height} + 2^{(m_1 + m_2 + \ldots + mm_1 - 1)}}{11 \times \text{height} + 1} \right\} \right] \quad \text{.......(1.67)}$$

mustard seeds. This amount of the seeds will be symbolized by m_4. After filling this 4th unstalble pit, the fourth seed is dropped into the reckoning-rod pit as usual. This process is thus continued m_1 times and at the end of the process, the last seed of the m_1 th unstable pit will fall in the $m_1 + m_2 + m_3 \ldots + m_{m_1}$ th island or sea.

Its diameter will be

$2^{(m_1 + m_2 + m_3 + \ldots + mm_1 - 1)}$ lac yojanas and it will contain the following number of seeds

$$\left[m_1(2^{(2m_1+2m_2+....+2mm_1-2)}\left\{\frac{11 \times \text{height} + 2^{(m_1+m_2+.....+mm_1-1)}}{11 \times \text{height} + 1}\right\}\right] \quad ......(1.68)$$

This number of seeds will be symbolized as m_{m_1+1}. On filling this pit of unstable diameter, the m_1+ 1 th seed is dropped in reckoning-rod pit, Now after exhausion of the last unstable pit, the new unstable pit is taken, filled up and the process of filling up the counter-reckoning-rod pit starts by filling it with seeds one by one at the end of each exhaustion of the successive unstable pit. The process will again take up m_1 times of exhaustion and filling up and suppose that we reach the m_2^2 unstable pit at the island or sea whose order number will be

$$m_1+ m_2+... + m_{m_1} + ...+ m_{2m_1} + ...+ m_{m_1}2. \quad .....(1.69)$$

The diameter of this pit and its seed content can be determined as usual. At the end of the complete filling in of the counter-reckoning-rod pit, one seed is dropped in the great reckoning-rod pit. The process is continued. The m_1^3 the unstalble pit, this time, after completely filling up of the great reckoning-rod pit, will have the seed dropped in the

$(m_1+ m_2+...+ m_{m_1} +...+m_{m_1}2 + ... + m_{2m_1}2 + ...+ m_{m_1}3)$ th island or sea. ......(1.70)

The diameter of this island or sea will be $2^{(m_1+m_2+...+m_{m_1}3-1)}$ lac yojanas, and ...(1.71)

the seed content will be

$$\left\{m_1\left(2^{2m_1+2m_2+....+2mm_1^3-2}\right)\left(\frac{11 \text{ height} + 2^{(m_1+m_2+.....+mm_1^3-1)}}{11 \text{ height} + 2}\right)\right\}$$

......(1.72)

This number will be denoted by $m_{m_1^3+1}$ ......(1.73)

From the above number, which is the minimal peripheral innumerate, we can get the maximal numerate, by subtracting one from it.

Thus,

$$Ap_l = Su + 1, \qquad \text{......(1.74)}$$

where we shall use the following notations:

numerate (saṁkhyāta)	S
innumerate (asaṁkhyāta)	A or a
Infinite (ananta)	I or i
peripheral (parīta)	p
yoked (yukta)	y
maximal (utkrṣṭa)	u
intermediate (madhyama)	m
minimal (jaghanya)	j.

or $$Su = Ap_j - 1, \qquad \text{......(1.75)}$$

where, $Ap_j > Su > Sm > Sj > 1$ ......(1.75)

and wheresoever numerate is to be searched the non-minimal-maximal numerate (Sm) is to be taken- (TPT, 4.309-310).

(vv.1.36 etc seq)

The Ap_m is obtained on increasing Apj by one, two, three etc.

$$Ap_m > Ap_j \qquad \text{......(1.76)}$$

and $$(Ap_j)^{Apj} = Ay_j \qquad \text{......(1.77)}$$

Before we proceed ahead, the process of filling up the pits in the above manner, explained in more details in appendix. However the following example may be given to explain in brief:

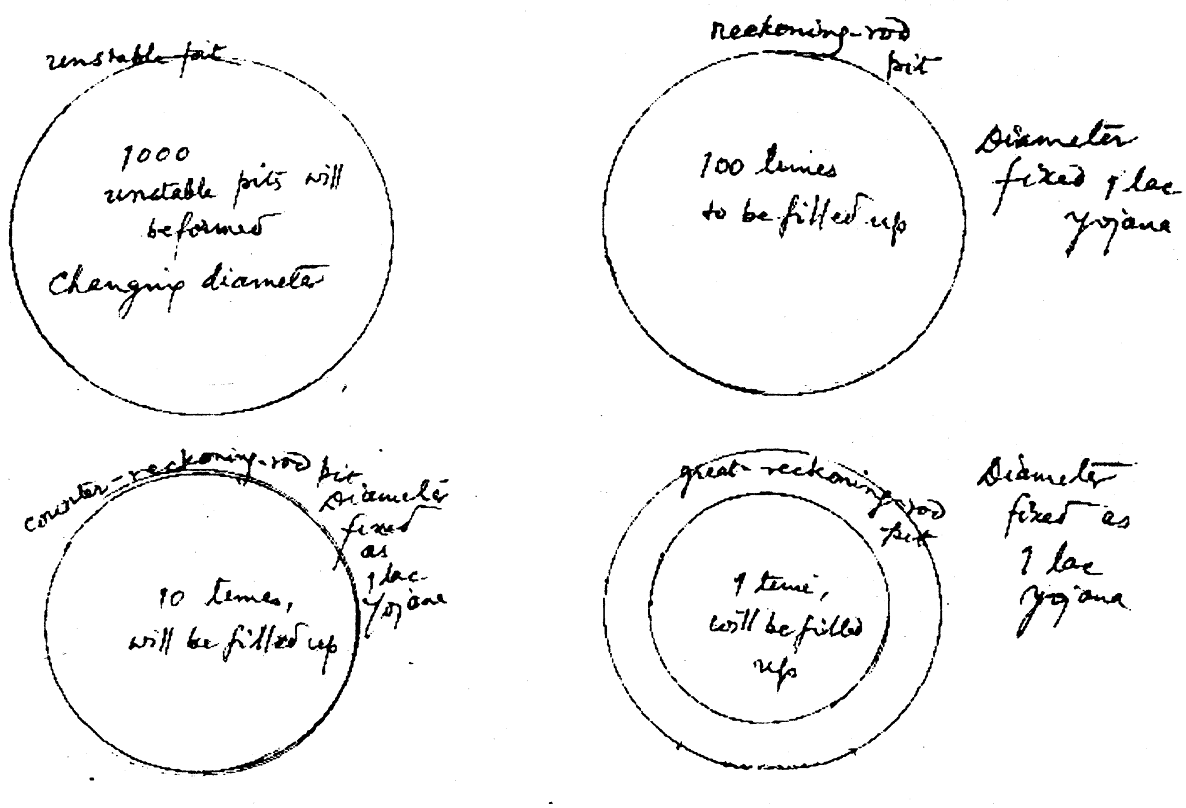


Figure 1.49

Let the first unstable pit be contained with 10 mustard seeds, hence on 10 unstable pits being built through increasing diameters, the reckoning-rod pit will be filled up only once, and then one seed will be placed in the counter-reakoning pit. Similarly, on $(10)^2$ or 100 unstable pits being built, with increasing diameters, the reckoning-rod pit will be filled up 10 times, and then the counter-reckoning-rod pit will be filled up once, and 1 seed will be placed in the great-reckoning-rod-set. Proceeding in this way, with the increasing diameters of the unstable, when $(10)^3$ unstable pits have been built-up, the reckoning-rod pit will be filled up 100 times, then the counter-reckoning-rod pit will be filled up 10 times, and the great reckoning-rod pit will be filled up only once.

In this way, the number of the mustard seeds in the ultimate unstable pit is Ap_j. Here, $Ap_j - 1 =$ Su, and that is how maximal numerate Su is obtained.

Further $\quad (Ap_j)^{Ap_j} = Ay_j = 1$ āvalī or trail ......(1.78)

$Ay_j - 1$ or āvalī $-1 = Ap_u$ ......(1.79)

The process of $(Ap_j)^{Ap_j}$ is called viralana-deya-gunaṇa, i.e. Ap_j is to be spread in to units and to each unity Ap_j is given, and then all are mutually multiplied

spread

1 1 1 1 ...1 (upto Apj)

given

Apj × Apj × Apj × Apj × ...... × Apj

mutually multiplied to give $(Ap_j)^{Apj}$.

for example, $(8)^8$ is shown as

$$\begin{matrix} 8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 \\ 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \end{matrix} = 16777216$$

Pandita Ṭoḍaramala states in his commentary, that if Apj is taken as 4 then Ayj = $(4)^4$ = 256. It may also be noted that in JTP commentary, Ayj has been symbolized as numeral symbol 2. Thus Apu has been denoted as 2 or (2-1).

Thus, $Ayj - 1 = Apu = \bar{a}val\bar{i} - 1$ ......(1.80)

Further, $(Ayj)^2 = Aaj$ ......(1.81)

It has been stated in TPT, 4.310-311, P.180, that wheresoever innumerate is searched, the Ay_j is to be accepted.

Further, $Aaj - 1 = Ayu$ ......(1.82)

Hence $Aaj > Ayu > Aym > Ayj > Apu$ ......(1.83)

In JTP, the symbol for Ayu is the numeral (4−1) in which when 1 is added it becomes 4, the symbal for Aaj.

Now $(Aaj)^{Aaj} = \overline{Aaj}|^{1}$ Once vargita samvargita of Aaj. ......(1.84)

Further $\left[\overline{Aaj}|^{1}\right]^{Aaj|^1} = \overline{Aaj}|^{2}$ = second time vargita-samvargita of Aaj ......(1.85)

And $\left[\overline{Aaj}|^{2}\right] = \overline{Aaj}|^{3}$ = third time vargita-saṁvargita of Aaj ......(1.86)

For example, if we take 2, then

$$[2]^2 = \overline{2|}^{1} \qquad = 4 \qquad \text{......(1.87)}$$

$$\left[\,\overline{2|}^{1}\,\right]^{\overline{2|}^{1}} \qquad = (4)^4 = 256 = \overline{2|}^{2} \qquad \text{.........(1.88)}$$

$$\left[\,\overline{2|}^{2}\,\right]^{\overline{2|}^{2}} \qquad = \overline{2|}^{3} \quad (256)^{256} \qquad \text{......(1.89)}$$

Further, we shall denote

$$\overline{Aaj|}^{Aaj} \qquad = \qquad \overline{Aaj|}_1 \qquad \text{......(1.90)}$$

This produces a very great quantity, through the process of śalākā (reckoning-log), viralana (spread), and deya (to be given). The process of vargaṇa-saṁvargaṇa is carried out as many times as the quantity itself, for each process, a unity being subtracted from Aaj, till the whole Aaj reckoning-rods are exhausted.

Now $\overline{Aaj|}_1$ is subjected to the same procedure, and we get

$$\left[\,\overline{Aaj|}_1\,\right]^{\left[\,\overline{Aaj|}_1\,\right]} \qquad = \qquad \overline{Aaj|}_2 \qquad \text{......(1.91)}$$

and

$$\left[\,\overline{Aaj|}_2\,\right]^{\left[\,\overline{Aaj|}_2\,\right]} \qquad = \qquad \overline{Aaj|}_3 \qquad \text{......(1.92)}$$

The whole process is called the completion of the śalākā-traya-niṣṭhāpanā or reckoning-rod-trio-establishing. Here śalākā set is Aaj, spread set is again Aaj and the set tobe given to each of spread units is also Aaj. [vide also Vīrasenācārya concept of vargita-saṁvargita, DVL, book 3, P.335, vide also TPT, 4.310-312]

If we show this process through the symbol $(256)^{256}$ already taken, we may take up $\overline{256|}^{1}$ and proceed.

Now, $\overline{Aaj}|_3$ is contained in Aam, and we have

$$Aau > Aam > Aaj \qquad ......(1.93)$$

We then proceed to find out Aau, a construction set of ordinals, from $\overline{Aaj}|_3$, for the purpose of which, first the point-sets of the equivalent sets, the dharma, the adharma, one bios (jīva), and the lokākāśa, having cardinal L_3 or symbolically ≡ , and further the set of non-established every vegetable bios (apretiṣṭhita pratyeka vanaspati jīva) which is A times the L_3 or ≡ a are added to the $\overline{Aaj}|_3$ still further the set of established every vegetable bios (apretiṣṭhita pratyeka vanaspati jīva) which is $AL^3 \times AL^3$ or ≡ a × ≡ a symbolically, is added to the preceding result. This gives the following result .

$$\overline{Aaj}|_3 + L^3 + L^3 + L^3 + L^3 + AL^3 + (AL^3 \times AL^3) \qquad ......(1.94)$$

or

$$\overline{Aaj}|_3 + L^3 (4 + A + L^3 AA) \qquad ......(1.95)$$

Further, this set is operated upon the same process of reckoning-rod, spread and give, for mutual multiplication, getting the following set

$$\overline{\overline{Aaj}|_3 + L^3 (4 + A + L^3 AA)}|_3 \qquad ......(1.96)$$

To this quantity the set of instants (samayas) of time in a kalpa (consisting of the 20 corore squared sāgar instant-sets of hyper-serpentine and hyposerpentime periods), which is PS or प १ is added to the expression in (1.96). Then AL^3 times this is the AL^3 set of life-time bond-efforts stations, and $AL^3 \times AL^3$ is the set of energy-bond-efforts stations are also added. Then $AL^3 \times AL^3 \times AL^3$ is the set of maximal yogas (volitions) of mind, speech and body in form of indivisible-corresponding-sections is also projected into the result. Thus the total sum amounts to

$$\overline{\overline{Aaj}|_3 + L^3 (4 + A + L^3 AA)}|_3 + PS + L^3A (1 + L^3A + L^3A \times L^3A)$$

......(1.97)

The above set is again subject to the 3 operations with śalākā-traya-niṣṭhāpanā, trio counter sets, and after mutual multiplications, we get

$$\overline{\left[\overline{\overline{Aaj}\,|_{2} + L^3 (4 + A + L^3 AA)}\,\Big|_3 + PS + L^3A\left(1 + L^3A \times L^3A\right)\right]}\,\Bigg|_3$$ ......(1.98)

which is denominated as Ipj.

Further $\quad$ Aau = Ipj − 1 ......(1.99)

wheresoever Aa is to be searched Aam or ajaghanyanutkṛṣta asaṁkhyāta-asaṁkhyāta is to be accepted. This is the subject of the clairvoyant. (TPT, 4.310, 311, P.182)

Ipm is obtained on adding one, two three, etc. to Iij .

Now $\quad \overline{Ipj}|^1 = Iyj = Ipu + 1$ ......(1.100)

or $\quad \overline{Ipj}|^1 - 1 = Iyj - 1 = Ipu$ ......(1.101)

Ipu is the measure of the set of unaccomplishable bios. When 1 and 2 etc. is added to Ipu, successively, Iym of various choices are produced. The symbol for asaṁkhyāta (innumerate) loka (universe) is ≡ ₹ . The ≡ stands for L^3 and ₹ stands for A.

Then we have the following relations :

$Iyj - 1 = Ipj$ ......(1.102)

$(Iyj)^2 = Iij$ .... (1.103)

$(Iyj)(Iyj) = Iij$ ...... (1.104)

$Ipu > Ipm > Ipj$ ......(1.105)

and $\quad$ ~~Iyu~~ $> Iym > Iyj > Ipu$ ......(1.106)

Further, again Iij is taken from equation (1.103) and subjected to the process of three counter-sets, (patirāśi) śalākā, viralana and deya (reckoning-rod, spread and give) for mutual multiplications, getting some form of Iim, as $\overline{Iij}\,|_3$ in to which the following six sets are added:

[1] The set of accomplished or emancipated souls J/I where J is the set of all bios and I is infinite. [In ancient symbol this has a numeral symbol 3, and the set of all bios is represented by 16.] We may also note as Je*

[2] The nigoda bios set which is the set of all the transmigrating bios excluding the three sets of (i) earth, air, water, fire bodied bios, (ii) every vegetable bios, and (iii) mobile (trasa) bios.

This set is infinite times the set of accomplished soul. This in ancient symbol is given by 13≡ १३ ≡, where ≡ is the symbol of subtraction of three sets stated above from 13, the set of transmigrating bios. Our symbol would be

$$\left[(J - J/I) - Jp, a, t, v - Jpr, va, - Jt\right] L^3 \qquad ....(1.107)$$

[3] The nigoda set of bios (total set of all vegetables) [which includes every vegetable]. Symbol for this will be givin by slightly greater than the previous, with ancient symbol 13 =, or १३ =

$$\left[(J - J/I) - Jp, a, t, v - Jt\right] L^3. \qquad ....(1.108)$$

[4] The set of all material ultimate particles, with ancient symbol 16 kha or १६ ख, where 16 is the set of all living bios in the universe and kha is infinite. Thus, we symbolise it as

$$JI \qquad ....(1.109)$$

[5] The instant-set (samaya rāśi) of the behavioral time (vyarahāra kāla) which is infinite times the previous set of all ultimate particles, with ancient symbol १६ख ख or 16 kha kha. Here we write it as

$$JII \qquad ......(1.110)$$

[6] The point-set of all the points (pradeśa) contained in the non-universe (alokākāśa), which is infinite times that of the preceding. It is denoted by १६ ख ख ख or 16 kha kha kha . we shall denote it by

$$JIII \qquad ......(1.111)$$

The above six sets are of infinite types to be projected or added into the $\overline{Iij}\,|_3$ and operated upon by śalākā-traya-niṣṭhāpanā or reckoning-rod-trio-establishment operational procedure as before, resulting in

$$\overline{\overline{Iij}\,|_3 + (J/I) + \left[(J - J/I) - Jp, a, t, v - Jpr, vn, - Jt\right] L^3 + \left[(J - J/I) - Jp, a, t, v - Jt\right] L^3 + (JI + JII + JIII)}\,\Big|_3$$

......(1.112)

We may replace in the above symbols J/I by Je* , the set of all accomplished bios, and JI, JII, JIII by J@ , J@@, J@@@ where @ dinotes infinite as I. Thus the above may be written as

$$\left. \begin{array}{l} \overline{\text{Iij}}\,|_3 + \text{Je}^* + \left[(\text{J} - \text{Je}^*) - \text{Jp, a, t, v} - \text{Jpr, vn} - \text{Jt} \right] \text{L}_3 \\ + \left[(\text{J} - \text{Je}) - \text{Jp, a, t, v} - \text{Jt} \right] \text{L}^3 + (\text{J@} + \text{J@@} + \text{J@@@}) \end{array} \right|_{3}$$

......(1.113)

In the above set, so obtined the indivisible-corresponding-sections of the dharma fluent's and the adhama fluent's non-gravity-levity (agurulaghu) control (guṇa) are added and the resulting set is again subjecteɑ to the operation of salaka-traya-nisthapana. We get, as these denoted by ख ख or kha kha , or @ @ here, and express the result as

$$\left. \left. \begin{array}{l} \overline{\text{Iij}}\,|_3 + \text{Je}^* + \left[(\text{J} - \text{Je}^*) - \text{Jp, a, t, v - Jpr, vn - Jt} \right] \text{L}^3 \\ + \left[(\text{J} - \text{Je}^*) - \text{Jp, a, t, v} - \text{Jt} \right] \text{L}^3 + \left[\text{J@} + \text{j@@} + \text{J@@@} \right] \end{array} \right|_3 + @@ \right|_3$$

.........(1.114)

Still then this set can not produce the Iiu which is the set of indivisible-corresponding-sections of all knowledge (kevala Jñāna).

Now, for the purpose of framing two equivalent sets, the procedure of subtracting and adding has been adopted simply to give the idea of the construct-set or construction sets, which can be carried out upto this limit and not beyond to reach the set of omniscience's indivisible-corresponding-sections. Here is the ultimate failure, as it seems, to be possible to get to the omniscience. Hence the following equation appears for understanding the omniscience:

$$\text{K} - \left. \left. \begin{array}{l} \overline{\text{Iij}}\,|_3 + \text{Je}^* + \left\{ (\text{J} - \text{Je}^*) - \text{Jp, a, t, v} - \text{Jpr, vn} - \text{Jt} \right\} \text{L}_3 \\ + \left\{ (\text{J} - \text{Je}^*) - \text{Jp, a, t, v} - \text{Jt} \right\} \text{L}_3 + \text{J@} + \text{J@@} + \text{J@@@} \end{array} \right|_3 + @@ \right|_3$$

$$\left.\left.\begin{array}{l} + \overline{Iij}|_3 + Je^* + \{(J - Je^*) - Jp, a, t, v - Jpr, vn - Jt\} L^3 \\ + \{(J - Je^*) - Jp, a, t, v - Je\} L^3 + J@ + J@@ + J@@@ \end{array}\right|_3 + @@ \right|_3$$

$$= Iiu, \qquad ....(1.115)$$

where K is the set of indivisible-corresponding-sections of all knowledge or omniscience.

Wheresoever there is necessity of accepting infinite-infinite, there Iim has tobe taken. (TPT, 4.312-313).

Even yativṛṣabhācārya has stated that the amount of set produced in (1.114) is bhājana (a fraction) and not an integrity of fluent (dravya), because the process gives rise only to a set which infinitesimal (part) of the omniscient's knowledge and vision (Kevala Jñāna and Kevala Darśana]. Thus, the limitation of the construction-sets have been related here. This may be a subject of further research, however, in view of recent set theory.

The knowledge has the measure as is that of the knowable. This is relative to the power of knowledge, and is manifestation is due to the knowable, as such the set of omniscience is adaptable, and the supreme adaptable set and no measure is greater than its measure. Whatever are the topice corrsponding to the simultaneous direct scriptural (heard) knowledge, clairvoyance and omniscience, they are tobe known respectively as numerete, innumerate and infinite. According to this definition the half-matter-cyclic-change (ardha-pudgala-parivartana) is infinite, because it is beyond the capacity of clairvoyance knowledge, but as per reality, it is not infinite in the supreme sense of the word, because, it gradually get ultimatery completely exhausted. When the set, without even any input, cannot be exhausted in infinite time, inspite of gradual exhausting out going elements, or members of the set, is called an unexhaustible infinite set. (DVL,1, 5, 4, pp.325-338, vol.4)

(vv.1.54 et seq)

In order to properly understand the domains of the numerate, the innumerate and the infinite number-measure, description of various sets which lie on the different locations at various number of terms in the fourteen fypes of sequences which are constructed in various ways, is given as follows.

The names of the fourteen sequences, with convenient devotaions may be placed as follows

:TABLE -1. 3

S1	:	The whole sequence (sarva dhārā)
S2	:	The even sequence (sama dhārā)
S3	:	The odd sequence (viṣama dhārā)
S4	:	The square sequence (kṛti dhārā)
S5	:	The non-square sequence (akṛti dhārā)
S6	:	The cube sequence (ghana dhārā)
S7	:	The non-cube sequence (aghana dhārā)
S8	:	The square-generating sequence (krtimātṛka dhārā)
S9	:	The non-square-generating sequence (akṛti mātṛka dhārā)
S10	:	The cube-generating sequence (ghana mātṛka dhārā)
S11	:	The non-cube-generating sequence (aghana mātṛka dhārā)
S12	:	The dyadic square sequence (dvirūpa varga dhārā)
S13	:	The dyadic cube sequence (dvirūpa ghana dhārā)
S14	:	The dyadic cube-non-cube sequence (dvirūpa ghanāghana dhārā)

There sequences are comparable with Cantor's works on transfinite sequences and numbers. (Bibliography of Books op. cit.). We shall use the following abbreviations:

ICS = indivisible-corresponding-sections (avibhāgī praticchedas)

TABLE- 1.4

The details of the sequencs are as follows:

Sequence number	first term	General term	last term
S_1	1	$(1+(n-1)1)$	K or Omniscience
S_2	2	$(2+(n-1)2)$	K
S_3	1	$(1+(n-1)2)$	K-1
S_4	1^2	n^2	$(K^{1/2})^2$
S_5	2	(n : n $\bar{I}S_1$- S_4)	K-1
S_6	1^3	n^3	$L^3 \rightarrow K$
S_7	2	(n : n $\bar{I}$ S1-S6)	K
S_8	$(1^2)^{1/2}$	$(n^2)^{1/2}$	$K^{1/2}$
S_9	$K^{1/2} + 1$	$K^{1/2} + n$	K
S_{10}	$(1^3)^{1/3}$	$(n^3)^{1/3}$	L $(K)^{1/3}$
S_{11}	$L+ 1 \rightarrow (K)^{1/3} +1$	$(K)^{1/3} + n$	K
S_{12}	2^2	2^{2^n}	K
S_{13}	2^3	$2^{3(2)^{n-1}}$	$((K^{(1/2)^2}))^3$
S_{14}	$2^{(3)^2}$ (2^{1-1})	$2^{(3)^2}$ $(2)^{n-2}$	$(K)^{(1/2)^{(4)}}$ ^{9}

TABLE - 1.5

The total number of terms in the above 14 sequences are as follows

Sequence	Number of terms
S_1	K
S_2	K/2
S_3	K/2
S_4	$K^{1/2}$
S_5	$K-K^{1/2}$
S_6	K/2
S_7	K-K/2
S_8	$K^{1/2}$
S_9	K-K/2
S_{10}	$(K)^{1/3}$
S_{11}	$K-(K)^{1/3}$
S_{12}	$2^{2^{\log \log K}}$
S_{13}	$2^{3.\ 2^{(\log \log (K^{(1/2)^2})\ 3-\ \log 3\ +\ 1)\ -\ 1}}$
S_{14} -1	$2^{3^2}.\ 2^{[\{\log\log(K)\ (1/2)\ (4)\ 9 \ldots\}}$ -2 log3 + 1]

Here in and what follows, log will mean $\log_2$. The set of operations which may be defined as valid through the principle of transfinite induction, producing the succeeding terms of S_n sequences are respectively as follows: The set of operations so far adopted in case of generation or production of the various types of the numerate, innumerate, and the infinite, and various number limits or ordinals were those of addition, subtraction, calculations of contents of cylindrical and conical variable and fixed volumes, squaring, spread, give and multiply, or sequaring as many-times as the quantity itself. Yet the most important operation is the injection of the innumerable types of existential sets in order to produce the actual innumerable sets and also the injection of the infinite types of existential sets to produce the actual infinite ordinals or cardinals.

TABLE - 1.6

Sequence	Operation for generally generating next term	
S_1	$f(n) = n+1$	
S_2	$f(2n) = 2(n+1)$	
S_3	$f(2n-1) = 2(n+1) - 1$	
S_4	$f(n^2) = (n+1)^2$	
S_5	$f(ne\ S_1 - S_4) =$	(drop $n^2 \in S_4$ from S_1 and pick up the remaining next in S_1)
S_6	$f(n)^3 = (n+1)^3$	
S_7	$f(n \in S_1 - S_6) =$	(drop n^3 6 S_6 from S_1 and pick up the remaining next in S_1)
S_8	$f((n^2)^{1/2}) = ((n+1)^2)^{1/2}$	
S_9	$f(n \in S_1 - S_8) =$	(Drop$((n^2))^{1/2} \in S_8$ from S_1 and pick up the remaining next is S_1)
S_{10}	$f((n^3))^{1/3} = ((n+1)^3)$	
S_{11}	$f(n \in S_1 - S_{10}) =$	(Drop $((n^3)^{1/3}) \in S_{10}$ from S_1 and pick up the remaining next in S_1
S_{12}	$f(2^{2^n}) = 2^{2^{n+1}}$	
S_{13}	$f(2^{3 \cdot 2^n}) = 2^{3 \cdot 2^{(n+1)}}$	
S_{14}	$f(2^{3^2 \cdot 2^n}) = 2^{3^2 \cdot 2^{(n+1)}}$	

Now we shall examine every such sequence of importance which were also studied in some other forms by G.Cantor.

The sequence S_1:

The S_1 includes all members whether fluents, their controls (gunas) and their events (paryāya) including becomings of all fluents of all times and of all space as well as all their combinations. It is an extended system of natural numbers yet made up of integers and positive integers alone. It may be regarded as a well-ordered set filling up every type of structure, discrete, continuem or manifolds of continuums of the finite and the infinite types. The last term of this sequence is the set of omniscience which is an adaptable set of the type which is capable of taking into its domain the range of still bigger sets of knowledge which might come into sudden existence if it could happen. Thus, the set may be called the supreme adaptable set. The sequence contains all the remaining sequences S_2 to S_{14}. Here, the production of the next term is attained by the operation $f(n) = n+1$, and this operation may be extended, by the principle of transfinite induction to the cardinal of the biggest adaptable set of ICS of omniscience. However, so far as the actual constructibility and existence of such a set is concerned, it may be challanged by the intutionists and the vast history of the struggle faced by canter and his supporters may repeat at this spot. The sequence contains K as the last term, the supremum set of omniscience, and there fore contains all the subsets of K as well, described in details in the Ṣaṭkhaṇḍāgama and the Mahābandha (cf. MBD) and (cf SKG).

In accordance with Cantor's theory, there exist two classes of transfinite numbers, whose existence if accepted will give rise to paradoxes like those of Burali-Forti and Russell. The two classes are:

(i) $0, 1, 2, \ldots, n, \ldots\ldots, \omega_0, \omega_0 + 1, \ldots \omega_2, \omega_2 + 1,$ ......(1.116)

(ii) $0, 1, 2, \ldots, n, \ldots \wp_0, \wp_1 \ldots\ldots \wp\,\omega_0 \quad \wp\,\omega_{0+1} \ldots\ldots\} \wp\,\omega\,\alpha, \ \wp\,\omega\,\alpha + 1,$ (1.117)

The first is the ordered class of all ordinal numbers. The second sequence is the ordered class of all cardinal numbers. [cf. Z lot, W.L. op.cit.]." It is to the undying credit of Gearg Cantor [1845-1918] that, in the face of conflict, both internal and external against apparent paradoxes popular prejudices and philosophical dicta (infinitum actu non dutur[3]) and even in the face of doubts that had been raised by the very greatest mathematicians, he dared this step into the realm of the infinite [vide Hausdorff, F., op.cit.p.11]. cf. also Grattan-Guinness, "Principien Einer Theorie der ordnungstypen Ersto Mitteilung", Acta Mathematica, vol.124, 1970, pp.65-107, which given an unpublished paper of cantor.

Here is a structure containing all types of what may be called today as the uniformity, proximity, and topological structures as limit numbers, representing structural sets of algebraic or dynamic variety; for the sets illustrated in the theory of karmic bonds are in form of matrices and a system operated by the inputs, input functions, outputs, output functions, state existence matrices and the next state functions and so on. (cf. the LDS project, and Kalman's book Mathematical System Theory). The topology of this sequence is therefore (K,K), where the null set concept exists as a member integer. Cantor's work was limited to the point-sets in Euclidean Space, whereas frechet (1878-), Hausdorft (1868-) and others carried it on to abstract spaces. Similarly in the S_1, one may find variety of abstract structures needed for the Jaina School for their cosmological theory studies as well as their karmic mathematical theory In this connection, one may further read the attempts of F. Riesz (1908), weil (1937), Effremovic (1952), H.Freudenthal (1942), and Akos Csaszar (1963)*.

Here, the method of locating the subsets of K through such a sequence deserves special attention because this programme attempted by Cantor was not so successful in being able to find out abstract and existential sets in nature and put them in their own proper place in the sequence $1,2,3,\ldots\ldots,\omega,\ \omega+1,\ldots\omega.2,\ldots,\omega.3\ldots\ \omega^2,\ldots\ldots.\omega^3a,\ldots\ldots.\omega^\omega$ and so on, and had no application immediately as the Jainas possessed. Yet such a sequence is valid on the basis of a "well-ordering theorem". It is, "Every set can be well ordered". or "Every class can be so ordered that each of its non-empty subclasses has a first element." (vide, Z lot, op.cit.). Its equivalent is the axiom of choice. This theorem unites the concepts of cardinality and ordinality for transfinite numbers in the same way as identified in case of finite numbers.

The theorem of general comparability (in which there are several examples in DVL, GJK,GKK and LDS), which asserts two sets are either equivalent or else one of them is equivalent to a subset of the other, depends upon the well-ordering theorem. Hartogs proved that the general comparability theorem is logically equivalent to the well-ordering theorem. (Vide, Zlot, op-cit.)

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*Vide Jaina, L.C., Divergent Sequences locating transfinite sets in Trilokasāra, IJHS, 12.1, 1977, pp.57-75.

Actually these sequences introduces the concept of topology. In, foundations of General Topology", A Kos Csaszar introduces that the topologists were led to search for a concept which would furnish a common basic term to systems of suitable axioms of topologies, uniformities and proximity structures, and to look for general (syntopogenous) structures from which deductions of these of structures could be possible from the same source. They found the basic term in the order relations defined for the subsets of the space (by order is meant a transitive relation). Similarly, in the Jaina School of Mathematics, Alpabahutva (comparability) plays a vital role in analysing the location of the structural (either constructional or existential) sets. It renders the knowledge of order of smallness or largeness in relation to seven tautos (Tattvas). It is defind as the nature of number also. The three types of comparability are about the bios (souls), the non-bios (non-souls), and the both (mixed). When the states of knowledge, perception, volition and intensity of karmic rendering are depricted, the comparability is of Noāgama type. All types of comparability are in general treated in three ways: one's own place, in other place and in general. (vide SVS, p.29; TVK, p.42; DVL vol.3, v.1.8-1, 1, 2, 23, 208).

The Axiom of choice may be formulated thus," If L is a set of non-null disjoint sets L_n, then there exists a set C called as a set of choice, which contains one and only one element from each of the L_n ". There are many equivalent forms of this axiom, for example, all cardinals are comparable and so on. It is also equivalent to the well-ordering theorem. For its consistency proof, vide Gödel, K., The consistency of the continuum Hypothesis, princeton,1964.

In all this view, the set theory of the Jaina School is to be studied. In the Dhavalā, abstraction or choice (vikalpa) is of two types: the lower (adhastana) and the upper (uparima).The former is classified into three types:

1. The dyadic square sequence (Dvirūpa varga dhārā).

2. The eight-form cube sequence (Astarūpa Ghana dhārā).

3. The cube-non-cube sequence (Ghanāghana dhārā).

The upper abstraction or choice (vikalpa) is also of three types:

1. The adopted (Gṛhīta).2. The adopted-adopted (Gṛhītāgṛahīta)..3. The adopted multiplier (Gṛhīta guṇakāra).

Each of these is again classified into those in which the lower abstraction is classified. (DVL. book-3, pp 52-63). (vide also cantor, op.cit.)

The problem of the generalization of the counting process to infinite sets can also be shown to depend upon the well-ordering theorem. (Z lot, op. cit.) Cantor asserted that the well-ordering statement was "a fundamental logical law of great consequence, being noteworthy by its universal validity". This statement gave rise to many conjectures and attempted proofs involving the axiom of choice. This axiom asserts the existence of a set (the multiplicative or choice-set), without even challenging the possibility of its constructibility by man and enlightens the view that man must take of any general theory of sets. (vide Z lot, The Principle of choice, pp.108-122).

Cantor evolved a process known as transfinite induction used in theorems which are related to exponentiation by infinite ordinals. (vide ibid.) The same allows the truth of the assertion that in the well-ordered sequence 1, 2, 3,...n,... ω, ω +1... the ω is attainable and has an immediate preceding term. This types of extension is admissible iff the well-ordering theorem is taken as valid. Z lot concludes that the well-ordering theorem, the theorem of general comparability, and other related assertions, all have the same purely existential character as the principle of choice, and need not be challanged for attainability, after its assertion at the beginning. (Z lot, doctoral thesis excerpt, op.cit. pp. 115-122). Thus, we find the naive set theory of the Jaina School has a great amount of rich material for research.*

The Complementary Sequences

S_2 and S_3: These sequences complement each other with respect to the universe. S_1. The infimum numerable 2, the infimum innumerable and the infimum infinite of the number measure (saṁkhyā pramāṇa) lie in S_2. Similarly the supremum numerable reduced by unity, the supremum innumerable reduced by unity and the supremum infinite reduced by unity of the number measure lie in S_2. For S_3, the last term is obtained by reducing unity from the cardinal of the set of ICS of omniscience. Similarly, the infimum number measure of the numerable, the innumerable, and the infinite here are obtained by adding unity to those of S_1. The supremum of the measures in S_1 are also supremum in S_3.

* for details of analysis of sets, vide Jain, L. C., Mathematical Topics of the Dhavalā Texts, IJHS, vol.11, no. 2, 19, pp. 85-111. The me thods author of cut (khaṇḍita), division (bhājita), spreed (viralita), reduction (apahṛta), measure (pramāṇa), reason (kāraṇa), explanation (nirukta), and abtraction (vikalpa).

The rule for finding out the number of terms is given as L = a + (n – 1)d. Thus, in both the cases the number of terms is K/2. The last term in case of S_3 is K – 1. Here, the value K/2 is subject to discussions but the reduction of unity from the right is admissible as denoted so far as the order is concerned. However in case of ordered sets, say $\omega + \omega$ means $\omega .2$.

S_4 and S_5: These sets are complement of each other with respect to the universe S_1. The total number of terms in S_4 is $(K)^{1/2}$. The operation of finding out square root of the supremum ordinal again seems to be a new concept open for discussion. The concept of a quotient set is defined, that of squaring may be possible to define on the basis of product, yet the concept for extraction of square or cube root or logarithms is perhaps lacking in the modern set theory, in a vivid form. Gentzen had proved the consistency of ordinary arithmetic by using transfinite induction.

In S_5 the rules for the infimum numerable and the supremum numerable etc. are similar to those for S_3. In this sequence there are no square places.

S_6 and S_7: These are complement of each other with respect to the universe S_1. In S_6, care is taken to find the last term such that its cube does not exceed K. Hence the word, "Āsannaghaṇa" has been used by the author. It means "nearest cube".

The number of elements in S_6 has been approximated to be K/2 as follows:

The sequence S_6 is compared with S_{12}. By dividing the odd terms of S_{12} by 4 the terms of S_6 are obtained:

Terms of S_{12} as divided by 4	Terms of S_6
$2^{2^1} \div 4$	$(1)^3$
$2^{2^3} \div 4$	$(4)^3$
$2^{2^5} \div 4$	$(2^{10})^3$
....	....
....	....

......(1.118)

Similarly, when the even terms of S_{12} are divided by 2, the terms of S_6 are obtained. Thus, in both the cases

$$z^3 \in 2^{2^{2n+1}} \div 4 \quad \text{or} \quad z^3 \in 2^{2^{2n}} \div 2, \qquad \text{.......(1.119)}$$

$$\text{therefore log} \quad Z = \frac{2}{3}(2^{2^n} - 1) \quad \text{or} \quad \log Z = (2^{2^n} - 1)/3 \qquad \text{......(1.120)}$$

Thus, in both the cases $2^{2^n} - 1$ is divisible by 3 for every positive integral value of n. Hence, $(2^{2^n} - 1) / (2+1)$ should be an integer for every n. This is true bacause $Z^{2n}-1$ is divisible by Z+1 for all values of Z, except for $Z = -1$. Since K is regarded as an even term of S_{12}, therefore K/2 will be a cube station (ghana- sthāna), that is, it will lie in the s_6 further K is the even term of s12 because measure of log log K is stated to be an even term of S_{12} and in the stations of S_{12}, the measure is in even form.

S_8 **and** S_9 : These are complement of each other with respect to the universe S_1.

S_{10} **and** S_{11} : These are also complement of each other with respect to the universe S_1.

STRUCTURAL ANALYSIS OF THE SEQUENCE S_{12}

The general term of S_{12} is 2^{2n} which is used for defining Fermat's numbers

$$Fn = 2^{2n} + 1 . \qquad \text{......(1.121)}$$

It is also clear that $\log \log (2^{2^n}) = n$, ...(1.122)

or the order of the n th term or station.

The structure of the sequence will be clear from the following terms which lie in the sequence in order of succession.

TABLE- 1.7

Serial No.	Name of term located	Value of n	Order of term from preceding term
1.	2^{2^1}	1	1
2.	log log (Apj)	S	S
3.	log (Apj)	S + S	S
4.	$(\text{Apj})^{1/2}$	S + S + S or S.3	S
5.	Apj	S.3 +1	1
6.	Āvalī (Trail)	S.3 + 1 + S	S
7.	$(\text{Āvalī})^2$	S.3 + 1 + S + 1	1
8.	log log (Palya)	S.3 +1+S+1+A	A
9.	log (Palya)	S.3 +1+S+1+A.2	A
10.	$(\text{Palya})^{1/2}$	S.3 +1+5+1+A.3	A
11.	(Palya) or Pit	S.3 +1+S+1+A.3+1	1
12.	Aṅgula (finger)	S.3+1+S+1+A.3+1+A	A
13.	$(\text{Aṅgula})^2$	S.3+1+S+1+A.3+1+A+1	1
14.	$(\text{Jagaśreṇī})^{1/3}$	S.3+1+S+1+A.3+1+A+1+A	A
15.	loglog (Ipj)	S.3+1+S+1+A.3+1+A+1+A.2	A
16.	log (Ipj)	S.3+1+S+1+A.3+1+A+1+A.3	A
17.	$(\text{Ipj})^{1/2}$	S.3+1+S+1+A.3+1+A+1+A.4	A
18.	Ipj	S.3+1+S+1+A.3+1+A+1+A.4+1	1
19.	Iyj (Abhavya Jīva rāsī) (set of unaccomplishable bios)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A	A

20.	$(Iyj)^2$ or Iij	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1	1
21.	log log (Jīva rāśi) or (set of bios operated by $\log_2$ of $\log_2$)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii	Ii
22.	log (Jīva rāśi)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.2	Ii
23.	$(\text{Jīva rāśi})^{1/2}$	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3	Ii
24.	Sarva Jīva rāśi or (set of all bios)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1	1
25.	Sarva Pudgala rāśi (set of all ultimate particles of matter)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1+Ii	Ii
26.	Sarva kāla rāśi (set of all instants in all time)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1+Ii.2	Ii
27.	Śrenyākāśa Pradeśa rāśi (set points in infinite space linear continuum)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1+Ii.3	Ii
28.	Pratārakāśa Pradeśa rāśi (set of points in infinite space areal continuum)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1+Ii.3+1	1
29.	Dharmādharma dravya agurulaghu avibhāgapra-ticcheda (set of ICS in non-gravity-levity of aether and anti-aether)	S.3+1+S+1+A.3+1+A+1+A.4 +1+a+1+Ii.3+1+Ii.3+1+Ii	Ii

30.	Eka Jīvadravya agurulaghu guṇāvibhāga praticcheda rāśi (set of ICS in non-gravity-levity control of a bios	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1+Ii.3+1+Ii.2	Ii
31.	Jaghanya Jñāna (set of ICS in infimum knowledge)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1+Ii.3+1+Ii.3	Ii
32.	Jaghanya kṣāyika Labdhi (set of ICS in the infimum attainment due to annihilation of karma -relevant)	S.3+1+S+1+A.3+1+A+1+A.4 +1+A+1+Ii.3+1+Ii.3+1 +1+Ii.4	Ii
33.	log log K or kevala jñāna varga śalākā rāśi	S.3+1+S+1+A.3+1+A+1+ A.4+1+A+1+Ii.3+1+Ii.3 +1+Ii.5	Ii
34.	log K or kevala Jñāna ardhaccheda rāśi	S.3+1+S+1+A.3+1+A+1 +A.4+1+A+1+Ii.3+1+Ii.3 +1+Ii.6	Ii
35.	$(K)^{(1/2)^8}$ kevala Jñāna āṭhavāṁ mūla	S.3+1+S+1+A.3+1+A+ 1+A.4+1+A+1+Ii.3+1+Ii.3+1+Ii.7	Ii
36.	K or Iiu (Supremum set of all becoming measures kevala Jñāna rāśi)	S.3+1+S+1+A.3+1+A+ 1+A.4+1+A+1+Ii.3+1+Ii.3 +1+Ii.7+8	8

The following points may be noted

1. In the above all the intermediary terms from 35 to 36 have not been shown in order to avoid unnecessary details.

2. The li has the significance of unending dimension either in time or in space or in the knowledge of the fluents (dravyas), their controls (guṇas) and events (paryāyas), and so on.

3. Comparing S and A with the denumerable and the non-denumerable of cantor, it is clear that of S represents a discrete structure, then A at a certain stage represents a continuum structure. The manifols produced and located through various operations above represent various types of structural sets distinctly, and they may be compared with those denoted by the omeges of cantor and alephs introduced by him. The difference in manipulation of such structures is natural. The structures obtained at the li level appear to be rich in various types of points, the variety of the points being due to the fact that there are many types of the indivisibles in the Prakrit literature. The study of these structures may be helpful in tracing the new and unknown paths in structural sciences.

4. If a quantity $(Z)^Z$ is obtained as a term of a sequence spread, give and mutually multiply, then $\log (Z^Z)$ or $\log\log (Z^Z)$ cannot be the terms of the same sequence, they may well be terms of another sequence. This rule applies for the remaining two sequences S_{13} and S_{14} as well.

5. The relation between adjacent terms for this sequence may be given by:

$$\log (2^{2^{n+1}}) = 2 \log (2^{2^n}) \text{ and} \quad \text{......(1.123)}$$

$$\log\log (2^{2^{n+1}}) = 1 + \log\log (2^{2^n}) \quad \text{......(1.124)}$$

6. The correspondence between S_{12} and S_{13} may be given as follows:

Terms of S_{12}	**Terms of S_{13}**
2^{2^n}	$2^{3 \cdot 2^{n-1}}$
$2^{2^{n+1}}$	$2^{3 \cdot 2^n}$
$2^{2^{n+2}}$	$2^{3 \cdot 2^{n+1}}$

......(1.125)

Now, $$3 \log \left(2^{2^n}\right) = \log \left(2^{3 \cdot 2^n}\right) \quad \text{......(1.126)}$$

It is important to observe the approximation here for correspondence:

$$\log\log \left(2^{2^n}\right) = \log\log \left(2^{3 \cdot 2^{n-1}}\right) \quad \text{......(1.127)}$$

or $$n = \log 3 + (n-1) \quad \text{......(1.128)}$$

7. Functionality:

Ardhaccheda of Ardhaccheda of Z = Vargaśalākā of z ......(1.129) or $\log(\log(z)) = \text{loglog}(z)$ ......(1.130)

and $2^{\log(\log(z))} = \log(z)$ ......(1.131)

8. The relation between the terms of S_{12} and S_{14} is given as under:

$$\left(2^{2^{n}}\right)^{9} = \left(2^{(3)^{2} \cdot 2^{n-1}}\right)^{2}$$ ......(1.132)

TABLE - 1.8

The Structure of S_{13}

The mathematical structure of S_{13} are located as under; the general term being

$$2^{3 \cdot (2)^{n-1}}$$ ......(1.133)

Ser. No.	Name of term	Value of n	Order of term from preceding
1.	$2^{3 \cdot 2^{1-1}}$	1	1
2.	$(\text{āvalī})^3$	S	S
3.	$((\text{āvalī})^2)^3$	S+1	1
4.	$(\text{log log Palya})^3$	S+1+A	A
5.	$(\text{log Palya})^3$	S+1+A.2	A
6.	$((\text{Palya})^{1/2})^3$	S+1+A.3	A
7.	$(\text{Palya}))^3$	S+1+A.3+1	1
8.	$(\text{Aṅgula})^3$	S+1+A.3+1+A	A
9.	Jagaśreṇī (universe-line)	S+1+A.3+1+A.2	A
10.	$(\text{Jagaśreṇī})^2$	S+1+A.3+1+A.2+1	1
11.	$(\text{log log (Jiva rāśi)})^3$	S+1+A.3+1+A.2+1+Ii	Ii
12.	$(\text{log (Jiva rāśi)})^3$	S+1+A.3+1+A.2+1+Ii.2	Ii
13.	$((\text{Jiva rāśi})^{1/2})^3$	S+1+A.3+1+A.2+1+Ii.3	Ii
14.	$(\text{Jiva rāśi})^3$	S+1+A.3+1+A.2+1+Ii.3+1	1
15.	$(\text{loglog śreṇyākāśa})^3$	S+1+A.3+1+A.2+1+Ii.3+1+Ii	Ii
16.	$(\text{log śreṇyākāśa})^3$	S+1+A.3+1+A.2+1+Ii.3+1+Ii.2	Ii
17.	$((\text{śreṇyākāśa})^{1/2})^3$	S+1+A.3+1+A.2+1+Ii.3+1+Ii.3+1	Ii
18.	$((\text{śreṇyākāśa})^3$ or the whole inspite space	S+1+A.3+1+A.2+1+Ii.3+1+Ii.3+1	1
19.	$((K)^{(1/2)^2})^3$	S+1+A.3+1+A.2+1+Ii.3+1+Ii.3+1	Ii

Note

1. The cube of the last and the last but one terms, that is the cubes of K and $(K)^{1/2}$ terms of the S_{12} do not exist in the S_{13} ; because the cubes then exceed the K.
2. The relation between the terms of the S_{13} with those of S_{12} has been shown already.

The Structure of S_{14}

The structure of S_{14} is to be compared carefully with S_{13} and S_{12} , how it is produced at important phase. The structure of this sequence and that of S_{13} has been produced at a very important cituation of and by projecting the sequence S_{12} by making use of the numerals 3 and the square of 3 as multipliers. This situation is the place of power to which 2 has been raised. Cantor was able to produce several alephs by making use of this technique which had brought the problem of the continuum. Whenever 2 is raised to any power, the combinatorial technique comes into being. (Vide Z lot and Hausdorff).

The structure of S_{14}, in brief, is as follows: General Term is $2^{(3)^2 \cdot 2^{n-2}}$

TABLE 1.9

Ser. No.	Name of term located	Value of n	Order of term from precedin term
1.	$2^{3^2 \cdot 2^{1-1}}$	1	1
2.	Lokākāśa Predeśa rāśi (set of points in the non-empty space or universe	A	A
3.	Tejaskāyika Jīva rāśi Guṇakāra śalākā rāśi (set of fire bodied bios Multiplier-reckoning-rod-set	A.2	A
4.	loglog (Tejaskāyika Jīva rāśi)	A.3	A
5.	log (Tejaskāyika Jīva rāśi)	A.4	A
6.	(Tejaskāyika Jīva rāśi)$^{1/2}$	A.5	A
7.	Tejaskāyika Jīva rāśi	A.5+1	1
8.	loglog (Tajaskāyika sthiti or life-time)	A.5+1+A	A
9.	log (Tejaskāyika sthiti)	A.5+1+A.2	A

10.	(Tejaskāyika sthiti)$^{1/2}$	A.5 +1+A.3	A
11.	Tejaskāyika sthiti	A.5+1+A.3+1	1
12.	log log (Avadhi nibaddha utkṛṣṭa kṣetra)	A.5+1+A.3+1+A	A
13.	log (Avadhi nibaddha utkṛṣṭa kṣetra)	A.5+1+A.3+1+A.2	A
14.	(Avadhi nibaddha utkṛṣṭa kṣetra)	A.5+1+A.3+1+A.3	A
15.	(Avadhi nibaddha utkṛṣṭa kṣetra) or set of points in supremum spatial range of clairvayance	A.5+1+A.3+1+A.3+1	1
16.	loglog (sthiti bandha pratyaya sthāna of kaṣāya)	A.5+1+A.3+1+A.3+1+A	A
17.	log(sthiti bandha pratyayasthāna)	A.5+1+A.3+1+A.3+1+A.2	A
18.	(Sthiti bandha pratyaya Sthāna)$^{1/2}$	A.5+1+A.3+1+A.3+1+A.3	A
19.	(Sthitibandha pratyaya sthāna) or set of stay obnd (life time bond) causal stations [of affection (kaṣāya)]	A.5+1+A.3+1+A.3+1+A.3+1	1
20.	loglog (rasa bandhādhya vasaya sthana of kaṣāya)	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A	A
21.	log (rasa bandhādhyava sāya sthāna)	A.5+1+A.3+1+A.3+1+A.3+1+A.2	A
22.	(rasa bandhādhyava sāya sthāna)	A.5+1+A.3+1+A.3+1+A.3+1+A.3	A
23.	rasa bandhādhyavasāya sthāna (set of impaslation energy extra-advenience stations of affection or kaṣāya)	A.5+1+A.3+1+A.3+1+A.3+1+A.3+1	1
24.	log log (nigoda Jīva kāya utkṛṣṭa saṁkhyā)	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A	A
25.	log (nigoda Jīva kāya utkṛṣta saṁkhyā)	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.2	A

26.	(nigode Jīva kāya utkṛṣṭa saṁkhyāta)	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3	A
27.	nigoda Jīva kāya utkṛṣṭa Saṁkhyāta	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+1	1
28.	loglog (nigoda kāya sthiti)	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+1+A.	A
29.	log (nigoda kāya Sthiti)$^{1/2}$	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+1+A.2	A
30.	(nigoda kāya Sthiti)$^{1/2}$	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+1+A.3	A
31.	(nigoda kāya sthiti)	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+A.3+1	1
32.	loglog (sarva Jyeṣṭha yoga utkṛṣṭha avibhāgī praticchada	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+1+A.3+1+A	A
33.	loglog (sarva Jyeṣṭha yoga utkṛṣṭa avibhāgī praticchada	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+1+A.3+1+A.2	A
34.	Sarva Jyeṣṭha yoga uṭkṛṣṭa avibhāgī praticcheda	A.5+1+A.3+1+A.3+1+A.3 +1+A.3+1+A.3+1+A.3+1+A.3	A
35.	Sarva Jyeṣṭha yoga uṭkṛṣṭa Avibhāgī praticchada	A.5+1+A.3+1+A.3+1+A.3+1 +A.3+1+A.3+1+A.3+1+A.3+1	1
36.	$(K)^{(1/2)^{(4)^{9}}}$	A.5+1+A.3+1+A.3+1+A.3+1+ A.3+1+A.3+1+A.3+1+A.3+1+Ii	Ii

Note: David Hilbert ascribed great importance to Cantor's Continum Problem. This was one from the set of 23 unsolved problems which he stipulated in 1900, discussions on which could make an advancement in science according to his conjecture. The solution of this problem is also connected with the well-ordering theorem (vide, zlot, Principle of choice, op.cit p.107).

The above sequences with logical processes given Vīrasena, may be compared with the strides in the set theory, sequences-spaces and topology,

ILLUSTRATIONS:

(1) The all sequence (sarva dhārā) is in numerical symbolism as

1, 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12,13,14,15 | and omniscience 16 |

or 1,2,3,...-, K-1, K, where K is the set of indivisible-corresponding sections of omniscience.

(2) The even sequence is 2, 4, 6, 8, 10, 12, 14 | Ke 16 |

or 2, 4, 6, 8. ...-K - 2, K.

(3) The odd sequence is 1, 3, 5, 7, 9, 11, 13, and 15 or omniscience set-1.

or 1, 3, 5, ..., K-1.

The number of stations is obtained by the formula in verse 57.

$$\text{Number of stations (gaccha)} = \frac{\text{last station} \sim \text{first station}}{\text{increas}} + 1,$$

increase is vṛddhi or caya.

(4) Square sequence (kṛti dhārā):

1, 4, 9, ...omniscience 16 |

Here two types of equations could be obtained :

(square root of any term - 1)^2 = preceding term ......(1.134)

(order number of any station)^2 = measure of the term of that station ......(1.135)

The sequence could also be written as

$1^2, 2^2, 3^2, \ldots, n^2 \ldots, \{(K)^{1/2}-1\}^2, (K^{1/2})^2$.

(5) non-square sequence (akṛtidhārā):

2, 3, 5, 6, 7, 8,10, 11, 12, 13, 14

or 2, 3, 5, 6, ..., (K-1), where the number of terms is K-$(K)^{1/2}$

(6) The cube squence

$$1^3, 2^3, 3^3, \ldots, \left[\left(\frac{K}{2}\right)^{1/3}\right]^3, \left[\left(\frac{K}{2}\right)^{1/3}+1\right]^3, \left[\left(\frac{K}{2}\right)^{1/3}+2\right]^3$$

$$\ldots, \left[\left(\frac{K}{2}\right)^{1/3}+x\right]^3,$$

where $$\left[\left(\frac{K}{2}\right)^{1/3}+x\right]^3 \to K$$

$$\therefore\ x \rightarrow (K)^{1/3}\left[1 - \frac{1}{(2)^{1/3}}\right]$$

(7) The dyadic square sequence is $2^{2^1}, 2^{2^2}, 2^{2^3}, \ldots\ldots\ldots\ldots, 2^{2^{2n+1}}$

let $2^{2^5} \div 4 = (2^{10})^3$ etc. ......(1.136)

let $2^{2^{2n+1}} \div 4 = x^3$, Then, $\log_2 x^3 = \log_2\left[2^{2^{2n+1}} \div 4\right]$ ....(1.137)

or $\log_2 x = \frac{2}{3}\left[2^{2n} - 1\right] = \frac{2\left(2^{2n} - 1\right)}{2+1}$ ....(1.138)

Similarly, if we take $2^{2^1}, 2^{2^2}, \ldots\ldots\ldots\ldots, 2^{2^{2n}}$

and we have,

Here, $\log_2 x^3 = \log_2\left[2^{2^{2n}} \div 2\right]$ ......(1.139)

or $\log_2 x = \frac{1}{3}\left[2^{2n} - 1\right] = \frac{2\left(2^{2n} - 1\right)}{2+1}$, ...(1.140)

let $2^{2^x} = K$ in this sequence

or $x = \log_2 \log_2 K$ ......(1.141)

(8) The non-cube sequence (aghana dhārā):

Terms are 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16 |

First term is 2, number of station = (K-(number of stations of cube sequence).

(9) Square-generating sequence (kṛti mātṛka dhārā) is 1, 2, 3, and first square root of ommiscience as 4 |

In general,

station 1, 2, 3, 4, ... $\sqrt{K-1}$, $\sqrt{K}$

terms of station $1, 2, 3, 4, \ldots\ldots \sqrt{K-1}, \sqrt{K}$

(10) Non-square-generating sequence (akṛti māṭṛka dhārā)

station $1, 2, 3, 4, \quad \ldots\ldots K - \sqrt{K-1}, K - \sqrt{K}$

station term $\sqrt{K+1}, \sqrt{K+2}, \sqrt{K+3}, \sqrt{K+4}, \ldots\ldots, K-1, K$

(11) The cube-generating-sequence (ghana-māṭṛkadhārā)

$$1, 2, 3, 4, 5, 6, 7, 8, 9, 10, \ldots\ldots 38, 39, 40.$$

Here omniscience has been denoted by 65536. Its near cube is 64000 whose cube root is 40 which is the last term.

Or it can be expressed as station

$$1, 2, 3, \ldots\ldots\ldots, \left(\frac{K}{2}\right)^{1/3}, \ldots\ldots\ldots, \left(\frac{K}{2}\right)^{1/3} + x - 1, \left(\frac{K}{2}\right)^{1/3} + x$$

station terms $1, 2, 3, \ldots\ldots\ldots, \left(\frac{K}{2}\right)^{1/3}, \ldots\ldots\ldots, \left(\frac{K}{2}\right)^{1/3} + x - 1, \left(\frac{K}{2}\right)^{1/3} + x$

Here, x is such that

$$\left[\left(\frac{K}{2}\right)^{1/3} + x\right]^3 \rightarrow K \qquad \ldots\ldots(1.142)$$

or $x \rightarrow \left(\frac{K}{2}\right)^{1/3} [2^{1/3} - 1]$

or $x \rightarrow (K)^{1/3} - \left(\frac{K}{2}\right)^{1/3}$

and $\left[\left(\frac{K}{2}\right)^{1/3} + x\right]^3 \leq K \qquad \ldots\ldots(1.143)$

In numerical symbolism the sequence is 41, 42, 43, ...and last term is 65536. (Its near cube is 64000) when subtracted by its cube root 40 is 65536-40 or 65496, gives the measure of all the stations. Its terms are station 1, 2, 3, ... $K - \left\{\left(\frac{K}{2}\right)^{1/3} + x\right\}$

station terms $\left(\frac{K}{2}\right)^{1/3} + x + 1, \left(\frac{K}{2}\right)^{1/3} + x + 2, \left(\frac{K}{2}\right)^{1/3} + x + 3, \ldots\ldots\ldots K$

Here, $\left[\left(\frac{K}{2}\right)^{1/3} + x\right]^3 \rightarrow K$

or $x \rightarrow (K)^{1/3} - \left(\frac{K}{2}\right)^{1/3}$

or $x \rightarrow \left(\frac{K}{2}\right)^{1/3} \left[2^{1/3} - 1\right]$

and $\left[\left(\frac{K}{2}\right)^{1/3} + x\right]^3 \leq K$ ......(1.144)

(12) The dyadic-square sequence (dvirūpa vargadhārā)

This may be represented as follows:

station 1, 2, 3. 4, ... , 2^n

station term 2^2 2^{2^2} 2^{2^3} 2^{2^4} 2^{2^n}

Here, $2^{2^s} = \log_2 \log_2 A_{p_j}$ $2^{2^{s+s}} = (\log_2 \log_2 A_{p_j})^{2^s} = \log_2 A_{p_j}$ ......(1.145)

Similarly, $2^{2^{(s+s+s)}} = (\log_2 \log_2 A_{p_j})^{2^{s+s}} = (\log_2 A_{p_j})^{2^s} = (A_{p_j})^{1/2}$ ....(1.146)

Then, $[(A_{p_j})^{1/2}]^2$ A_{p_j} where s is $\log_2 A_{p_j}$ ......(1.147)

Further, $(A_{p_j})^{2^{(\log 2 Apj)}} = (A_{p_j})^{2^s} = A_{y_j} \ldots\ldots = \text{āvalī} = R$ ....(1.148)

as $S = \log_2$ Apj, and R denotes āvalī.

(13) Further, If P denotes palya, F denotes aṅgula, and L denotes jagaśreṇī, then we have,

$[(A_{v_2})^2]^{2^{\wedge}} = [R^2]^{2} = \log_2 \log_2 P$ .... (1.149)

Again $[\log_2 \log_2 P]^{2^{\wedge}} = \log_2 P. \quad \log_2 [P]^{2^{\wedge}} = [P]^{1/2}$ .... (1.150)

$([P]^{1/2})^2 = P. \quad [P]^{2^{\wedge}} = [P]^{(2^{\log_2 \log_2 P})} = [P]^{\log_2 P} = F$ .... (1.151)

Further. $[F]^{2^1} = F^2, [F^2]^{2^{\wedge}} = [L]^{1/3}$ .... (1.152)

Now, $[[L]^{1/3}]^{2^{\wedge}} = \log_2 \log_2 Ipj$ .... (1.153)

Again. $[\log_2 \log_2 Ipj]^{2^{\wedge}} = \log_2 Ipj,$

$\log_2 [Ipj]^{2^{\wedge}} = [Ipj]^{(1/2)^1} = [Ipj]^{1/2}, ((Ipj)^{1/2})^2\ Ipj$ .... (1.154)

and $[Ipj]^{2^{(\log_2 Ipj)}} = (Ipj)^{2^{\wedge}} = Iyj$ = non-emancipable Bios set = Je .... (1.155)

Further, $(Iyj)^2 = Iij, (Iij)^{2^{(Ii)}} = \log_2 \log_2 J$ .... (1.156)

$(\log_2 \log_2 J)^2 = \log_2 J, (\log_2 J)^{(2)^{(Ii)}} = \{J\}^{1/2}, (J^{1/2})^2 = J$ .... (1.157)

$(J)^{2^{Ii}} = Je$ all matter particle set = JI .... (1.158)

$(J@)^{2^{Ii}}\ j@@ = JII$ - All-time instants set .... (1.159)

$(J@@)^{2^{Ii}} = (J@@@)^{1/3} = (JIII)^{1/3}$ all space-line point set .... (1.160)

$[(JIII^{1/3})^2] = (JIII)^{2/3}$ = All space-areal point-set .... (1.161)

$[(JIII)^{2/3}]^{2^{Ii}} = II = @@$ = Indivisible-corresponding-section set of non-gravity-levity control of dharma and adharma fluents .... (1.162)

$\{II\}^{2^{Ii}} = III = @@@$ = ICS of non-gravity-levity control of a bios fluent .... (1.163)

$[III]^{2^{Ii}} = IIII = @@@@$ = ICS of scriptural (heard) knowledge of the lowest event of the fine nigoda attainment underdeveloped bios .... (1.164)

Then, $(IIII)^{2^{Ii}} = IIIII = @@@@@$ = ICS of annihilation-serenity attainment of a subhuman non-vowed serene visioned bios. .... (1.165)

$(IIIII)^{2^{Ii}} = \log_2 \log_2 K, (\log_2 \log_2 K)^{2^{Ii}} = \log_2 K$ .... (1.166)

$(\log_2 K)^{2^{Ii}} = (K)^{(1/2)^8}, \quad (K^{(1/2)^8})^2 \quad [(K)^{(1/2)^8}]^2 \quad (K)^{(1/2)^7}$

and so on till K is reached .... (1.167)

(14) The dyadic cube sequence has the general term $2^{3(2)^{n-1}}$.

Now $\log_2\log_2 2^{2^{n+1}}$ of the dyadic square sequence

$= \log_2 2 + \log_2 2^{2^n} = 1 + \log_2 2^{2^n}$

and $\log_2 \log_2 2^{2^n} = n$ .....(1.168)

and $\log_2\log_2 (2^{3.2^n}) = \log_2 [3\log_2 2^{2^{n-1}}] = \log_2 3 + \log_2 \log_2 2^{2^{n-1}}$

$= 1 + n-1 = n.$ .....(1.169)

Thus, the terms are. for this sequence as follows:

$2^3, (2^3)^2, ((2^3)^2)^2$ and so on or $2^3, 4^3, 16^3, 256^3$ ......

and the terms of dyadic cube-non-cube sequence are

$(2)^9, (2^9)^2, ((2^9)^2)^2$ ....and so on

where as the dyadic square sequence has terms

$2^3, 4^3, 16^3, 256^3$ ...... and so on

It is important to know the procedure how to obtain the set of fire-bodied bios, and for this as per operations already defined, in brief we can write this set in the following form.

$$\overline{\overline{L^3}\Big|_3}^{\left[\overline{L^3}\Big|_3 - \overline{L^3}\Big|_2 - \overline{L^3}\Big|_1 - L^3\right]}$$ .....(1.170)

Here $\overline{L^3}\Big|_3 - \overline{L^3}\Big|_2 - \overline{L^3}\Big|_1 - L^3$ is called the multiplier

reckoning-rod set (guṇakāra śalākā rāśi). ......(1.171)

This has been said to be produced after $3\frac{1}{2}$ times reckoning-rod established set,

"āuḍḍha rāśi vāraṁ jage aṇṇoṇṇa saṁguṇe teo"//

Further the vargaśalākā rāśi of the fire bodied bios set (1.170) given by

$$\log_2 \log_2 \left\{ \left(\overline{\overline{L^3}}_3\right)^{\left[\overline{L^3}_3 - \overline{L^3}_2 - \overline{L^3}_1 - L^3\right]} \right\} \quad \text{.......(1.172)}$$

and the ardhaccheda śalākā rāśi is

$$\log_2 \left\{ \left(\overline{\overline{L^3}}_3\right)^{\left[\overline{L^3}_3 - \overline{L^3}_2 - \overline{L^3}_1 - L^3\right]} \right\} \quad \text{.......(1.173)}$$

The last term of this sequence is

$$\left[(K)^{\left(\frac{1}{2}\right)^4}\right]^3 \left[\left\{(K)^{\left(\frac{1}{2}\right)^4}\right\}^3\right]^2$$

or

$$\left[(K)^{\left(\frac{1}{2}\right)^4}\right]^9 = (K)^{9/16} \quad \text{......(1.174)}$$

(15) In the verse 91, the author tells than the above description of the sequences is in brief and for greater details the Vṛhaddhārā Parikarma may be consulted. But it is not available now.

(vv.1.92 et seq.)

In these verses the simile measure (upamā pramāṇa) has been described for the purpose of understanding the measure of an existential set, similarly, the simile measure also gives better understa nding of the existential sets for their measures. These simile measures of sets of instants in huge periods of time which are constructional structures, then are related with the huge sets of points, and through the universal, cosmological such measuring sets depict the measures of set of bios, matter, and karmic matter along with the various types of phases of a bios and matter, passing through changes consequent upon interactions and will be get separeted or otherwise

The simile measure are as follows-of eight types, and we show them through symbols which have been adopted in the old texts and also what has been thought to be in modern types of scripts, symbols etc.

TABLE- 1.10

Name of simile Measure	Ancient symbols	Working-symbols
Palya (pit)	प	P
Sāgara (sea)	सा	C
Aṅgula (finger)	२	F
Prataräṅgula (fingers quared)	४	F^2
Ghanāṅgula (finger-cubed)	६	F^3
Jagaśreṇī (univerce-line)	-	L
Jagapratara (universe-square)	=	L^2
Ghanaloka (universe-cube)	≡	L^3

The palya is of three types:

1) Vyavahāra (behaviorial) palya, through which number is known.

2) Uddhāra (geometrical) palya, through which the mathematics of geometrical constructions, island, seas etc. are measured.

3) Addhā (temporal) palya, through which the life-time of karma is measured, so also that of the divine beings etc.

In order to find out the measure of palya, first of all, the pit, to be described next, is completely filled up (without formation of a cone) by the foreparts of the hair of a ram of 7 days of age, born in the gracious pleasure-land (uttama bhogabhūmi). These hair-fore-parts may be crores of number.

That pit is of one yojana in diameter, and its circumference is slightly greater than three times in diameter. Its depth is also one yojana. Thus it is a cylinder, and it is fully filled through the hair-fore parts. The number of these hair-fore-parts is called the palya or palyopama.

For finding out the circumference from the diameter of a circle the following procedure is in form of a formula

The diameter here is 1, it is squared getting 1^2, it is then multiplied by 10, getting $1^2 \times 10$ or 10, whose square root is $\sqrt{10}$, which by expansion through binomial theorem gives

$$\sqrt{9+1} = 3\sqrt{1+\frac{1}{9}} = 3\left(1+\frac{1}{18}\right) = 3+\frac{1}{6} = \frac{19}{6} \qquad \text{......(1.175)}$$

This has been stated as fine value of the circumference. Here $\frac{19}{6}$ yojana is thus the circumference, and when this is multiplied by $\frac{1}{4}$ of the diameter, it gives the value of area of the base of cylender as $\frac{19}{6} \times \frac{1}{4} = \frac{19}{24}$ square yojanas as per formula :

$$\pi\ r^2 \qquad \text{or} \qquad \pi\ .\ \frac{D^2}{4}$$

$$\text{where} \quad \pi = \frac{Cir}{Dia} = \frac{3\frac{1}{6}}{1} \quad \text{and} \quad \frac{D^2}{4} = \frac{1^2}{4} = \frac{1}{4}. \qquad \text{............(1.176)}$$

Hence area of the circular base $= 3\frac{1}{6} \times \frac{1}{4} = \frac{19}{24}$ square yojana, which is fine area.

The volume of the cylinder can be obtained by multiplying the area of the base by its height or it is

$$\frac{19}{24} \times 1 = \frac{19}{24} \text{ cubic yojana} \qquad \text{......(1.177)}$$

This is the fine volume in pramāṇa cubic yojana.

This should then be converted into behavioral cubic yojana.

Method:

$\because$ One pramāṇa yojana has 500 behavioral yojana

$\therefore$ $\frac{19}{24}$ pramāṇa yojana has $500 \times \frac{19}{24}$ behavioral yojana

$\therefore$ $\frac{19}{24}$ pramāṇa cubic yojana has $500 \times 500 \times 500 \times \frac{19}{24}$ cubic behavioral yojana.

Further, 1 cubic behavioral yojana has $(768000)^3$ cubic aṅgula.

$$\therefore \frac{19}{24} \times (500)^3 \text{ behavioral yojana has } \frac{19}{24} \times (500)^3 \times (768000)^3 \text{ cubic aṅgula.} \quad ....(1.178)$$

Now, 1 cubic aṅgula has $(8)^3$ cubic yava, 1 cubic yava has $(8)^3$ cubic tila, one cubic tila $(8)^3$ likha, 1 cubic likha is equal to $(8)^3$ cubic. Karma bhūmi hair-foreparts, 1 cubic Karma bhūmi hair-forepart has $(8)^3$ cubic madhyama bhogabhūmi hairfore parts, 1 cubic madhyama bhoga bhūmi hair-fore part has $(8)^3$ good bhoga bhūmi hair-fore- parts.

Thus, 1 cubic finger has $(8)^{21}$ hair-fore-parts, hence $\frac{19}{24} \times (500)^3 \times (768000)^3$ has

$$\frac{19}{24} \times (500)^3 \times (768000)^3 \times (8)^{21} \text{ hair-fore- parts.} \quad ......(1.179)$$

Now the rationale of the diameter is stated : See also appendix.

The circle is with diameter of 1 yojana. For this escribe a rectangle, rather a square, of side 1 yojana.

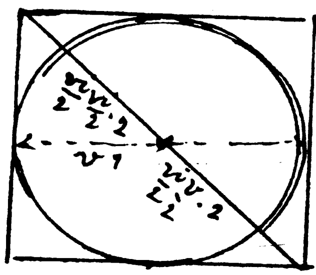
v1 means viṣkambha 1 yojana.

The diagonal square of this circle is given by

$$BD^2 = AB^2 + AD^2 = 1^2 + 1^2 = 2. \quad ....(1.180)$$

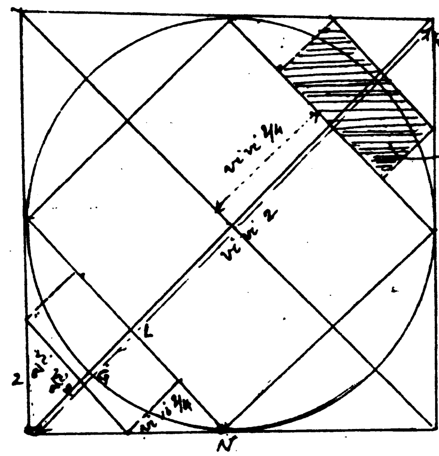
This has been symboli zed as vivi 2.

The square of BD is first halved and then again halved and it is further halved to get the one eighth part, as shown in the figure



The circle is inscribed in a rectangle

Fig 1.50



vivi 1

1/8th part

Figure 1.52

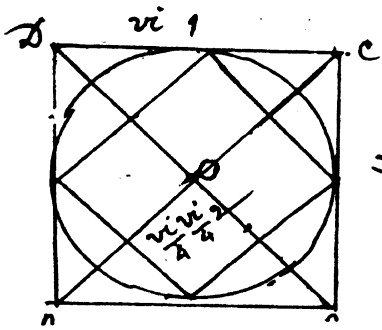


Fig. 1.51

vivi + vivi = square diagonal square or $(1)^2 + (1)^2 = 2(1)^2$ or 2(viṣkambha)^2

= (square diagonal)^2 or 8(viṣkambha)^2 = 4 (square diagonal)^2

On adding 10(viskambha)^2 = [5 square diagonal]^2 ......(1.180A)

Now let square diagonal denote here the hypotenuese (karṇa) hence 10

(diagonal)^2 = 5 (hypotenuse)^2.

Further, $LG^2 + LN^2 = GN^2$ approximating for chord and arc,

$$\left(\frac{\text{hypotenuse}}{8}\right)^2 + \left(\frac{\text{hypotenuse}}{4}\right)^2 = \left(\frac{\text{circumference}}{8}\right)^2$$

or $$\frac{(\text{hypotenuse})^2}{64} + \frac{4\ (\text{hypotenuse})^2}{64} = \frac{(\text{circumference})^2}{64}$$

or $(\text{hypotenuse})^2 + 4\ (\text{hypotenuse})^2 = (\text{circumference})^2$

because, we have already seen that

$$10\ (\text{diagonal})^2 = (\text{circumference})^2 + 4\ (\text{hypotenuse})^2, \qquad \text{........(1.180 B)}$$

hence $10\ (\text{diagonal})^2 = (\text{circumference})^2$.

Thus, the circumference $= \sqrt{10}$ diameter. ......(1.180C)

However, we could also follow Mādhavacandra the commentator in getting the $\frac{1}{8}$ th part and there displaying the rationale as follows:

The one eighth part of the area is a rectangle with length as $\frac{vi}{4} \cdot \frac{vi}{4} \cdot 2$, and breadh as $\frac{vi}{8} \cdot \frac{vi}{8} \cdot 2$. When they are having equal L.C.M, the length becomes $\frac{vi}{8} \cdot \frac{vi}{8} \cdot 2 \times 2 \times 2$ and the breadth is $\frac{vi}{8} \cdot \frac{vi}{8} \cdot 2$. When both are added the measure of the one eighth part is $\frac{vi}{8} \cdot \frac{vi}{8} .10$ When on eighth part has the measure of area as $\frac{vi}{8} \cdot \frac{vi}{8} .10$ then the eighth part has the area given by $\frac{vi}{8} \cdot \frac{vi}{8} \times 10 \times \frac{8}{1} \times \frac{8}{1}$ or vi vi 10. This shows that 10 $(\text{Diameter})^2$ is the square of the circumference, or $\sqrt{10}$ d is the circumference. According to this logic, in eight parts, the square of eight is the multiplier. Hence the rationale.

(V.1.97)

The hair-fore-parts contained in the pit is the number of them in a palya, and it is obtained as a product of

$$2^{2^6} \times 2^{2^4} \times 19 \times 18 \times (10)^{18} \qquad ....(1.181)$$

or $$18446744073709551616 \times 65536 \times 19 \times 18 \times (10)^{18} \qquad ......(1.182)$$

The product appears as

413 452 630 308 203 177 749512192000.000.000.000.000.000 ......(1.183)

(V.1.98)

The following alphabets have been used to denote the above sequence of digits, through the kaṭapayādi system.

"Katapayapurasthavarṇairnavapañcāṣṭakalpitaiḥ kramaśaḥ /

svarajana śūnyasaṁkhyā, mātro parimākṣaraṁ tyājyaṁ"//

Here,

from ka to jha	9 alphabets
ta to dha	9 alphabets
and pa group	5 alphabets
and from ya to ha	8 alphabets

have the digit of its order, and the vowels, a etc., ña, na, are to be taken as zero, leaving the mātrās and combined alphabets.

Thus, va (4), ta (1), la (3), va (4), na (5), ra (2), ca (6), ga (3), na (0), ga (3), na (0), ja (8), ra (2), na (0), ga (3), ka (1), sa (7), sa (7), sa (7), gha (4), dha (9), ma (5), pa(1), ra (2), ka (1), dha (9), ra (2), and 18 zeros more to be placed in decimal notation from left to right.

(v.1.99)

The hair-fore-parts contained in the pit, are taken out, one by one, once in every 100 years. That amount of number of instants of time gives the measure of a vyavahāra palya or behavioral pit. Thus the number of years so obtained are to be converted into instans of time with the help of definitions: 1 year = 360 days, 1 day = 30 muhūrta, 1 muhūrta = 3773 respiration (ucchavāsa), one respiration = numerate āviḷī, one āvalī has Ayj instants. Thus, through the rule of three, the number of instants contained in the product, getting it as

$$41345263030820317774951219 2 \times (10)^{20} \times 360 \times 30 \times 3773 \times S \times Ayj \quad ....(1.184)$$

(v.1.100)

The measure of uddhāra palya (geometrical palya) is found out by cutting each by the heir-fore parts of the set of vyavahāra palya into as many parts as are the measure of instants in innumerate years. This gives the set of the hairs fore parts of the uddhāra palya. Whatever is the number of the hair-fore parts of the uddhāra palya is the number of instants in an uddhāra palya.

(v.1.101)

Each hair-fore part of the uddhārapalya is cut into as many parts as there are instants in innumuate years. This gives the addhā palya, whose number of instants is the same as the number of hair fore parts contained in it. Here, intermediate innumerate is applicable.

(v.1.102)

Each palya when multiplied by ten crore squared or $(10)(10)^7(10)^7$ or $(10)^{15}$, gives the corresponding sāgara (sea).

Thus, $(10)^{15}$ vyavahāra palya = 1 vyavahāra sāgara

$(10)^{15}$ uddhāra palya = 1 uddhāra sāgara

$(10)^{15}$ addhā palya = 1 addhā sāgara.

Sāgara is also called sāgaropama, just as palya is also called palyopama.

(v.1.103)

The name sāgaropama has been explained to expose its etymological meaning. For this purpose the following Prakrit verse is quoted

"antāyi sūyi joggaṁ, ruṁdadhaguṇittu duppaḍim kiccā /

tiguṇam dahakaraṇi guṇam, bādara suhumaṁ phalaṁ balaye //"

Meaning: Whatever is obtained on adding the final diameter and the initial diameter, it should be multiplied by the half of width of the rundra (ring). The result is placed at two places, one being multiplied by 3 gives the gross area of the circular region, and the other place it is multiplied by square root of ten and the multiplication yields the fine area of the circle-shaped.

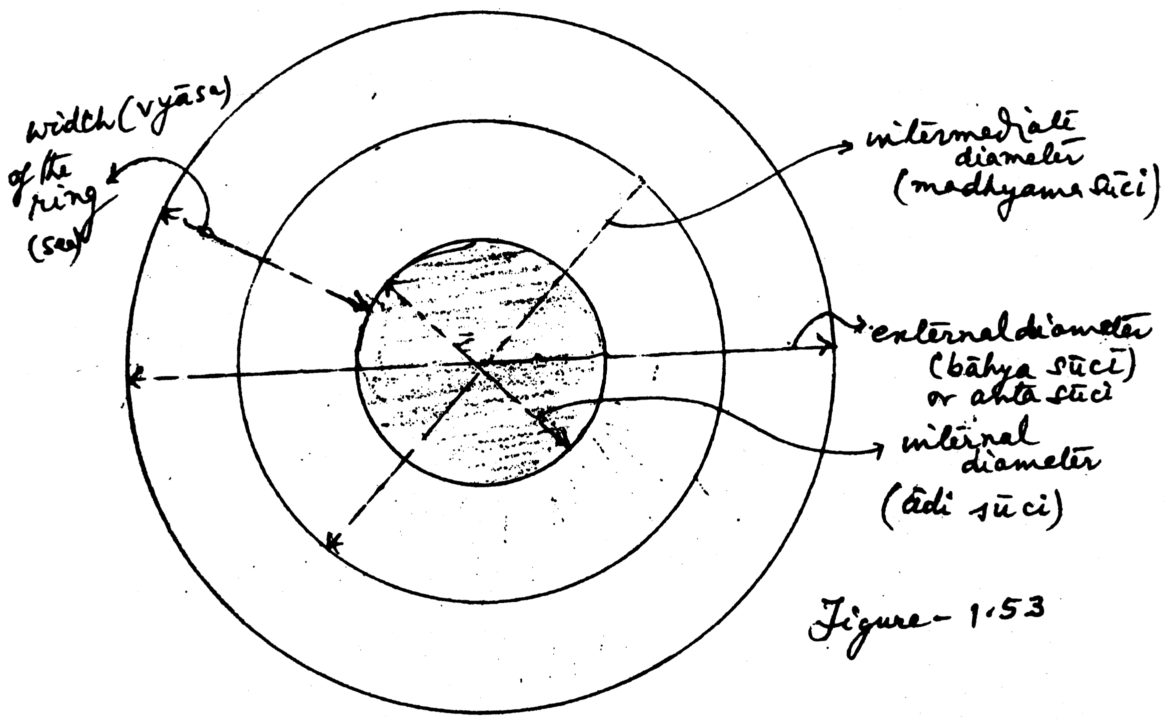


Figure - 1.53

The external diameter of Lavaṇa sea is 5 lac yojanas.

The internal diameter of Lavaṇa sea is 1 lac yojanas.

The intermediate diameter of Lavaṇa sea is 3 lac yojanas.

The external circumference of Lavaṇa sea is 5 lac $\times \sqrt{10}$ yojanas.

The internal circumference of the Lavaṇa sea is 1 lac $\times \sqrt{10}$ yojanas.

The intermediate circumference of the Lavaṇa sea is 3 lac $\times \sqrt{10}$ yojanas.

The width of the ring of the Lavaṇa sea is 2 lac yojanas.

Process :

Adding 5 L and 1 L, we get 6 L, where L is 1 lac. The half of the width is $\frac{21}{2}$ = 11. On multiplying 6L by 1L we get 6L which is placed at two placs. $6L^2 \times 3 = 18\ L^2$ is the gross area of the Lavaṇa sea, in square yojana and $6L^2 \times \sqrt{10}$ is the fine area of the Lavaṇa sea, in square yojana.

Method for demonstrating how the fine area of the Lavaṇa sea is to be obtained in the form of a quadrilateral (trapezium to rectangle). This is the rationale:

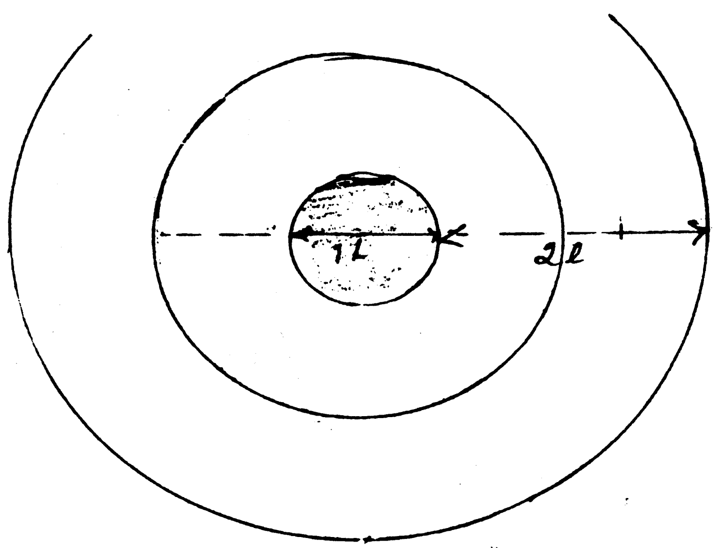
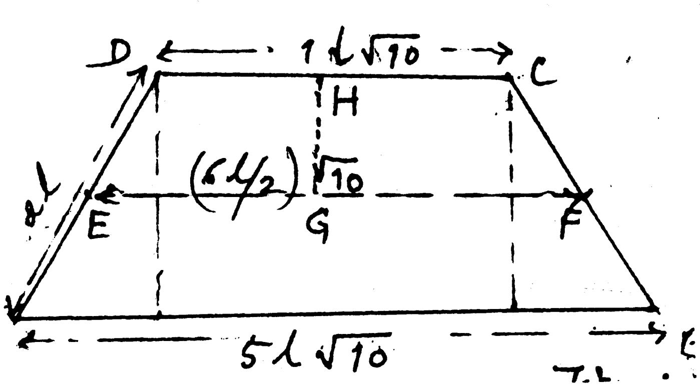


Figure 1.54

The ring width of the Lavaṇa sea is torn and spread in the form of a trapezium in the following form:



Now, this figure with the measures as shown in the above figure 1.55, has been bisected by EF, turning into two, upper trapezium EFCD and lower trapezium ABFE. Both are cut into two portions. Then the upper trapezium EFCD is bisected by the middle line GH to get two equal portions cut in order to apply them to the lower trapezium in such a way that it is converted into a rectangle shown in the figure 1.56 . The added portions are GHDE and GHCF towards the left and right sides of ABFE.

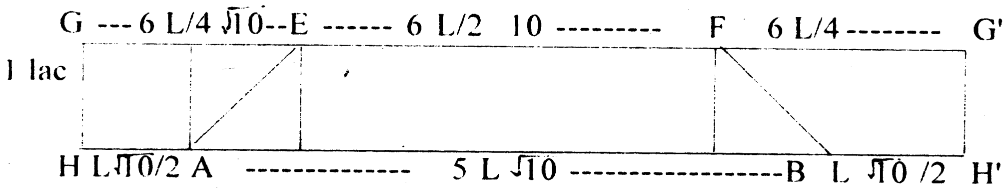


Figure 1.56

Thus, the side is given as length HH' $= \frac{1\sqrt{10}}{2} + 5\,L\sqrt{10} + \frac{1\sqrt{10}}{2} = 6\,L\sqrt{10}$

and the breadth HG = 1 lac = 1 L

Hence, the area of the quadrilateral rectangle = lenght × breadth

$= 6\,L\sqrt{10} \times 1 = 6\,L^2\sqrt{10}$ ......(1.83)

If there be a pit, cylindrical with base of diameter 1 yojana and depth 1 yojana, we could find the number of such pits contained in the Lavaṇa of depth 1 yojana. Now the area of a circle

with 1 yojana diameter is πr^2 or $\sqrt{10}\,\frac{1}{2}\cdot\frac{1}{2} = \frac{\sqrt{10}}{4}$. Hence such circular areas contained

in the area of the Lavaṇa ring will be $6\,L^2\sqrt{10} \div \frac{\sqrt{10}}{4} = 24\,L^2$ ......(1.184)

Now, the height is 1000 yojanas, hence the volume = $24L^2 \times 1000$ yojanas will give the $24L^2 \times 1000$ pits contents of size 1 yojana diameter of base and 1 yojana depth cylinders.

(v.1.104)

Now the symbols are described for further use

The symbol for the number of hair-fronts of vyavahāra palya is 41 = .

Now innumerate times this is the number of hair-fronts in uddhāra palya, with symbol 41 = a or 41 = g as in the text. Further innumerate times the preceding is the number of hair-fronts in the addhā palya, written as 41 = a a. From this data, by the rule of three we can find out the number of hair-fronts in the pits contanined in the Lavaṇa sea, the number is found to be (41 = a a) $(24\ L^2.1000)$.

Imp ∵ Where it takes 25 samayas to take out water out of space occupied by 6 hair-fronts,

∴ to find out the time taken for taken for taking out water out of space occupied by $(41=)aa \times 24L^2 \times 1000$ hair fronts.

It will be given by $\frac{(41\ =) \times a \times a \times 25 \times 24\, 1^2 \times 1000}{6}$

or $(41=)\ a\ a \times 25 \times 4L^2 \times 1000$ ......(1.185)

or $25 \times 4\,1^2 \times 1000$ addhāpalya ......(1.186)

or $100L^2 \times 1000$ addhāpalya ......(1.187)

or 10 crore × 10 crore adhāpalya or 1 sāgara. ......(1.188)

(v.1.105)

In the two form (dyadic) square sequence, sāgaropama in not generated, hence the logarithm to base 2 of the sāgaropama are demonstrated.

Let the multiplicand be 16 and multiplier be 8. $16 \times 8 = 128$. Here, $\log_2 16 = 4$, $\log_2 8 = 3$. Hence $\log_2 16 + \log_2 8 = \log_2 128 = 7$. This rule may also be applied in finding out

$\log_2 (10^{14} P) = \log_2 \quad 10^{14} + \log_2 P$ ......(1.189)

Actually it is $\log_2 (10)^{15} + \log_2 P = \log_2 (10)^{15} P = \log_2 C,$ ......(1.190)

Here,

$\log_2 \log_2 C$ are said not to exist ?

(v.1.106)

This contains the rule of logarithm to base two. In the former verse we found the rule

$\log_2 a + \log_2 b = \log_2 ab$

or $\log_2 ab = \log_2 a + \log_2 b$ ......(1.191)

Similarly, here

$$\log_2 \frac{a}{b} = \log_2 a - \log_2 b$$

say if $\frac{64}{4} = 16$, Then $\log_2 64 \log_2 4 = \log_2 16$, or $6 - 2 = 4$ ....(1.192)

(v.1.107)

Here, $(16)^4 = 65536$

or (given set) $^{\text{spread set}}$ = generated set ...(1.193)

or $4 \log_2 16 = \log_2 65536$ ......(1.194)

Here, the third rule of logarithm has ben applied,

$\log_2 (a)^b = b \log_2 a$ ......(1.195)

Now,

$(\text{addha palya})^{\log_2 (\text{addha palya})}$ = sūcyaṅgula ......(1.196)

or $(P)^{\log 2\, P} = F$ ......(1.197)

Taking $\log_2$ both the sides we have,

$\log_2 p \log_2 p = \log_2 F$

or $(\log_2 P)^2 = \log_2 F$ ......(1.198)

(v.1.108)

As we saw earlier that $\log_2 \log_2 C$ could not be determined as per statement of the commentator, but actually they could be determined as follows; however for greater details cf. v.1.110 and v.1.111, through logarithmic analysis. C or sāgara is $P \times (10)^{15}$,

$\log_2 C = \log_2 P + \log_2 (10)^{15}$ or $\log_2 P + S$.

Now $\log_2 \log_2 C = \log_2 [\log_2 P+S]$.

The right hand side has been placed as it is, ...(1.199)

hence, due to plus, the school did not proceed ahead.

However in the case of this verse we shall see how $\log_2 \log_2$ have been operated:

$$(\text{set given})^{\text{spread set}} = \text{generated set}$$

or $$(\text{spread set}) \log_2 (\text{given set}) = \log_2 (\text{generated set})$$

or $$\{\log_2 (\text{spread set})\} + \{\log_2 \log_2 (\text{given set})\}$$

$$= \log_2 \log_2 (\text{generated set}) \quad \text{......(1.200)}$$

for example

$$(16)^4 = 65536, \quad \therefore 4 \log_2 16 = \log_2 (65536)$$

or $$\log_2 (4 \log_2 16) = \log_2 \log_2 (65536)$$

or $$\log_2 4 + \log_2 \log_2 16 = \log_2 \log_2 (65536)$$

or $$2 + 2 = 4 \quad \text{......(1.201)}$$

Similarly, we can find out the following relations :

Now, we have already seen in equation (1.198) that

$(\log_2 P)^2 = \log_2 F$, and on taking $\log_2$ both sides,

$\therefore \log_2 [\log_2 P. \log_2 P] = \log_2 \log_2 F$

or $2 \log_2 \log_2 P = \log_2 \log_2 F$ ......(1.202)

Further, $\log_2 (F)^2 = 2 \log_2 F$,

or $\log_2 \log_2 (F)^2 = \log_2 2 + \log_2 \log_2 F$

$$= 1 + \log_2 \log_2 F \qquad \text{......(1.203)}$$

Similarly,

$$\log_2 (F)^3 = 3 \log_2 F$$

$$\therefore \log_2 \log_2 (F)^3 = \log_2 3 + \log_2 \log_2 F$$

or approximately the RHS $= 1 + \log_2 \log_2 F$. ......(1.204)

It may be remembered that $\log_2$ is the ardhaccheda operator and $\log_2 \log_2$ operator is called vargaśalākā.

Further,

$$[F^3]^{\log 2 \, P/A} = L \qquad \text{......(1.205)}$$

On taking logarithm

$$\frac{\log_2 P}{A} . \log_2 F^3 = \log_2 L . \qquad \text{......(1.206)}$$

Further, $\log_2 \log_2 P - \log A + \log_2 \log_2 F^3 = \log_2 \log_2 L$ . ...(1.206A)

(v.1.109)

This verse carries the following demonstration :

The following relations have been given :

$$\frac{\log_2 \log_2 P}{2 A p_j} + \log_2 \log_2 F^3 = \log_2 \log_2 L \qquad \text{......(1.207)}$$

Reason

$$\log_2 [\log_2 P] = \log_2 \log_2 P,$$

or $\log_2 [\{\{\log_2 P\}^{1/2}\}^1] = \frac{1}{2} \log_2 \log_2 P,$

or $\log_2 [\{\log_2 P\}^{(\frac{1}{2})^2}] = (\frac{1}{2})^2 \log_2 \log_2 P,$

or $\log_2 [\{\log_2 P\}^{(1/2)^3}] = (\frac{1}{2})^3 \log_2 \log_2 P,$

or $\log_2 [\{\log_2 P\}^{(\frac{1}{2})^n} = \frac{1}{2 \, Ap_j} \,.\, \log_2 \log_2 p$

where, $(\frac{1}{2})^n = \frac{1}{2 \, Ap_j}$, or $2^n = 2 \, Ap_j$

or $n = 1 + \log_2 Ap_j$.

Thus,

$$\log_2 [\{\log_2 P\}^{(1/2)(1+\log_2 Apj)}] = \frac{1}{2 \, Ap_j} \log_2 \log_2 P \qquad ......(1.208)$$

Similarly,

$$\log_2 [\{ \log_2 P\}^{(1/2)(1+\log_2 Apj)}]^{(2)^1} = \frac{1}{(2)^{(1+\log_2 Ap\,j)-1}} \log_2 \log_2 P \,.$$

Finally, we have,

$$\log_2 [\{ \log_2 P\}^{(1/2)^{(1+Apj)}}]^{2^{(1+Apj)}} = \log_2 \log_2 P \qquad ......(1.209)$$

Thus, the $\log_2$ of the root is $1 + \log_2 Apj$.

Again, $2^{(1+\log 2 \, Apj)} = 2 \, Apj$ ......(1.210) because,

$$(1+\log_2 Apj)\log_2 2 = \log_2 2 + \log_2 Apj$$

or $1+\log_2 Apj = 1+\log_2 Apj.$

Further regarding the universe-line L, the spread set is $\frac{\log_2 P}{A}$,

or we have from equation (1.206),

$$\frac{\log_2 P}{A} . \log_2 F^3 = \log_2 L \qquad \text{......(1.211)}$$

or $[\{F^3\}]^{\frac{\log_2 P}{A}} = L,$

hence we have,

$$[\log_2 P]^{(1/2)(1+\log_2 Apj)} = (\log_2 P) \div A$$

or $\log_2 [\log_2 P]^{(1/2)(1+\log_2 Apj)} = \log_2 (\frac{\log_2 P}{A})$

or $[(\frac{1}{2})^{(1+\log_2 Apj)}] \log_2 \log_2 P = \log_2 [\frac{\log_2 P}{A}]$

or $\frac{\log_2 \log_2 P}{2Ap_j} = \log_2 [\frac{\log_2 P}{A}].$ ......(1.212)

Now the given set (set to be distributed distribution set) is the F^3 set.

Hence, $\log_2 \log_2 F^3 + \frac{\log_2 \log_2 P}{2Ap_j} = \log_2 \log_2 L$

or $\frac{\log_2 \log_2 P}{2 Ap_j} + \log_2 \log_2 F^3 = \log_2 \log_2 L$

Again, $2 [\log_2 L] = \log_2 L^2$

$\therefore \log_2 [2 \log_2 L] = \log_2 \log_2 L^2$

or $\log_2 2 + \log_2 \log_2 L = \log_2 \log_2 L^2$. ......(1.213)

Again, $3 \log_2 L = \log_2 L^3$

$\therefore \log_2 3 = \log_2 \log_2 L = \log_2 \log_2 L^3$ ......(1.213)

Here, in the text $\log_2 3$ has been neglected owing to misunderstanding or some other reason or error. It may be that here $\log_2 3$ might have been reqarded as negligible as compared with $\log_2 \log_2 L$.

(vv.1.110-111)

Denoting palya by P and sāgaropama by C, we have the following relations .

$\log_2 P$ is the spread set here. Over this value, the $\log_2 C$ is in excess of $\text{Log}_2 C - \log_2 P$ which is S or numerate. ......(1.214)

Now, $2^{\{\log_2 C - \log_2 P\}} = 10 (10)^{14} = 10^{15}$ ......(1.215)

Here, $2^{\log_2 P} = P$, or $\log_2 C - \log_2 P = \log_2 10^{15}$

or $P \times 10^{15} = C$ ......(1.216)

because $\log_2 C = \log_2 P + \log_2 10^{15}$

$\therefore C = 2^{(\log 2 P + \log 2 10^{15})} = P (10)^{15}$. ......(1.217)

Now, we have already seen that

$2^{[\log_2 65536 - \log_2 4096]} = 2^4 = 16$ . ...(1.218)

Hence, $\log_2 65536 - \log_2 4096 = 4$ ......(1.219) or $\log_2 65536/4096 = \log_2 2^4$ ......(1.220)

or $65536/4096 = 16$. ......(1.221)

Similarly,

$$2\{\log_2 C - \log_2 P\} = 10^{15}$$ ......(1.222)

or $\log_2 C - \log_2 P = \log_2 10^{15}$

or $\log_2 \frac{C}{P} = \log_2 10^{15}$

$$\therefore \frac{C}{P} = 10^{15}$$ ......(1.223)

(v.1.112)

So far we have introduced the following working symbols :

TABLE - 1.11

Palya	P	(pit)	instant-sets
Sāgara	C	(sea)	
linear finger	F	(sūcyaṅgula)	
square finger	F2	(prataräṅgula)	
cubic finger	F3	(ghanaṅgula)	{point-sets}
universe-line	L	(jagaśreṇi)	$= [F^3]^{[\log_2 P + A]}$
universe square	L^2	(jagapratara)	
universe cube	L^3	(ghanalōka)	
rāju	L/7	(jagaśreṇi)	

First we describe this portion through the ancient symbols. The aṅgula is 2, prataräṅgula is 4, ghanāṅgula is 6. jagaśreṇī is – , jagapratara is = , ghanaloka is ≡ . (Cf. GJK and ASG, p.58 and p.28.315 etc. respectively. The hair fronts in palya is 41 = .

Vyavahāra palya is 2 S S or 2 ऽ ऽ.

The uddhāra palya is denoted by

o
३   ३ ---ᑕ---
वि छे छे ३   or   वि छे छे ३
१)   ।)२५ को २   (1.224)
                       १.)
३ । २५ को २   ३

Explanation : छे is logarithm of palya to base 2. When the spread (viralana) set is the logarithm of palya, and the distribution set is palya, this generates the sūcyaṅgula.

Sūcyaṅgula = (palya) $^{(\log_2 \text{ of palya})}$

or $\log_2$ sūcyaṅgula = ($\log_2$ of palya) ($\log_2$ of palya)

∴ ardhaccheda of sūcī aṅgula = छे छे

And $\log_2$ (sūcyaṅgula)^3 = ३ छे छे

Now, for generating jagaśreṇī, the spread set is innumerate part of $\log_2$ of palya which is called vi. As it lies as a power exponent, therefore it appears as product of छे छे ३ and written as वि छे छे ३ . This is the symbol for logarithm of jagaśreṇī. As rāju is $\frac{L}{7}$ or $\frac{\text{jagaśreṇi}}{7}$

∴ logarithm of rāju is obtained by subtracting $\log_2 7$ from वि छे छे ३, and $\log_2 7$ may be approximately taken as 3 which has been subtracted from वि छे छे ३ and getting

o
३
वि छे छे ३

where o is symbol for subtraction. From this we can find out the value of number of all islands and seas. Here, first $\log_2$ or bisection point of rāju falls on meru, the centre of Jambū island, including it there are numerate or ꣳ logarithms of a lac yojana and a yojana remains. Again there are 768000 aṅgula in a yojana. It has numerate log_2 and remains an aṅgula. In this way there are numerate ardhaccheda, and the log_2 of one aṅgula is added to it, and the number so obtained is subtracted from the logarithm of rajju. This gives the total number of islands and seas. For subtraction, the method is as follows:

The multiplier is three times the logarithm of sūcyaṅgula, hence when this is to be subtracted, the innumerate part of logarithms of addhāpalya is to be subtracted by one as it is the multiplicand; hence if here numerate more than logarithms of sūcyaṅgula is to be subtracted how much will be subtracted. Hence by rule of three slightly more than the portion is subtracted. Thus slightly more than one third part is subtracted from innumerate part of logarithms of palya, and this is multiplied by three times the logarithm of palya.

This gives the number of all islands and seas. The symbol is: Vertical line is for slightly greater: Here, from the spread set वि is shown reduced by one third part. The notation for subtraction is), a phase of the moon-indicating reduction.

The number of islands and seas is the measure of the uddhāra sāgara. It contains $25(10)^7$ palyas. For so much number of palya, what should be the number for one uddhāra palya. Thus, by rule of three sets, the above number is divided by $25(10)^7$ or २५ को २, giving the number of hair fronts in a uddhāra palya as

३ ----९----

वि छे छे ३

१)

३ । २५ को २

In place of ३ ----९---- we can also write.

०

३

In order to get the addhāpalya, every one of the hair-fronts of uddhāra palya is subdivided into as many instants as are the instants in innumerate years. Then the pit with so many sub parts of hair is exhausted, by taking out the parts one by one. This time period is called addhāpalya and denoted by a change in the sign of subtraction as shown. The addhā palya is generated in the dyadic square sequence.

३ ----८----
वि छे छे ३
।
९
३ २५ को २ ......(1.225)

The above may also be demonstrated through working symbols:

$$F = [P]^{\log_2 P}, \log_2 F = \log_2 P \log_2 P \quad ......(1.226)$$

$$\log_2 (F)^3 = 3 \log_2 P \log_2 P ; L = [F^3]^{\frac{\log_2 P}{A}} \quad ......(1.227)$$

$$\therefore \log_2 L = \frac{\log_2 P}{A} . \log_2 F^3 = \frac{\log_2 P}{A} . 3 \log_2 P \log_2 P \quad ......(1.228)$$

$$\log_2 \text{rāju} = \log_2 L/7 = \log_2 L - \log_2 7 = \log_2 L - 3 \text{ approximately.} \quad ....(1.229)$$

$$\therefore \log_2 \text{rāju} = \frac{\log_2 P}{A} \{ (\log_2 P)(\log_2 P) .3\} -3 \quad ......(1.230)$$

The number of islands and seas = $\log_2 (\text{rāju}) - [S + \log_2 F)$ ......(1.231)

$$= (\log_2 \text{rāju}) - [S + \log_2 P \log_2 P)]$$

$$= \frac{\log_2 P}{A} [\log_2 \log_2 P.3] - 3 - [S + (\log_2 P \log_2 P)]$$

$$= 3 \log_2 P \log_2 P [\frac{\log_2 P}{A} - \frac{S + (\log_2 \log_2 P)}{3 \log_2 \log_2 p}] - 3$$

$$= 3 \log_2 \log_2 P[\frac{\log_2 P}{A} - (\text{greater than } 1/3)] -3 \text{ (approximately)} \quad ......(1.232)$$

This is the measure of uddhāra sāgara. It contains $25(10)^{14}$ palyas. Hence the measure of the uddhāra palya is as follows:

$$3(\log_2 P)(\log_2 P)\left[\frac{\log_2 P}{A} - (\text{greater than } 1/3)\right] - 3/25(10^7)^2 \qquad ......(1.233)$$

The same has been denoted in ancient symbolism as

३ ----८----
वि छे छे ३
।)२५ को २
९
३

Now $\log_2 P$ in excess of S can be denoted as $\log_2 P + S$ or in ancient symbols as छे १

or $\log_2 C = \log_2 [P(10)^{15}] = \log_2 P + \log_2 (10)^{15}$

$= (\log_2 P + S)$ or छे १ ......(1.234)

Further,

$\log_2 \log_2 C = \log_2 [\log_2 P + \log_2 (10)^{15}]$

$= \log_2 [\log_2 P + S]$ ......(1.235)

Again,

$F = (P)\, 2^{\log_2 P}$ $\quad F = (P)^{2^{\log_2 \log_2 P}}$, or $\quad \log_2 F = (2)^{\log_2 \log_2 P} . \log_2 P$

$\therefore \log_2 \log_2 F = \log_2 \log_2 P \log_2 2 + \log_2 \log_2 P$

$= 2 \log_2 \log_2 P$ ......(1.236)

Now $\quad F^2 = [(p)^{\log_2 P}]^2 = (P)^{2 \log_2 P}$,

$\therefore \log_2 F^2 = 2 \log_2 \log_2 P$, or $\log_2 \log_2 F^2 = \log_2 2 + \log_2 \log_2 P + \log_2 \log_2 P$

$= 1 + 2 \log_2 \log_2 P$ ......(1.237)

The same has been expressed in ancient symbols as

१ -
व २

where व stands for $\log_2 \log_2 P$ and १ - stands for plus one.

Further $(F)^3 = [(P)^{\log_2 P}]^3 = [P]^{3 \log_2 P}$. ......(1.238)

$\therefore \quad \log_2 (F)^3 = 3 \log_2 P \log_2 P$.

Hence on taking $\log_2$ again,

$\log_2 \log_2 (F)^3 = \log_2 3 + \log_2 \log_2 P + \log_2 \log_2 P$

$= 1 + 2 \log_2 \log_2 P$ (approximately) ......(1.239)

This is the same as
१ -
व २ ,

and slightly greater than this in a fine mesure.

Now $L = [F^3]^{(\log_2 P)/A}$ ......(1.240)

Here, A may be obtained from the following equation

$$\left[(\log_2 P)^{1/2^{(1+\log_2 Apj)}} \right] = \frac{\log_2 P}{A} .$$

or $\dfrac{\log_2 \log_2 P}{2Ap_j} = \log_2 \left[\dfrac{\log_2 P}{A} \right]$ ......(1.241)

Hence,

$$\log_2 L = \frac{\log_2 P}{A} \cdot [\log_2 (F^3)] = \frac{\log_2 P}{A} \log_2 [(P)^{\log_2 P}]^3$$

or $\log_2 L = \dfrac{\log_2 P}{A} \cdot [3 \log_2 P \log_2 P]$ ......(1.242)

In ancient symbols this has been denoted as छे छे छे ३

a

Further, in ancient symbols the log, log, L has been determind by a procedure as described below. The log, of Palya has their square root as twice, and then log_2 of Apj may be stated in order. There the symbol for the product of the $log_2 P$ and $log_2 log_2 P$ is छे व.

Further the logarithm to base two of first root of log_2 of Palya are half of $log_2 log_2$ of palya. In symbol this is (२), and may be written as $\log_2 (\log_2 P)^{1/2} = \frac{1}{2} \log_2 \log_2 P$ ......(1.243)

छे ।	व
मू १ ।	व
मू २ ।	२
	व
	२।२
मू ३	व
	२।२।२
०	०
०	०
०	०
मू	व
	१६
मू	व
	१६।२

The above denotes the functionality as shown on the right hand side.

In this way we go on continuing with $\frac{1}{2}$ and $\frac{1}{2}$ of $\frac{1}{2}$ with the above equations.

This is मू १ । व २ . In the last but one equation, (5) the logarithm is tobe known as the $\log_2 \log_2$ of palya as divided by Apj as denoted in ancient symbol as मू । व
१६

In modern symbol we writen this as

$$\log_2 (\log_2 P)^{(1/2)^{2Apj-1}} \quad \frac{\log_2 \log_2 P}{2Ap_j}$$, where Apj is denoted by 16 in ancient symbols.
......(1.244)

The last equation (6) , have their logarithms, half of the above. Thus, the 2's measuring as logarithm to base 2 of the last root, when mutually multiplied, produces the innumerately part of $\log_2$ of palya and it is the spread set (viralana rāśi) in respect of the universe-line.

In working symbols,

$$2\left[\frac{\log_2 \log_2 P}{2Ap_j}\right] = \frac{\log_2 P}{A}$$ ......(1.245)

Thus the logarithms of spread set are $\log_2 \frac{\log_2 P}{A}$ or $\frac{\log_2 \log_2 P}{2Ap_j}$ ......(1.246)

We get the $\log_2 \log_2 L$ on adding the $\log_2 \log_2 F$ which is the distribution set, in $\log_2$ of the spread set.

Thus,

$$\log_2 \log_2 L = \frac{\log_2 \log_2 P}{2Ap_j} + \log_2 \log_2 (F^3)$$ ......(1.246)

Slightly different is the following treatment,

$$\log_2 \log_2 L = \log_2 \left[\frac{\log_2 P}{A} . (3 \log_2 P \log_2 P)\right].$$ ......(1.247)

$$= \log_2 \left(\frac{\log_2 P}{A} \right) + \log_2 \quad (3 \log_2 \log_2 P)$$

$$= \frac{\log_2 \log_2 P}{2 Ap_j} + \log_2 (3 \log_2 P \log_2 P)$$

$$= \frac{\log_2 \log_2 P}{2 Ap_j} + \log_2 3 + 2 \log_2 \log_2 P \qquad ......(1.248)$$

In ancient symbol this is व

१६ । २

व । २ , where १६ is Apj. व is $\log_2 \log_2 P$.

Now, $\log_2 (L^2) = 2 \log_2 L = 2 \frac{\log_2 P}{A} [3 \log_2 P \log_2 P]$

$$= 6 \frac{\log_2 P}{A} [\log_2 P \log_2 P] . \qquad ......(1.249)$$

The above in ancient symbols is

वि छे छे । ६

Similarly, the following relation holds

$\log_2 \log_2 (L)^2 = \log_2 (2 \log_2 L)$ or $\log_2 2 + \log_2 \log_2 L$

$$= 1 + \log_2 \log_2 L . \qquad ......(1.250)$$

$$= 1 + \frac{\log_2 \log_2 P}{2 Ap_j} + [\log_2 3 + 2 \log_2 \log_2 P] . \qquad ......(1.251)$$

The same has been expressed in ancient symbols

१ -

व

१६ :

व २

There is only difference in the excess of $\log_2 3$ which seems to have been considered as negligible in ancient symbols.

Further, $L^3 = [\,[F^3]^{\frac{\log_2 P}{A}}\,]^3$

$$\therefore \log_2 L^3 = 3 \log_2 L = 3\,[3\,\frac{\log_2 P}{A} \log_2 P \,.\, \log_2 P\,] = 9 \log_2$$

$$9\frac{\log_2 P}{A} \cdot \log_2 P \log_2 P \qquad \text{......(1.252)}$$

In ancient symbols, this is

वि छे छे । ह or vi che che | 9

where vi is $\frac{\log_2 P}{A}$, the spread set.

Now,

$$\log_2 \log_2 L^3 = \log_2 (3 \log_2 L) = \log_2 3 + \log_2 \log_2 L\,, \qquad \text{.....(1.253)}$$

where $\log_2 3$ may be appro ximated to be 1.

Thus in working symbols we have the following relations

$$\log_2 \log_2 (L^3) = \log_2 3 + \frac{\log_2 \log_2 P}{2Ap_1} + \log_2 3 + 2 \log_2 \log_2 P$$

......(1.254)

In ancient symbol this is

व	or	va
१६ । २		16 | 2
व । २		va | 2

The difference may be seen in the 2 $\log_2 3$ which does not appear below in ancient symbols.

(vv.1.113 et seq.)

In the very central portion of all empty space is situated the universe with the following dimensions for its divisions.

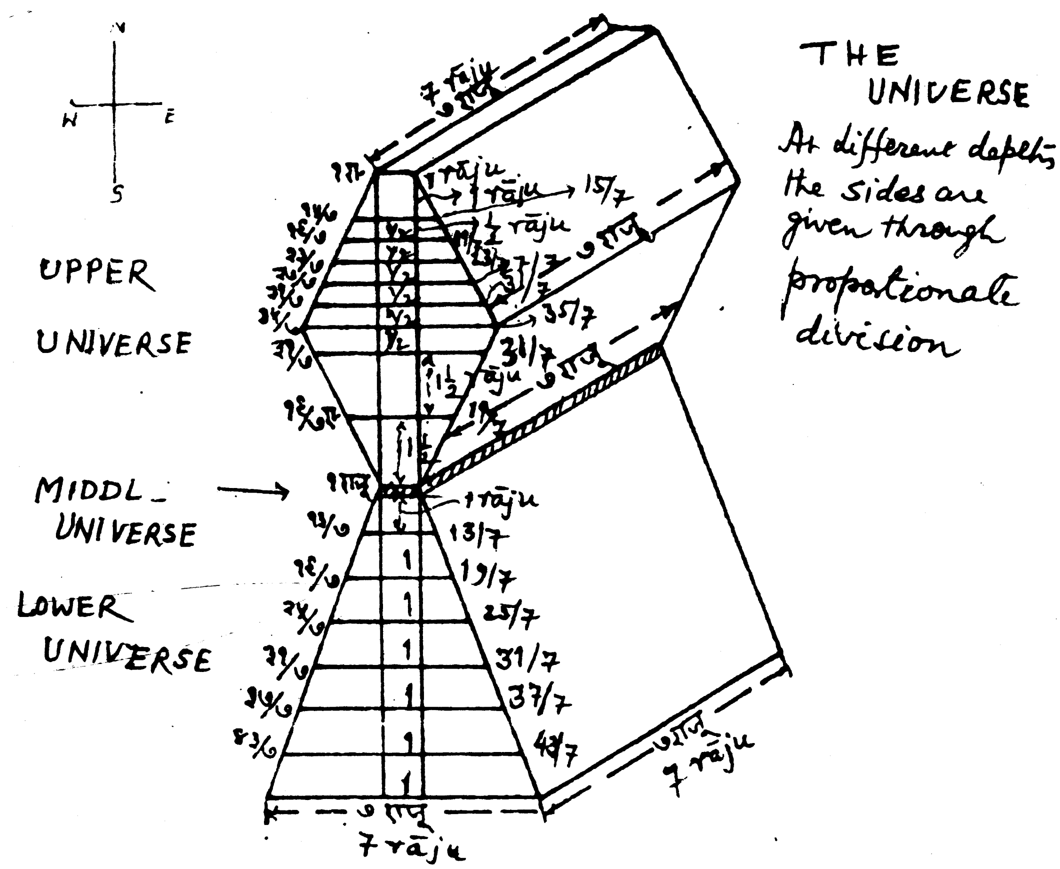


Figure 1.53

The total height of the universe is 14 rājus, 7 rājus being for the lower, 7 rājus for the upper, and the middle being in between.

In the verse 114, the formula for finding out the reduction in sides of the face is given. When the base is 7 rājus and the top is 1 rāju, the difference is $7 - 1 = 6$ rājus. This is the reduction. Similarly, when at the height of 7 rājus, there is a decrease of 6 rājus, then at the height of 1 rāju, there will be a decrease of $\frac{6}{7}$ rāju.

Hence the side there is $7 - \frac{6}{7} = \frac{49-6}{7} = \frac{43}{7}$ rāju. That is how for the different height of 7 divisions in the lower universe and for various heights of the middle and upper universe, the measure of the sides have been calculated.

TABLE - 1.13

Height above the base of 7 rāju		measure of the sides	
Lower universe	1 rāju	$\frac{43}{7}$ rāju	
	2 rāju	$\frac{37}{7}$ rāju	The divisions for seven hellish earth
	3 rāju	$\frac{31}{7}$ rāju	Formula: Decrease (or increase)
	4 rāju	$\frac{25}{7}$ rāju	in the base (or top)
	5 rāju	$\frac{19}{7}$ rāju	$= \frac{\text{base} \sim \text{top}}{\text{height}}$
	6 rāju	$\frac{13}{7}$ rāju	

Height above the base of 1 rāju upto $3\frac{1}{2}$ rāju		measure of sides	
upper universe	$1\frac{1}{2}$ rāju	$\frac{19}{7}$ rāju	The divisions for various paradises
	3 rāju	$\frac{31}{7}$ rāju	
	$3\frac{1}{2}$ rāju	$\frac{35}{7}$ or 5 rāju	

Height above the base of 5 raju upto $3\frac{1}{2}$ rāju	measure of sides
$\frac{1}{2}$ rāju	$\frac{31}{7}$ rāju
1 rāju	$\frac{27}{7}$ rāju
$1\frac{1}{2}$ rāju	$\frac{23}{7}$ rāju
2 rāju	$\frac{19}{7}$ rāju
$2\frac{1}{2}$ rāju	$\frac{15}{7}$ rāju
$3\frac{1}{2}$ rāju	1 rāju

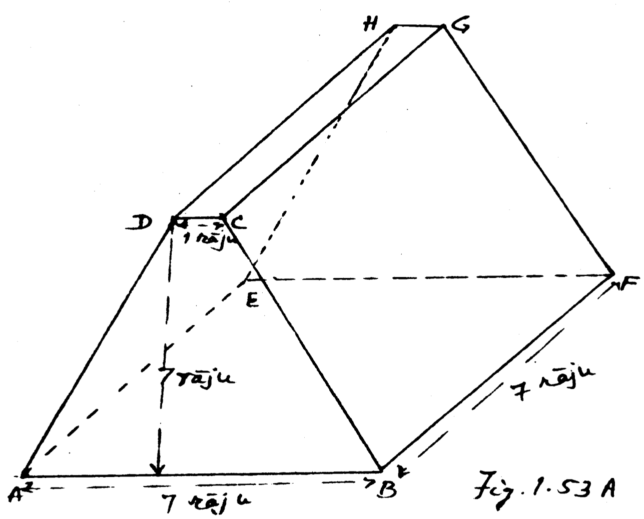


Fig. 1.53 A

THE LOWER UNIVERSE WITH
A SQUARE BASE OF EACH SIDE
= 7 RĀJU = ONE JAGAŚREṆĪ
A TRAPEZOID
WITH HEIGHT
= 7 RĀJU

In what follows, we shall consider only the face ABCD, the depth BF being the same all through will not be shown in figures. This will be deformed in various geometrical figures-

1.Common lower universe (sāmānya loka)

2. Vertical-rectangular lower universe

3. Horizontal-rectangular

4. Barley-drum

5. Barley-middle

6. Mandara mountain type

7. Tent (dūṣya)

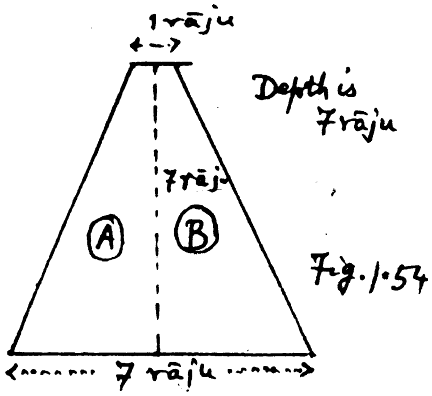
8. Mount-cut (Girikataka)

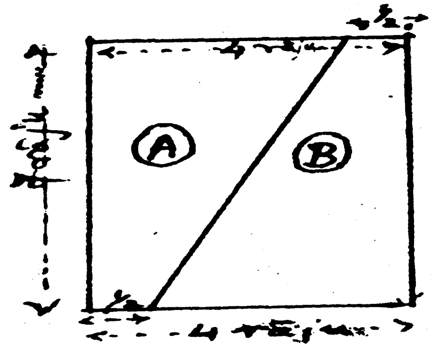
The volumes in each case will be the same given by the volume of the common lower universe which is $7 + \frac{1}{2} \times 7 \times 7$ cubic rāju.

(vv.1.115 et seq.) The lower universe in the above shape and size can be deformed in eight types of geometrical shapes:

1. Common lower universe (sāmānya adho loka)

2. Vertical Rectangular (urdhāyata)





depth is 7 rāju, volume of this = 4 × 7 × 7 = 196 cubic rāju

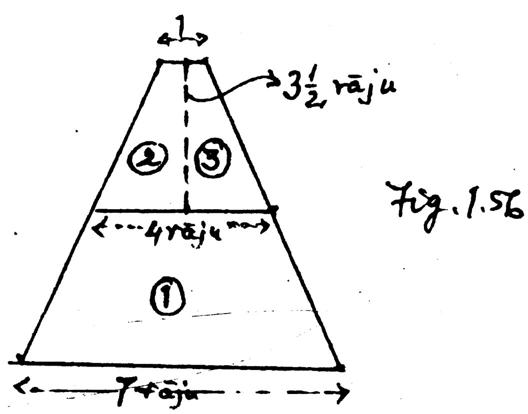
The volume of common universe

$= 7 + \frac{1}{2} \times 7 \times 7 = 196$ cubic rāju

This is obtained by bisecting the fig 1.54 and placing the two congruent parts juxtawise.

3. Horizontal Rectangular (tiryagāyata)

volume $= 8 \times 3\frac{1}{2} \times 7 = 196$ cubic rāju



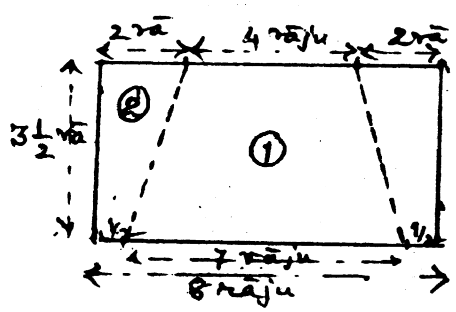


Figure 1.56 **Figure 1.57**

The above figure 1.57 is obtained from the fig 1.56 by first bisecting the latter by the horizontal line through middle points of adjacent sides, and again by a vertical line dividing the figure in (1), (2), (3) portions. Then in figure 1.57 these have been so placed as to form a horizontal rectangle.

4. Barley-drum lower universe (Yavamuraja adholoka)

The division of the lower universe into the drum and the barleys is called barley drum lower universe.

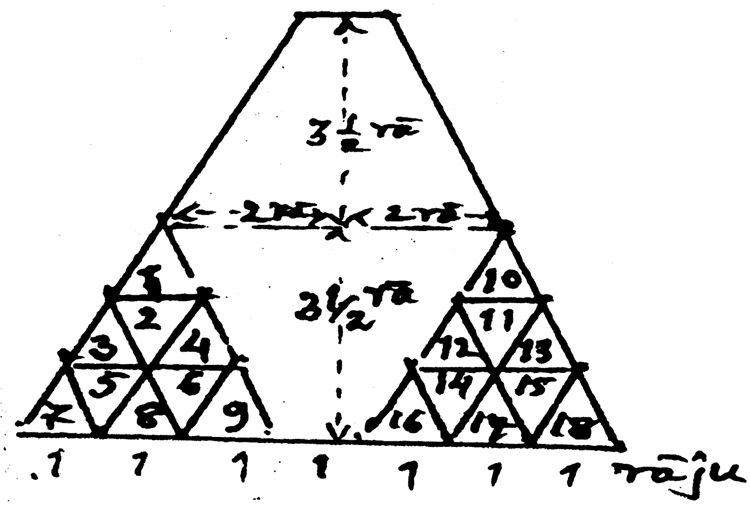


Figure 1.58

The lower universe is 7 rāju at base and 1 rāju at top. The height of the barley is obtained by calculating that at 1 rāju reduction, getting it as $\frac{7}{3}$ rāju. Half the yava (barley) will have a height of $\frac{7}{6}$ rāju. There are 18 semi-barleys both sides of the drum giving their volume $= \frac{1+0}{2}$

$$\times \frac{7}{6} \times 7 \times 18 = 10\frac{1}{2} \times 7 = 73\frac{1}{2} \text{ cubic rāju} \qquad \text{......(1.255)}$$

Further, volume of the drum in two parts

$$= 2\left[\frac{1+4}{2} \times 3\frac{1}{2} \times 7\right] = 17\frac{1}{2} \times 7 = 122\frac{1}{2} \text{ cubic rāju} \qquad \text{......(1.256)}$$

Adding both the volumes,

$$73\frac{1}{2} + 122\frac{1}{2} = 196 \text{ cubic rāju,} \qquad \text{.......(1.257)}$$

5. Barley middle lower universe (yavamadhya adholoka)

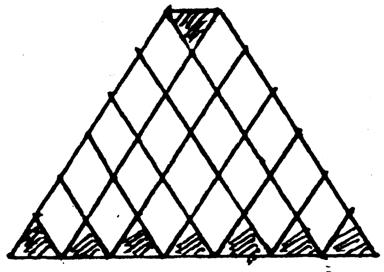


Fig. 1.59

As in the last example, the whole lower universe has been divided into 8 half barley and 20 full barleys. This leads to 48 half barleys or trangls whose area is $\frac{7}{6}$, base 1 rāju, thus, each semibarley has area given by $\frac{1}{2} \times 1 \times \frac{7}{6} = \frac{7}{12}$. Its depth is 7 rāju, $\therefore$ volume of 1 half barley is $\frac{7}{12} \times 7$ cubic rāju. Hence volume of 48 half barleys is $\frac{7}{12} \times 7 \times 48 = 196$ cubic rāju.

Note that every where this figure extents upto a depth of 7 rāju, hence multiplication by depth everywhere is effected.

6. The Mandara lower universe (Mandara adholoka)

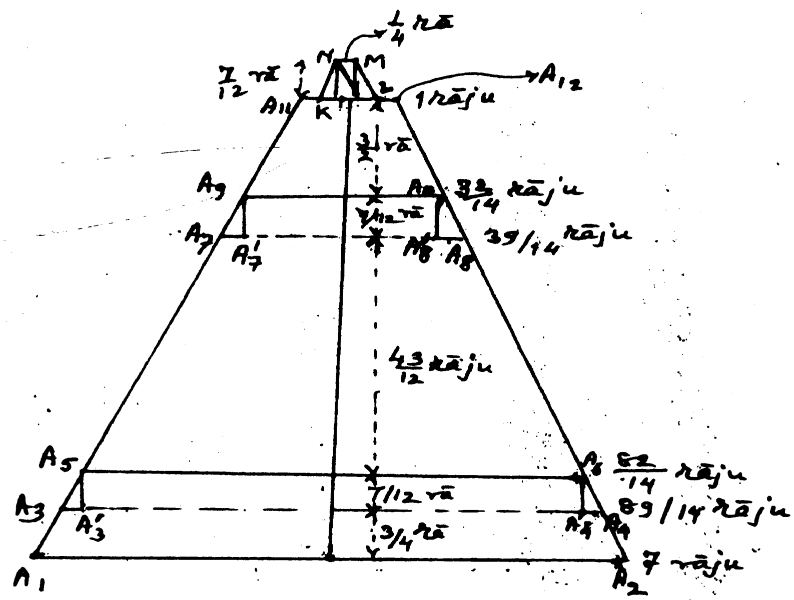


Figure 1.60

The total height is

$$\frac{3}{4} + \frac{7}{12} + \frac{43}{12} + \frac{7}{12} + \frac{3}{2} = \frac{84}{12} = 7 \text{ rāju}$$

Here,

$A_1 A_2 = 7$ rāju

$$A_3 \ A_4 = \text{base} - \left(\frac{\text{base - top}}{\text{total height}} \times \text{arbitrary height} \right)$$

$$= 7 - \left(\frac{7-1}{7} \times \frac{3}{4} \right) = \frac{89}{14} \text{ rāju}$$

Similarly,

$$A_5 A_6 = \frac{89}{14} - \left(\frac{7-1}{7} \times \frac{7}{12} \right) = \frac{82}{14} \text{ rāju}$$

$$A_7 A_8 = \frac{82}{14} - \left(\frac{7-1}{7} \times \frac{43}{12} \right) = \frac{82}{14} - \frac{43}{14} = \frac{39}{14} \text{ rāju}$$

$$A_9 A_{10} = \frac{39}{14} - \left(\frac{7-1}{7} \times \frac{7}{12} \right) = \frac{32}{14} \text{ rāju}$$

$$A_{11} A_{12} = \frac{32}{14} - \left(\frac{7-1}{7} \times \frac{3}{2} \right) = \frac{14}{14} = 1 \text{ rāju}$$

Now the area of quadrilateral is found through the formula "muha bhūmi jogadale". The area of rectangular region is found through formula, ' bhuja koṭi vedha ......". All the six areas are added by L.C.M. method, and $\frac{9408}{336}$ or 28 square rāju is obtained. We find the areas of these as follows, through the above two formulae

$$\text{Area } A_1\, A_2\, A_4\, A_3 = \frac{7 + \frac{89}{14}}{2} \times \frac{3}{4} = \frac{187}{28} \times \frac{3}{4} \text{ square rāju}$$

$$\text{Area} \quad A'_3\, A'_4\, A'_6\, A_5 = \frac{82}{14} \times \frac{7}{12} \text{ square rāju}$$

$$\text{Area} \quad A'_7\, A'_8\, A_{10}\, A_9 = \frac{32}{14} \times \frac{7}{12} \text{ square rāju}$$

$$\text{Area} \quad A_5\, A_6\, A_8\, A_7 = \left(\frac{\frac{82}{14} + \frac{39}{14}}{2} \times \frac{43}{14} = \frac{121}{28} \times \frac{43}{12} \text{ square rāju}$$

$$\text{Area} \quad A_9\, A_{10}\, A_{12}\, A_{11} = \left(\frac{\frac{32}{14} + 1}{2} \right) \times \frac{3}{2} = \frac{46}{28} \times \frac{3}{2} \text{ square rāju}$$

$$\text{Area} \quad KLMN = \left[\frac{\frac{3}{4} + \frac{1}{4}}{2} \right] \times \frac{7}{12} = \frac{1}{2} \times \frac{7}{12} \text{ square rāju}$$

$$\text{Total Area} = \left[\frac{187}{28} \times \frac{3}{4}\right] + \left[\frac{82}{14} \times \frac{7}{12}\right] + \left[\frac{181}{28} \times \frac{43}{12}\right] + \left[\frac{32}{14} \times \frac{7}{12}\right]$$

$$+ \left[\frac{46}{28} \times \frac{3}{2}\right] + \left[\frac{1}{2} \times \frac{7}{12}\right] \text{ square rāju}$$

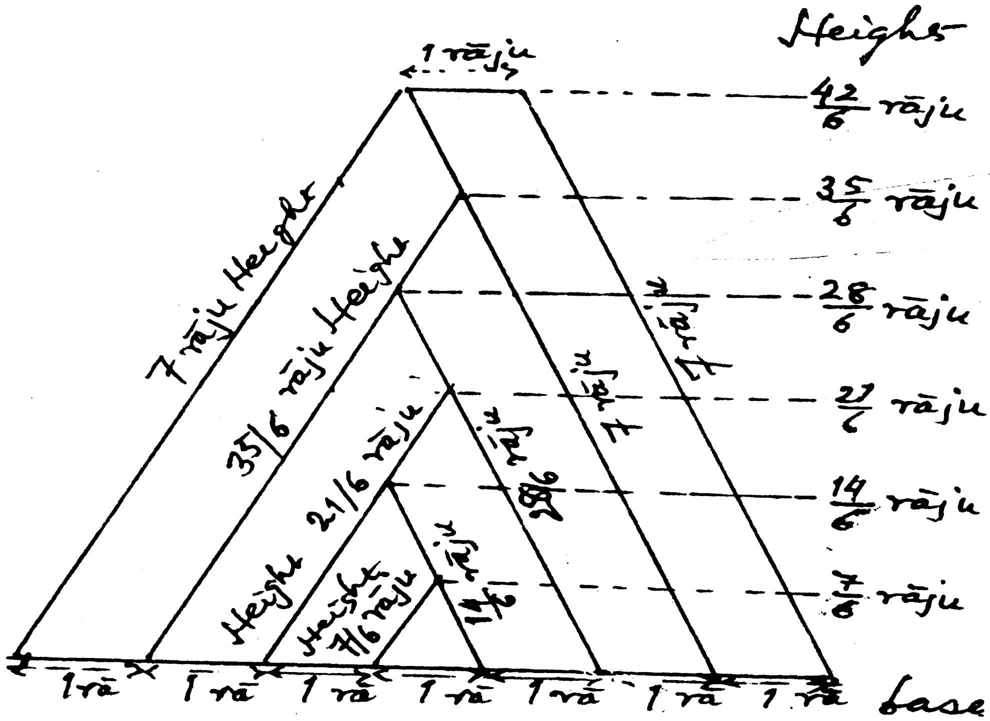
$$= \frac{9408}{336} = 28 \text{ square rāju.}$$

Hence,

volume = 28 × 7 = 196 cubic rāju.

7. The Tent (Dūṣya kṣetra)

This type of figure has appeared in the TLS, perhaps envisaged by R.L. Mukhtar in which the slant sides, through they represent the tent like figure, how could they be of 7 rājus? However, the areas found out, of the quadrilaterals, may be based on perpendicular base and heights.



In this tent area, the first region is rectangular quadrilateral, whose base is 7 rājus and height 1 rāju. The 2nd, 3rd, 4th, 5th and 6th regions are irregular quadrilaterals, and their height each is 1, 1 rāju. The last seventh is a triangle with height $\frac{7}{6}$ rāju. On subtracting this form 7 rāju, $\frac{42}{6} - \frac{7}{6} = \frac{35}{6}$ rāju. Thus, the base of the first quadrilateral is 7 rāju, top $\frac{35}{6}$ rāju. On subtracting again $\frac{7}{6}$ from $\frac{35}{6}$ rāju, the top of other quadilateral is found to be $\frac{35}{6} - \frac{7}{6} = \frac{28}{6}$, similarly, others bases are found. On adding the so called top and base, halving the addition, and on multiplying by the height, the areas are obtained. [Actually 1 be taken as base, and the heights as shown for application of formula, properly.

Area of regions

(1) $7 \times 1 = 7$ square rāju.

(2) $\left(\frac{42}{6} + \frac{35}{6}\right) \times \frac{1}{2} \times 1 = \frac{77}{12}$ square rāju

(3) $\left(\frac{35}{6} + \frac{28}{6}\right) \times \frac{1}{2} \times 1 = \frac{63}{12}$ square rāju

(4) $\left(\frac{28}{6} + \frac{21}{6}\right) \times \frac{1}{2} \times 1 = \frac{49}{12}$ square rāju

(5) $\left(\frac{21}{6} + \frac{14}{6}\right) \times \frac{1}{2} \times 1 = \frac{35}{12}$ square rāju

(6) $\left(\frac{14}{6} + \frac{7}{6}\right) \times \frac{1}{2} \times 1 = \frac{21}{12}$ square rāju

(7) $\left(\frac{7}{6} + 0\right) \times \frac{1}{2} \times 1 = \frac{7}{12}$ square rāju

Total area $= 7 + \frac{77}{12} + \frac{63}{12} + \frac{49}{12} + \frac{35}{12} + \frac{21}{12} + \frac{7}{12}$ square rāju

$= \frac{336}{12} = 28$ square rāju.

Hence the volume $= 28 \times 7 = 196$ cubic rāju.

8. The Mountain-cut lower universe (Girikaṭaka kṣetra)

There are 21 cuts and 27 mounts totalling to 48 triangles of which the area has already been found to be $\frac{1}{2} \times \frac{7}{6} = \frac{7}{12}$ square rāju for each triangle. As these are 48 triangles,

$\therefore$ total area $= 48 \times \frac{7}{12} = 28$ square rāju

$\therefore$ volume $= 28 \times 7 = 196$ cubic rāju.

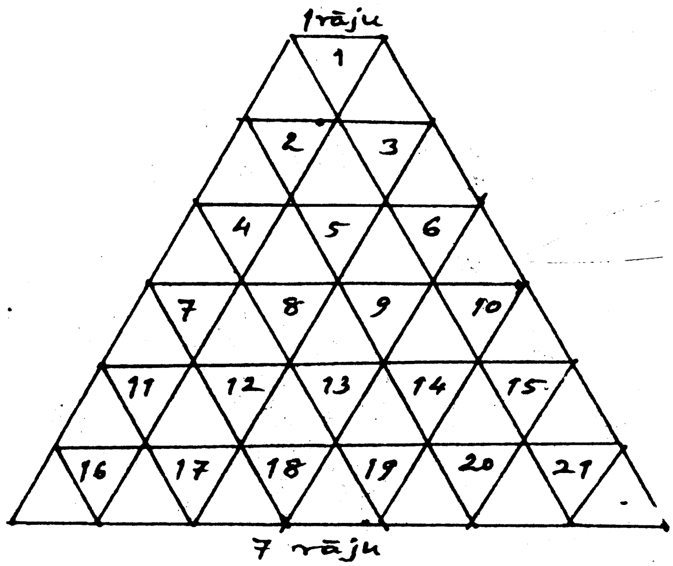


Figure 1.62

(vv.1.118 et seq.)

Similarly, the upper universe (ūrdhva loka) has been deformed in five types of geometrical shapes, keeping the same volume.

They are,

1. Samīkṛta or Common (sāmānya)
2. Pratyeka or Every
3. Ardhastambha or semi-pillar
4. Stambha or pillar
5. Pinaṣṭi or divisional

1. The common (sāmānya) upper universe This is the identical upper-universe with the following figure, two trapezoids, one over the other with depth of 7 rāju. we make first we find the area of the face ABCDEF. Half the face Area = ABCF = $\frac{5+1}{2} \times \frac{7}{2} = 10\frac{1}{2}$ square rāju

∴ The full face ABCDEF Area

$= 10\frac{1}{2} \times 2 = 21$ square rāju.

Hence the total volume = (ABCDEF, GHIJKL) = 21 × 7 = 147 cubic rāju.

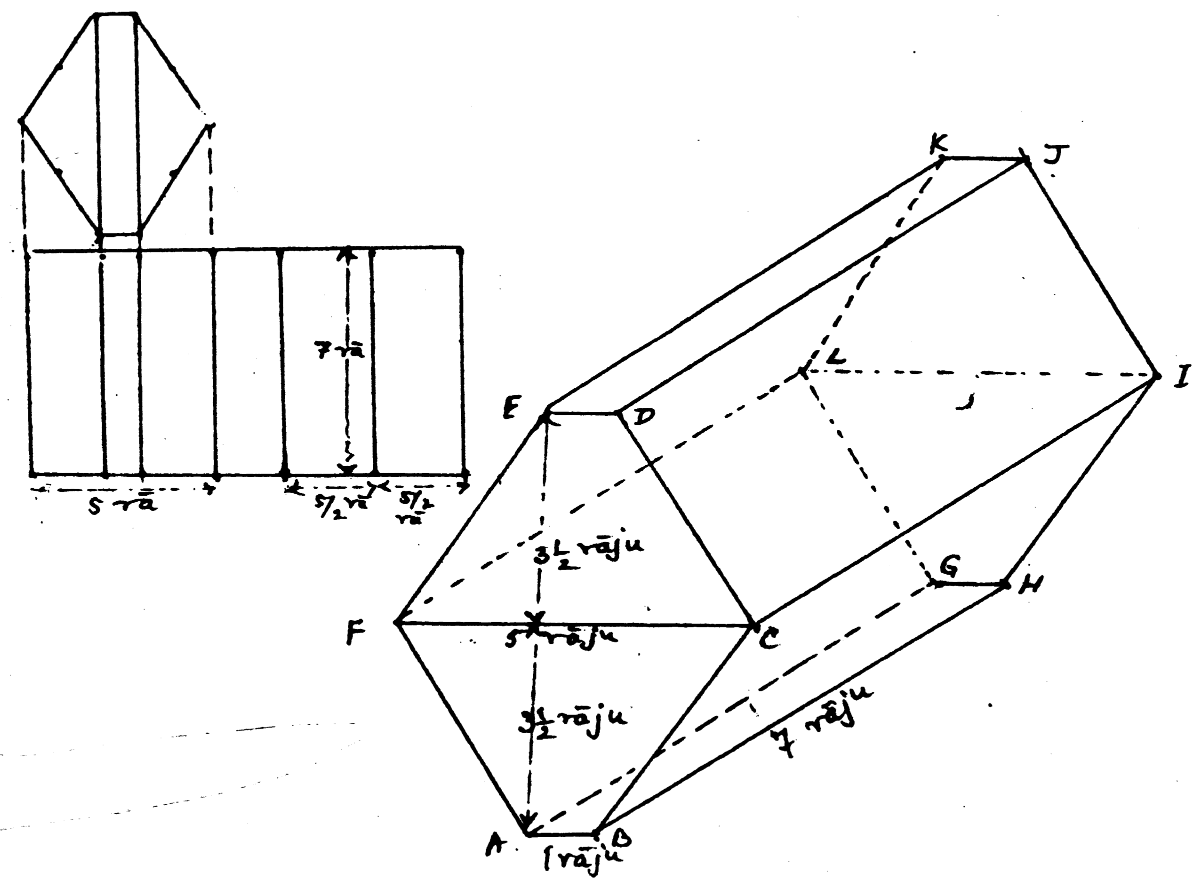


Figure 1.63

2. **Every upper universe- (Pratyeka ūrdhvaloka)**

Note: the depth is 7 rāju of each paradise:

From east and west, from the Brahmottara, 1 and 2 rāju entry vertical divide it.

However, we take each paradisewise here.

At $3\frac{1}{2}$ rāju height, 4 rāju increase,

$\therefore$ at $1\frac{1}{2}$ rāju height $4 \times \frac{2}{7} \times \frac{3}{2} = \frac{12}{7}$ rāju.

Thus, $1 + \frac{12}{7} = \frac{19}{7}$ rāju as the base of the second division.

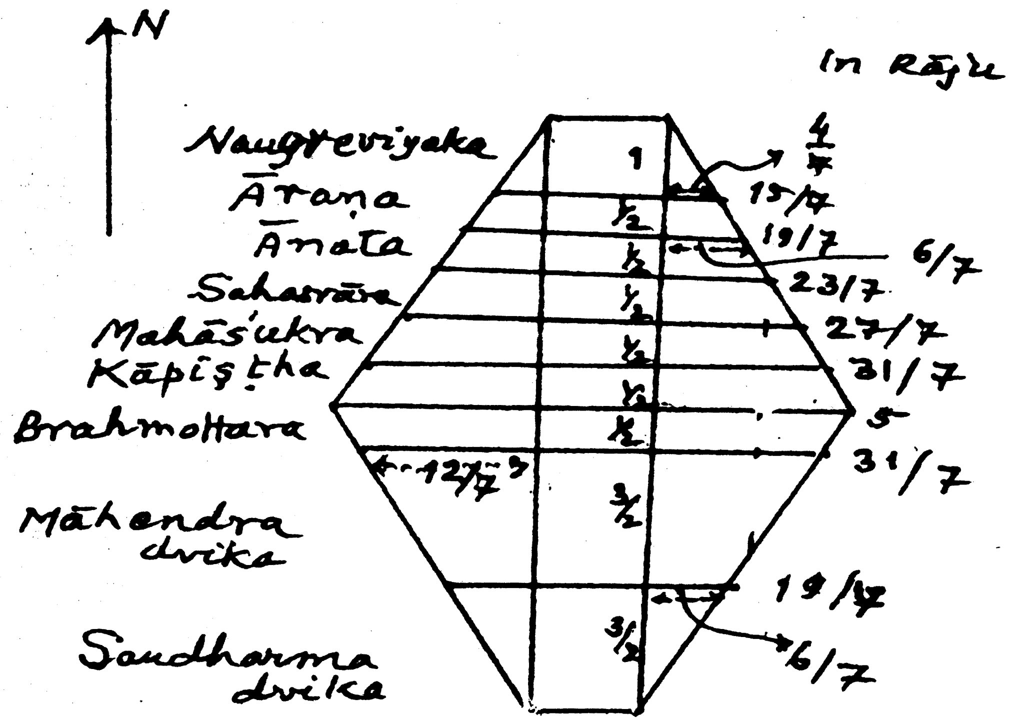


Figure 1.64

Similarly, at the end of 3 rāju, increase is $4 \times \frac{2}{7} \times 3 = \frac{24}{7}$ rāju.

The increase is $= 1 + \frac{24}{7} = \frac{31}{7}$ rāju, the base of the third division.

Again. At the end of $3\frac{1}{2}$ rāju, the increase is $4 \times \frac{2}{7} \times \frac{7}{2} = 4$ rāju.

Hence, the base of the 4th division or top of the third division is $1 + 4 = 5$ rāju.

In this way, the area of all the divisions

$$= \left(\frac{1+\frac{19}{7}}{2} \times 1\frac{1}{2}\right) + \left(\frac{\frac{19}{7}+\frac{31}{7}}{2} \times 1\frac{1}{2}\right) + \left(\frac{\frac{31}{7}+5}{2} \times \frac{1}{2}\right) + \left(\frac{5+\frac{31}{7}}{2} \times \frac{1}{2}\right)$$

$$\left(\frac{\frac{31}{7}+\frac{27}{7}}{2} \times \frac{1}{2}\right) + \left(\frac{\frac{27}{7}+\frac{23}{7}}{2} \times \frac{1}{2}\right) + \left(\frac{\frac{23}{7}+\frac{19}{7}}{2} \times \frac{1}{2}\right) + \left(\frac{\frac{19}{7}+\frac{15}{7}}{2} \times \frac{1}{2}\right) + \left(\frac{\frac{15}{7}+1}{2} \times 1\right)$$

$$= \frac{39+75+33+33+29+25+21+17+22}{14} \text{ square rāju}$$

$$= \frac{294}{14} = 21 \text{ square rāju.}$$

Thus, the volume $= 21 \times \text{depth} = 21 \times 7 = 147$ cubic rāju.

3. Half-pillar upper universe (Ardha stambha ūrdhva loka)

The vertical section of the upper universe has now been deformed into a rectangle. The parts have been so arranged as to have the same coverage of area.

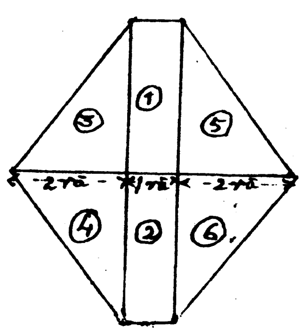


Figure 1.65

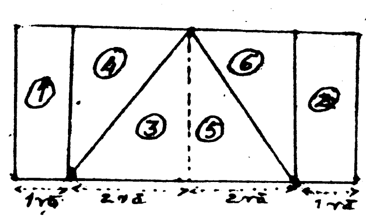


Figure 1.66

Area of (1) + (2) $= 2 [1 \times \frac{7}{2}]$ = 7 square rāju

Area of (3) + (5) + (4) + (6) $= 4 [\frac{1}{2} (2 \times \frac{7}{2})]$ = 14 square rāju

Total area = 7 + 14 = 21 square rāju

Hence volume = 21 × 7 = 147 cubic rāju.

4. **Pillar upper universe (Stambha Ūrdhva Loka)** The common universe is now divided into pillars, and by applying the equivalent portions at the proper places, it is converted into a rectangle.

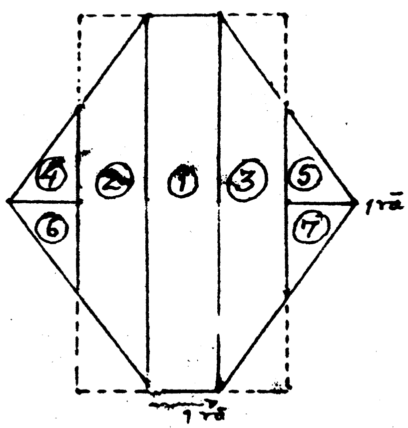


Figure 1.67

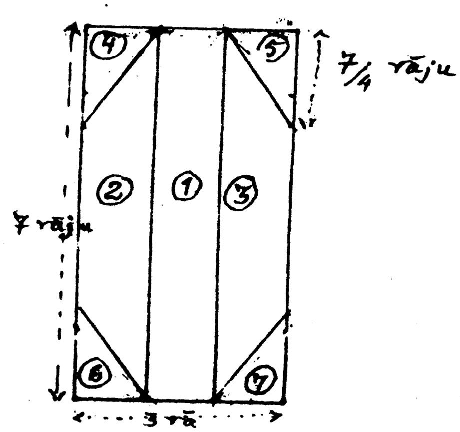


Figure 1.68

Here the area (1) = 1 × 7 = 7 square rāju

the area (2) + (3) $= 2 (\frac{7+2(\frac{3}{4})}{2} \times 1 = \frac{21}{2}$ square rāju

the area (4) + (5) + (6) + (7) $= 4 [1 \times \frac{7}{4} \times \frac{1}{2}] = \frac{7}{2}$ square rāju.

Hence total volume = 21 × 7 = 147

$$\text{Total} = \frac{7}{1} + \frac{21}{2} + \frac{7}{2} = 21 \text{ square rāju}$$

5. Divisional Upper Universe (Pinaṣti ūrdhva loka)

As already found out, the sides as bases have been given as shown in the figure. The figure shows the divisions on east and west as of equivalent area.

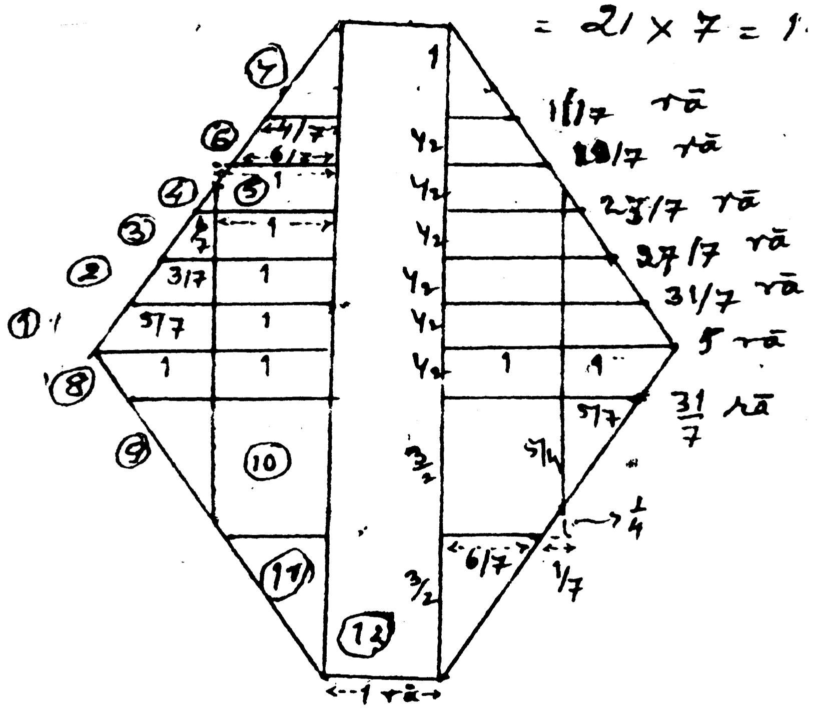


Figure 1.69

First we shall calculate the areas of the upper trapezium, and then that of lower will be just similar. Areas are (1) to (7) on the LHS, as also on RHS.

Areas of the upper portion :

Area of the central rectangle $= \frac{7}{4} \times 1 = \frac{7}{4}$ sequare rāju

Area of the 4 rectangls $= \frac{7}{4} \times 4 = \frac{392}{56}$ square rāju

LHS and RHS

Area of (1) $= 2\left[\frac{1}{2}\left(\frac{5}{7}+\frac{7}{7}\right)\times\frac{1}{2}\right] = \frac{48}{56}$ square rāju

Area of (2) $= 2\left[\frac{1}{2}\left(\frac{3}{7}+\frac{5}{7}\right)\times\frac{1}{2}\right] = \frac{32}{56}$ square rāju

Area of (3) $= 2\left[\frac{1}{2}\left(\frac{1}{7}+\frac{3}{7}\right)\times\frac{1}{2}\right] = \frac{16}{56}$ square rāju

Area of (4) $= 2\left[\frac{1}{2}\left(\frac{1}{7}\times\frac{1}{4}\right)\right] = \frac{2}{56}$ square rāju

Area of (5) $= 2\left[\frac{1}{2}\left(\frac{7}{6}+\frac{7}{7}\right)\times\frac{1}{4}\right] = \frac{26}{56}$ square rāju

Area of (6) $= 2\left[\frac{1}{2}\left(\frac{4}{7}+\frac{6}{7}\right)\times\frac{1}{2}\right] = \frac{40}{56}$ square rāju

Area of (7) $= 2\left[\frac{1}{2}\left(\frac{4}{7}\right)\times 1\right] = \frac{32}{56}$ square rāju

The above areas totals $= \frac{392+48+32+16+2+26+40+32}{56}$ square rāju

$= \frac{588}{56}$ square rāju

$= \frac{1176}{56}$ $= 21$ square rāju

Hence twice this is the grand total area.

∴ The volume of the whole divisional area = 21 × 7 = 147 cubic rāju

Note : In the TLS. The areas have been calculated separately according to the figure itself, for the upper trapezium and the lower trapezium, vide, p.117, op. cit. The reason is that the paradises in lower portion have a different division scheme. The areas have been marked as (8), (9), (10), (11) and (12).

(vv.1.121 et seq.)

The east-west boundary of the universe is $39\frac{42}{120}$ rāju and south north is 42 rāju. The reason is that in the south-north, every where it is 7 rāju wide, above and below. The height of the universe is 14 rāju, hence 7 rāju above and 7 rāju below, as well as in both sides, 14,14 rāju make 7 + 7 + 14 + 14 = 42 rāju south north.

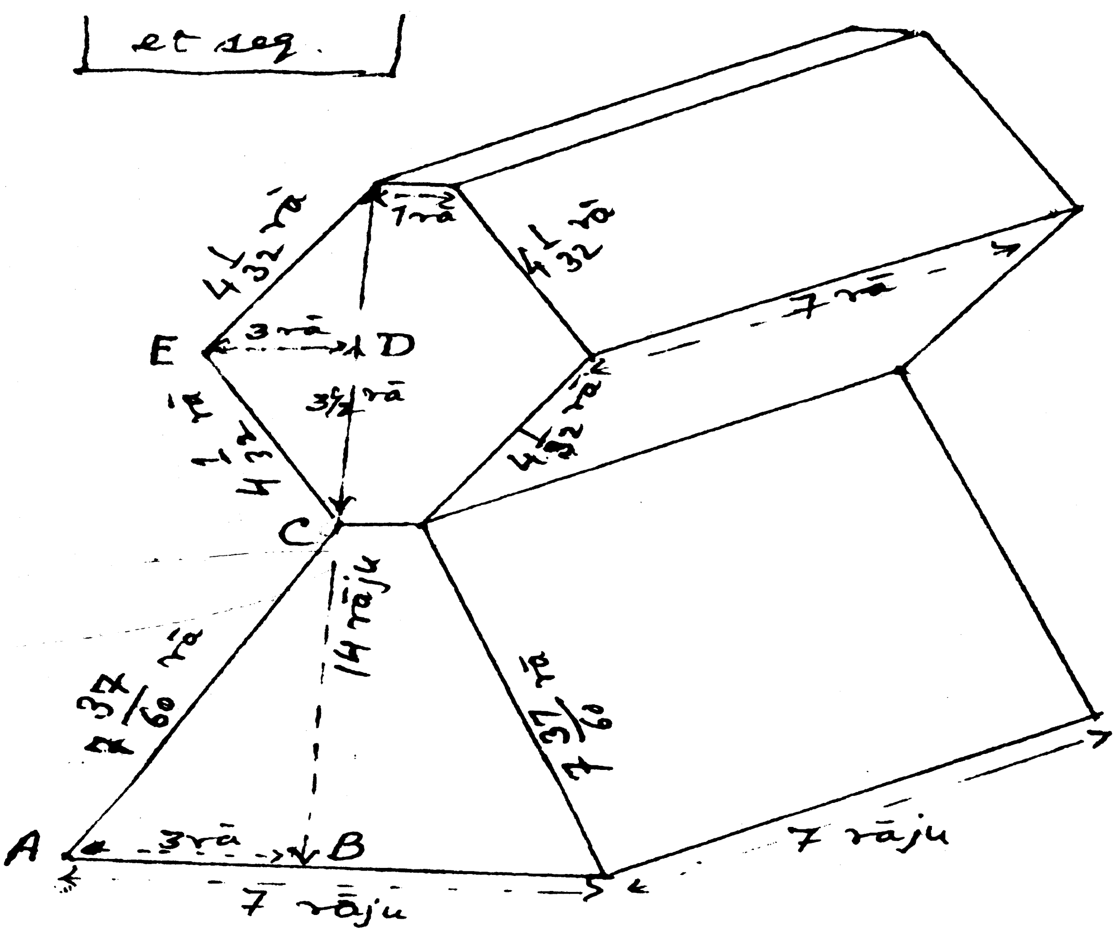


Figure 1.70

In order to the value of boundary of the universe east-west, the value of the hypotenues (karaṇa) AC and CE etc. are to be determined by the formula:

$$\text{base}^2 + \text{height}^2 = \text{hypotenuse}^2$$

for example, $AC^2 = AB^2 + BC^2 = (3)^2 + (7)^2 = 58$

Covering both sides the total becomes $4 \times 58 = 232$,

whose squareroot is $15\frac{7}{30}$ rāju. This is the boundery of both the hypotenuses.

Similarly, every triangle in the upper universe has its hypotenuse given by $(\frac{7}{2})^2 + (2)^2 =$

$\frac{49}{4} + \frac{4}{1} = \frac{65}{4}$. Thus, for 4 trangls, it becomes $\frac{65}{4} \times 4 \times 4 = 260$ square rāju. The square root

of this is $16\frac{4}{32}$. Hence this the boundary above.

Above, width of universe is 1 rāju, below its 7 rāju,

$\therefore$ 7 + 1 = 8. Without $\frac{7}{30}$, $\frac{4}{32}$ boundary, remaining boundary is 15 + 16 = 31 rāju to which on adding 8 we get 39 rāju. Both the excess sets.

$(\frac{7}{30} + \frac{4}{32})$ have denomination (30, 32 have 15,16 as halves), on having made with similar denominiaters become $\frac{15}{15} \times \frac{4}{32}$ or $\frac{16}{16} \times \frac{7}{30}$ or $\frac{60}{480}$ and $\frac{112}{480}$ are obtained whose sum total is $\frac{172}{480}$. On concellation by 4, we get $\frac{43}{120}$ raju in excess of measure. Hence the total boundary east west is $39\frac{43}{120}$ rāju.

Alternate Meth d

Here,

$A_1 A_2 A_3 A_4 A_5 A_6 A_7 A_8$ is the total east west boundary.

$A_3 A_4 + A_5 A_6 = 2\sqrt{58} = \sqrt{4 \times 58}$

$= \sqrt{232} = 15\frac{7}{30}$ rāju

$A_1 A_2 + A_2 A_3 A_6 A_7 + A_7 A_8 = 4\sqrt{\frac{65}{4}} = \sqrt{16 \times \frac{65}{4}}$

$= \sqrt{260} = 16\frac{4}{32}$ rāju

$\therefore$ Total $A_1 A_2 A_3 A_4 A_5 A_6 A_7 A_8$

$= 15\frac{7}{30} + 16\frac{4}{32} + 7 + 1$

$= 39\frac{43}{120}$ rāju

The theorem of Pythagoras has been applied here.

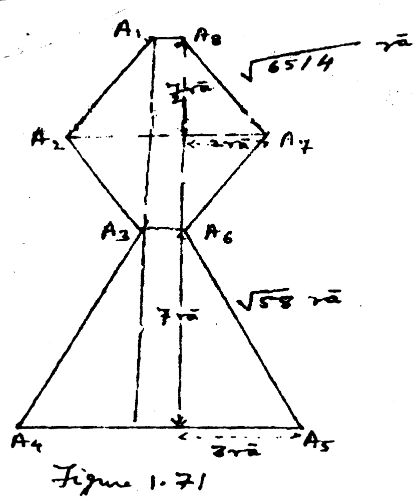


Figure 1.71

Now for the volumes of the air-envelops, covering the whole universe in 3 layers are described

(vv.1.124 et seq.)

The universe is surounded by densewater, dense air and rare air envelops. Their colours are respective like that of urine, mūṅga pulse and of various types. They are like the bark of a tree. Their thickness will decide their volumes, on every side of the universe.

Whatever and whereever are the hellish earths and the freedom (mokṣa) earth, there is the thickness of the air-envelops are the frustrums of triangular prisms at the faces and they could be converted into cuboids with the same volumes.

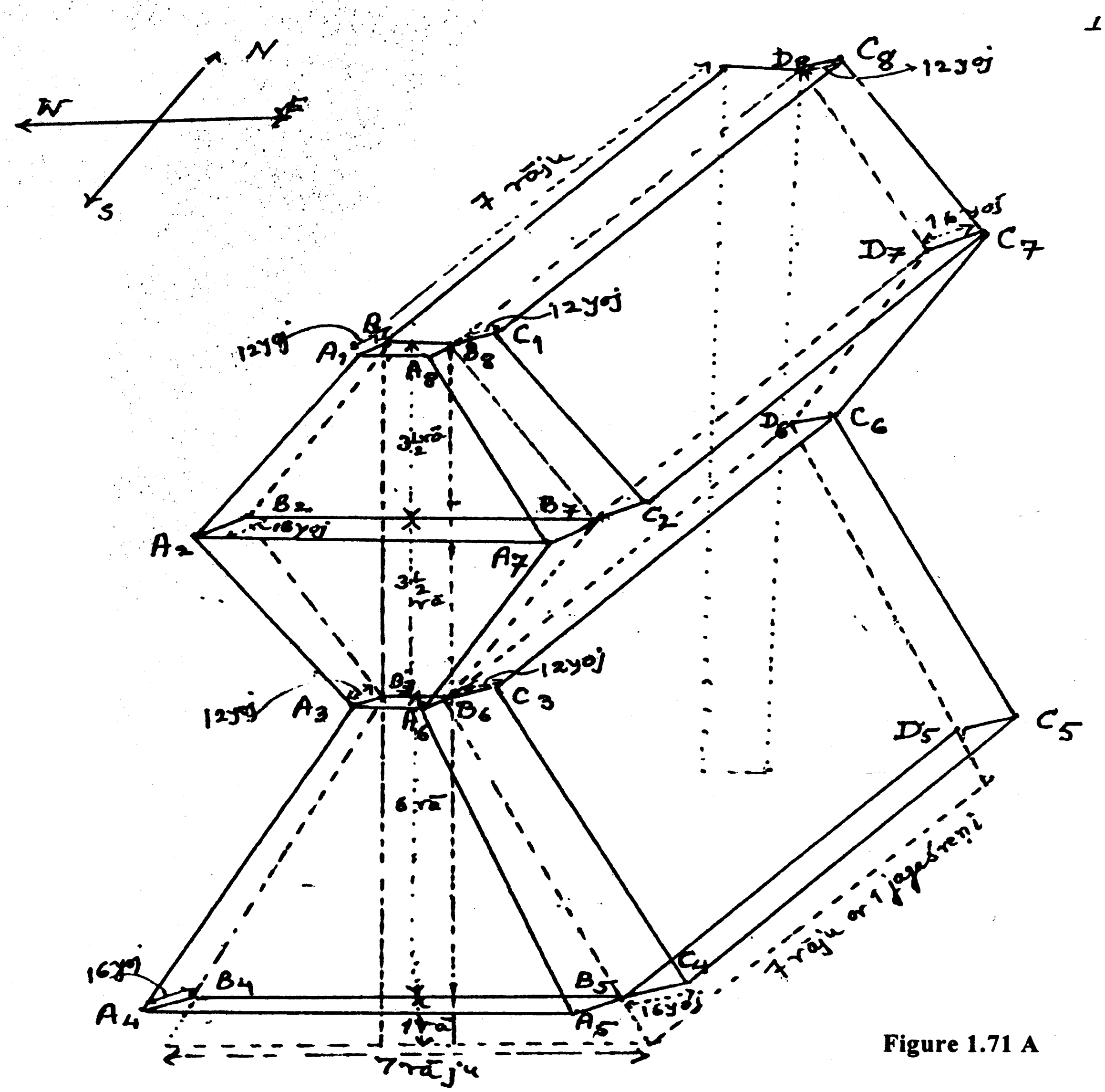


Figure 1.71 A

Thickness of 20000 yojanas below the lower-universe, upto a height of 1 rāju in the lateral portions. Near the seventh hellish earth, the air envelops are respectively 7, 5, and 4 yojanas thickness. Then they go on increasing, till near the Brahmaloka, their thickness is the same, 7, 5, and 4 yojanas. Over and above these, it reduces near the upper universe, it is 5, 4,3 yojanas thick respectively. The formula through which the volumes are to be calculated is "muha bhūmiṇa visese udaya hide", etc.

Calculations

For the height of 6 rāju, there is decrease from 16 to 12 yojanas

∴ For 1 rāju height, $\frac{4}{6}$ yojana decrease

∴ near 6th hellish earth the thickness (bāhalya)

$= \frac{16}{1} - \frac{4}{6} = \frac{92}{6} = 15\frac{1}{3}$ yojanas

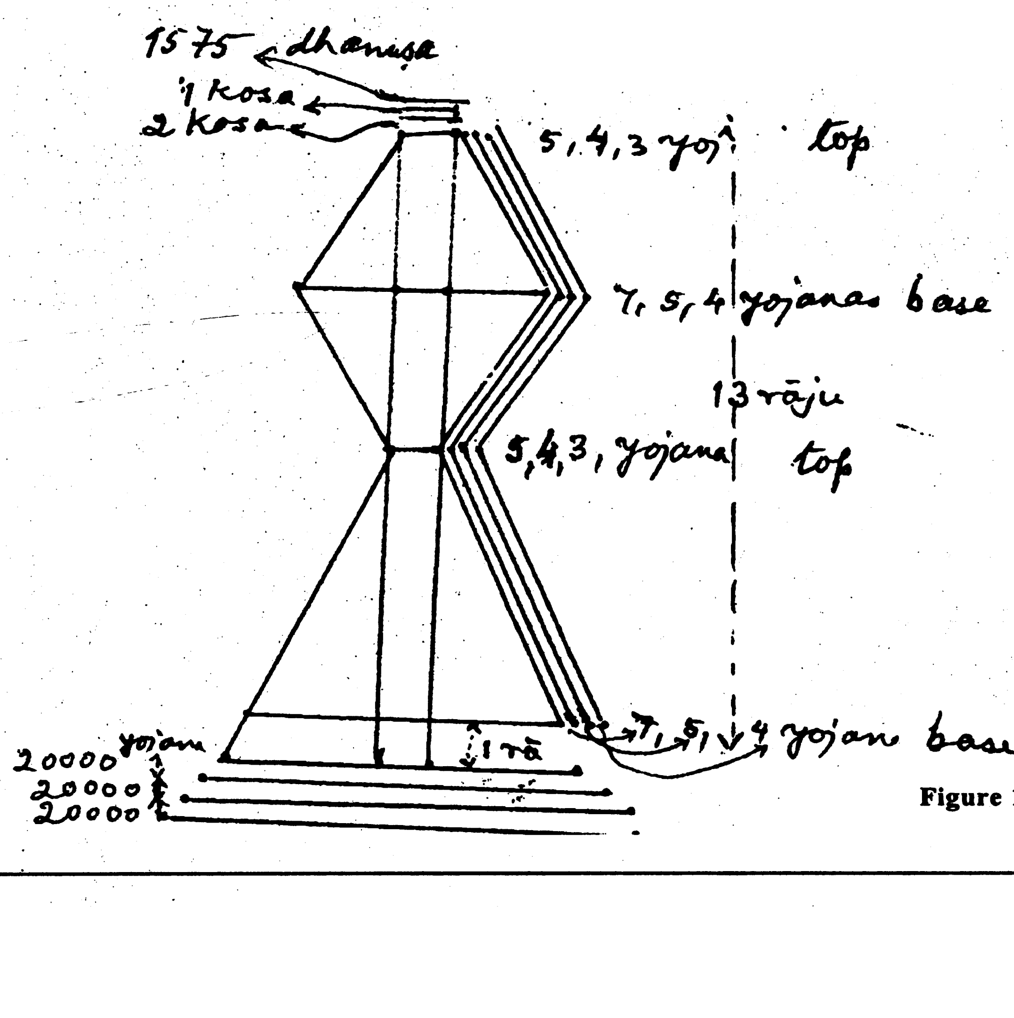


Figure 1.72

Similary, near 5th hellish earth. thickness $= 15\frac{1}{3} - \frac{2}{3} = 14\frac{2}{3}$ yojanas

$\therefore$ Near 4th hellish earth, thickness $= 14\frac{2}{3} - \frac{2}{3} = 14$ yojanas

$\therefore$ Near 3rd hellish earth, thickness $= \frac{14}{1} - \frac{2}{3} = 13\frac{1}{3}$ yojanas

$\therefore$ Near 2nd hellish earth, thickness $= 13\frac{1}{3} - \frac{2}{3} = 12\frac{2}{3}$ yojanas

$\therefore$ Near 1st hellish earth, thickness $= 12\frac{2}{3} - \frac{2}{3} = 12$ yojanas

Similarly, about the upper universe

$\therefore$ At the height of $\frac{7}{2}$ rāju there is increase of thickness by 16 - 12 or 4

$\therefore$ At the height of 1 rāju there is increase of thickness by $4 \times \frac{2}{7}$ yojanas

$\therefore$ At the height of $\frac{3}{2}$ rāju there is increase of thickness by $4 \times \frac{2}{7} \times \frac{3}{2}$

$\therefore$ near Saudharma pair, there is increase of thickness $= 12 + \frac{12}{7} = 13\frac{5}{7}$ yojanas and so on.

At the top of the universe, the measure of heights or thickness is given by 2 kośa, 1 kośa and 1575 dhanuṣas respectively for the 3 envelops.

Now, we proceed to calculate the areas and volumes of the envelopes

Area of the lower universe base = universe-line × universe-line

= Jagapratara = L^2

The volume of the airenvelops there = L^2 × (6000 yojanas) ......(1.258)

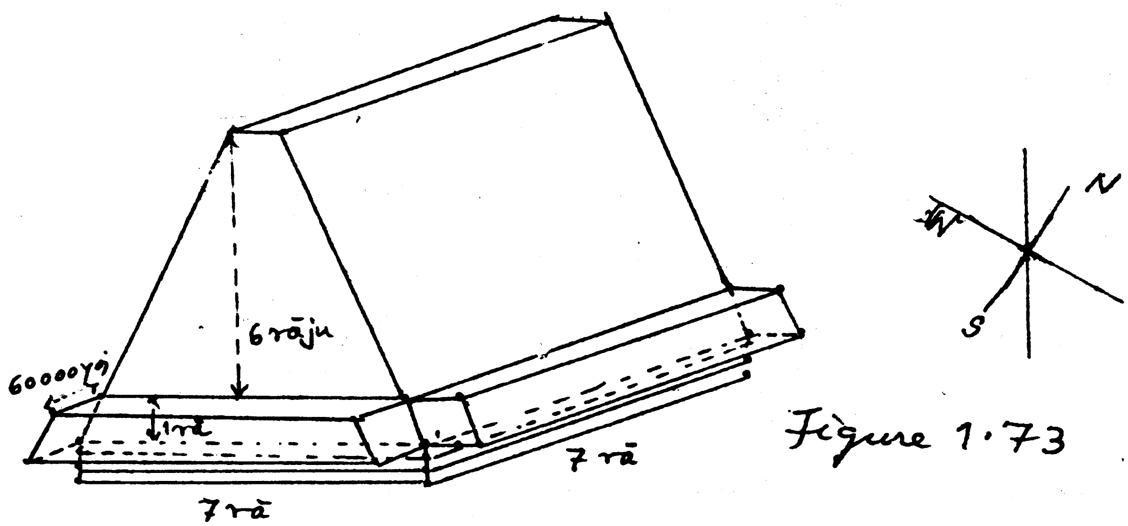


Figure 1.73

Calculation

base side = slightly less than a rāju = $\frac{L}{7}$ = (bhuja)

height = universe line = L = (koṭi)

thickness = 60000 yojanas or (vedha)

The volume of one side = $\frac{L}{7} \times L \times$ (60000 yojanas)

$$= \frac{L^2}{7} \times \text{(60000 yojanas)}$$

∴ volume of both sides = $\frac{L^2}{7}$ × (12000 yojanas) ......(1.259)

Now, from the universe bottom upto 7th earth, height rāju is called rise (udaya) or pada.

The width is a rāju, and top is $\frac{\text{rāju}}{7}$ or $\frac{L}{7^2}$ or mukha. Width of the universe is L, called base (bhūmi). Here thickness of the air envelops is 60000 yojanas. This is called vedha. Now the formula is applied here, "muha bhūmi joga dale", for getting volume of both sides in north-south.

Calculation

Height $= 1$ rāju $= \frac{L}{7}$ = pada or udaya of 7th earth from universe base

Width of the universe near 7th earth $= 6\frac{1}{7}$ rāju $= \frac{43}{7}$ rāju $= \frac{43}{7} \cdot \frac{L}{7}$

Width of the universe at the base $= \frac{L}{7}$ = bhūmi.

Width or thickness of envelops = 60000 yojanas = vedha

Hence applying the formula, " muha bhūmi joga dale".

The right prism frustrum shaped volume of airenvelops in north-south,

$$= \left(\frac{7 + 6\frac{1}{7}}{2}\right) \text{rāju} \times 1 \text{ rāju} \times (60000 \text{ yojanas}).$$

$$\therefore \text{ volume of both sides } = 2\left[\frac{7 + 6\frac{1}{7}}{2}\right] \text{rāju} \times 1 \text{ rāju} \times (60000 \text{ yojanas})$$

$$= \frac{L^2}{343} \times (5520000 \text{ yojanas}). \qquad \text{.........(1.260)}$$

Now, the volume of the air envelops from seventh earth to the middle universe is calculated. It is a universe-line, east-west, which is called a side (bhuja). Again, the height of the middle universe from the seventh earth is 6 rāju, which is the width or koṭi. Again on making decrease and increase equivalent, the thickness becomes 14 yojanas, which has been called utsedha or vedha. Here bhuja and koṭi are multiplied, and then multiplied by vedha. Cancelling by 7, volume of side is obtained and on doubling it, we get the volume of both sides.

The figure is to be treated as in the TPT, TPG v.1.268

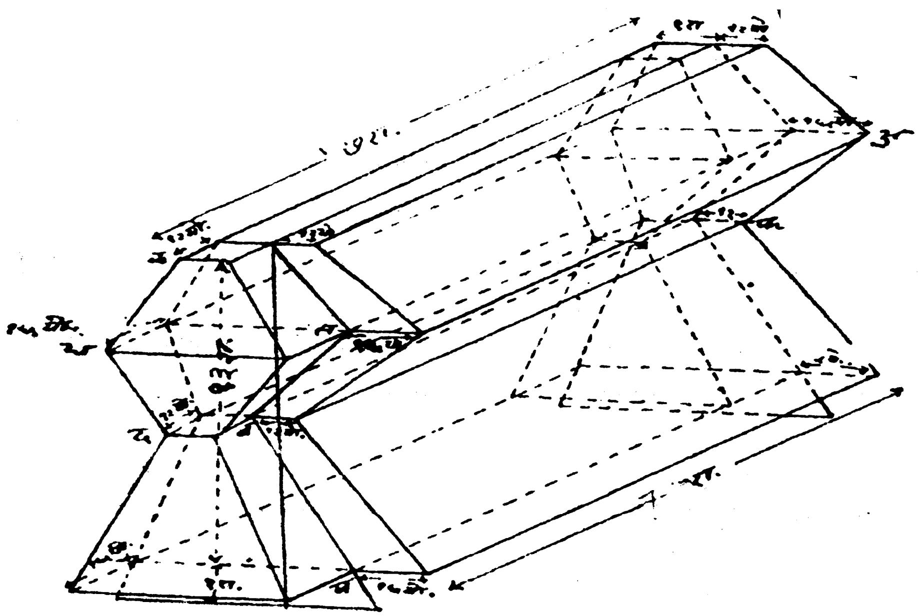


Figure 1.74

Calculations

The east-west length from the 7th hellish earth to the middle or oblique region universe = L = bhuja

The height of the same = 6 rāju = vyāsa = koṭi

On taking the union of the decrease-increase of the three air envelops, thickness

$= 14$ yojanas = utsedha = vedha = $\frac{16+12}{2}$

∴ the one side volume of the air envelop = L × (6 rāju) × (14 yojanas)

And the two sides volume of the air envelop $= 2$ (L (6 rājus) × (14 yojanas)

$$= 2 \left(L \times \left(\frac{6L}{7} \times (14 \text{ yojanas})\right)\right)$$

$$= L^2 \quad (24 \text{ yojanas}) \qquad \text{...........(1.261)}$$

Here, the formula used is

$$\text{volume} = \left(\frac{\text{base} + \text{top}}{2}\right) \times \text{height} \times \text{thickness} \qquad \text{........(1.262)}$$

Now, vide Figure 1.71 A, $C_2\ C_3\ C_6\ C_7\ B_7\ B_6\ D_6\ D_7$; $C_1\ C_2\ C_7\ C_8\ B_8\ B_7\ D_7\ D_8$.

Further, in the same figure, above, the volume of both sides, is obtained as universe square multiplied by 600 yojanas and divide by 7^2 or 49.

Here, 1 rāju is multiplied by half of the base plus top, or by $\frac{25}{7}$ rāju, getting universe-square-rāju in 49th part, as multiplied by $\frac{25}{7}$. Then on multiplying by $\frac{150}{7}$ and by 14, after cancellation by 7, then 300 is obtained. On doubling it volume of both sides is obtained.

Calculation:

$$\text{volume of one side} = \left(\frac{\frac{43}{7}+1}{2}\right) \text{rāju} \times 6 \text{ rāju} \times 14 \text{ yojanas}$$

$$= 150 (\text{rāju})^2 \times 2 \text{ yojanas} = \frac{L^2}{49} \times 300 \text{ yojanas.}$$

$$\therefore \text{ volume of both sides} = \frac{L^2}{49} \times 600 \text{ yojanas.} \qquad \text{.........(1.263)}$$

From the middle universe, upto Brahma paradise, in east-west, of one side volume. Height between them is $3\frac{1}{2}$ rāju. which is called vyāsa or koṭi. Again breadth all around is universe-line or L, called bhuja. Again the thickness or vedha is 14 yojanas of the three envelops is 14 yojanas on the average. In this way, with the help of the formula, "bhuja koṭi ....".

Formula is the same

volume = bhuja × koṭi × vedha.

Here height = $\frac{7}{2}$ rāju = vyāsa = koṭi

breadth = universe line = L = bhuja

thickness of the three air-envelops = 14 yojanas = vedha

Hence one side volume = $\frac{7}{2}$ rāju × jagaśreṇī × 14 yojanas

= $\frac{1}{2}$ jagapratara × 14 yojanas

= $L^2 \times 7$ yojanas

volume of all four sides = $L^2 \times 28$ yojanas ....(1.264)

Now vide figure 1.71 A;- $A_2 A_3 A_6 A_7 B_2 B_3 B_6 B_7$, and $A_1 A_2 A_7 A_8 B_1 B_2 B_7 B_8$:

Now we seek that volume of the upper universe airenvelops, south-north, on all the four sides

Calculations :

Height of the air-envelops

from middle universe upto Brahmloka = 7 rāju = gaccha = tuṅga = pada

Breadth near Brahma paradise = 5 rāju = bhūmi

Height near middle universe = 1 rāju = mukha.

Thickness of the three air-envelops = 14 yojanas = vedha

Here, the formula used is, " muha bhūmi joga dale ...."

Hence volume of one part at one side

$$= (\frac{5+1}{2})\text{ rāju} \times \frac{7}{2}\text{ rāju} \times 14\text{ yojanas}$$

$$= \frac{\text{jagapratara}}{49} \times \frac{14\times6\times7}{2\times2}\text{ yojanas}$$

$$= L^2 \times 3\text{ yojanas}$$

Hence, the volume of 4 parts of both sides of the total upper universe air-envelops

$= 4 \times$ jagapratara $\times$ 3 yojanas

$= L^2 \times 12$ yojanas ....(1.265)

Now, the volume of air envelops in the fore part of the universe is related. Relating to east-west, the width here should be known to be one rāju as the width of the loka, which is also called koṭi : The thickness of the air envelops is out of $\frac{303}{320}$ of a yojana, which should be called here as udaya or vedha. Relative to north south, the width is one jagaśreṇī or universe-line as bhuja. Here the bhuja, koṭi and vedha are to be multiplied together this gives the volume of the air envelops above the eighth earth called the Īsat prāgbhāra. Here $\frac{303}{320}$ yojanas is obtained as thickness of air-envelops on adding the thickness of 2 kośa ≥4000 dhanuṣa, then of 1 kośa = 2000 dhanuṣa and then rare air being 1575. Total is 7575 dhanuṣa Converting this in yojana which is equal to 8000 dhanuṣas, this gives $\frac{7575}{8000}$ yojanas or cancelling by 25, it gives $\frac{303}{320}$ yojanas.

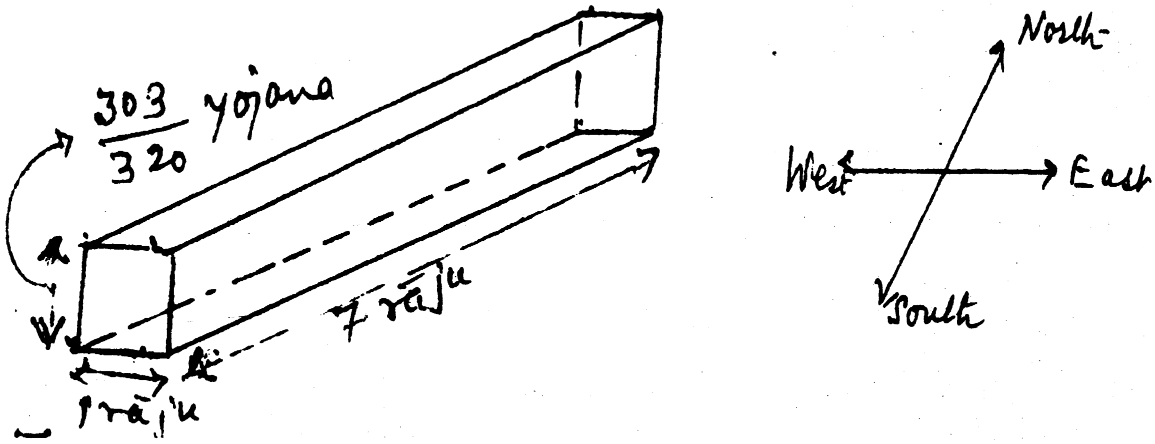


Figure 1.75

First, we find the volume of the air-envelops east-west, width of the universe, width of air-envelop = 1 rāju = koṭi Thickness of the three air-envelops = $\frac{303}{320}$ yojanas = udaya = vedha

[Reason : utsedha = 2 kośa + 1 kośa + 1575 dhanuṣa

$$7575 \text{ dhanuṣa} = \frac{7575}{8000} \text{ yojanas} = \frac{303}{320} \text{ yojana}]$$

Further,

Relative to south-north the bhuja (side) equal to vyāsa (width) of the loka

= jagaśreṇī = bhuja

∴ The volume of air-envelops above the eighth earth named

Īsat prāgabhāra earth = bhuja × koṭi × vedha

$$= \text{jagaśreṇī} \times 1 \text{ rāju} \times \frac{303}{320} \text{ yojanas}$$

$$= \frac{\text{jagapratara}}{7} \times \frac{303}{320} \text{ yojanas}$$

$$= \frac{L^2}{7} \times \frac{303}{320} \text{ yojanas} \qquad \text{.........(1.266)}$$

Further. the south-north sides have the volume of the air envelops as follows :

From the seventh earth upto middle universe, height is one rāju, called udaya or pada. Again near the seventh earth, breadth is $\frac{43}{7}$ rāju, called bhūmi. Near the middle universe, breadth is 1 rāju, called mukha. Again taking the sum of the three envelops, thickness is 14 yojanas, called vedha. Hence formula 'muha bhūmi ...." is applied here.

Calculation :

Height of air envelops from seventh earth upto middle universe

= 6 rāju = udaya = pada

Breadth of air envelops near seventh earth

= 43 = bhūmi

Breadth near middle universe

= 1 rāju = mukha.

The total of the thickness of air-envelops

= 14 yojanas = vedha

Hence volume of one side

$$= \frac{1}{2}\left(\frac{43}{7} + 1\right) \text{rāju} \times \frac{6}{1} \text{ rāju} \times \left(\frac{14}{1} \text{ yojanas}\right).$$

volume of both sides

$$= \frac{L^2}{49} \times 600 \text{ yojanas.} \qquad \text{........(1.267)}$$

CALCULATION OF GRAND TOTAL OF VOLUMES OF ENVELOPS

Now the volumes of the air-envelops except that at the fore-part of the universe are as follows:

Name place	Ancient symbol	Modern symbol
1] Below the universe.	volume is = 60000	L^2 60000 yojanas
2] East West upto 7th earth	$\frac{=}{7}$ 120000	$\frac{L^2\ 120000}{7}$ yojanas
3] Upto seventh earth south-north	$\frac{=}{343}$ 5520000	$\frac{L^2\ 5520000}{343}$ yojanas
4] Upto middle universe east-west	= 24	L^2 24 yojanas
5] Upto middle universe south north	$\frac{=}{49}$ 600	$\frac{L^2 600}{49}$ yojanas
6] Upto upper universe east-west	= 28	L^2 28 yojanas
7] Upto upper universe suouth-north	= 12	L^2 12 yojanas
The volume above eighth earth	= $\frac{303}{2240}$	$L^2\ \frac{303}{2240}$ yojanas
8]	or $\frac{=}{7}\ \frac{303}{320}$	$\frac{L^2}{7}\ \frac{303}{320}$ yojanas

The summation of ancient symbols give jagapratara

$$\left[\frac{20580000}{343} \quad \frac{5880000}{343} \quad \frac{5520000}{343} \quad \frac{8232}{343} \quad \frac{4200}{343} \quad \frac{9604}{343} \text{ and } \frac{4116}{343}\right] \quad .....(1.268)$$

$$\text{or} \quad \text{jagapratara } \frac{32006152}{343} \quad ....(1.269)$$

To this is added

$$\text{the 8th datum} \quad \frac{=}{7} \quad \frac{303}{320}$$

$$\text{or} \quad = \frac{14847}{109760} \text{ which when added to the above gives}$$

$$= \frac{3006152}{343} \times \frac{303}{320} \text{ plus } = \frac{14847}{109760} \text{ or } = \frac{10241968640}{109760} \text{ plus } = \frac{14847}{109760}$$

$$\text{or total sum is} \quad = \frac{10241983487}{109760} \text{ yojanas} \quad ......(1.270)$$

In modern symbol

$$\text{Sum} = L^2 \left[60000 + \frac{120000}{7} + \frac{5520000}{343} + 24 + \frac{600}{49} + 28 + 12 + \frac{303}{2240}\right] \text{ yojanas}$$

$$= L^2 \frac{10241983487}{109760} \text{ yojanas.} \quad ....(1.271)$$

Note :- One has to be very careful about the L and yojana in the above expression, as the multiple counts with the unit adopted.

(v.1.141)

The thickness of the rare-air-envelop is divided into 900000 parts. This gives the least immersion (avagāhanā) of the accomplished souls. When the same is divided into 1500 parts, it gives the maximal immersion:

$$\text{Least immersion of the accomplished} = \frac{\text{thickness of the rare-air-envelop}}{900000}$$

$$\text{Maximal immersion of the accomplished} = \frac{\text{thickness of the rare-air-envelop}}{1500}$$

As the thickness of the rare-air-envelop

= 1575 dhanuṣas (pramāṇa)

= 1575 $\times$ 500 dhanuṣas (vyavahāra)

= 787500 dhanuṣas (vyavahāra)

Hence,

least immersion = $\frac{7}{8}$ dhanusa ....(1.272)

The denominator $= \frac{787500}{1} \times \frac{8}{7}$

= 900000 dhanuṣas ......(1.273)

Again the maximal immersion of the accomplished

$= \frac{787500}{1500}$

= 525 dhanuṣas (vyavahāra) ....(1.274)

where the denominator is $\frac{787500}{525} = 1500$ ....(1.275)

(v.1.138)

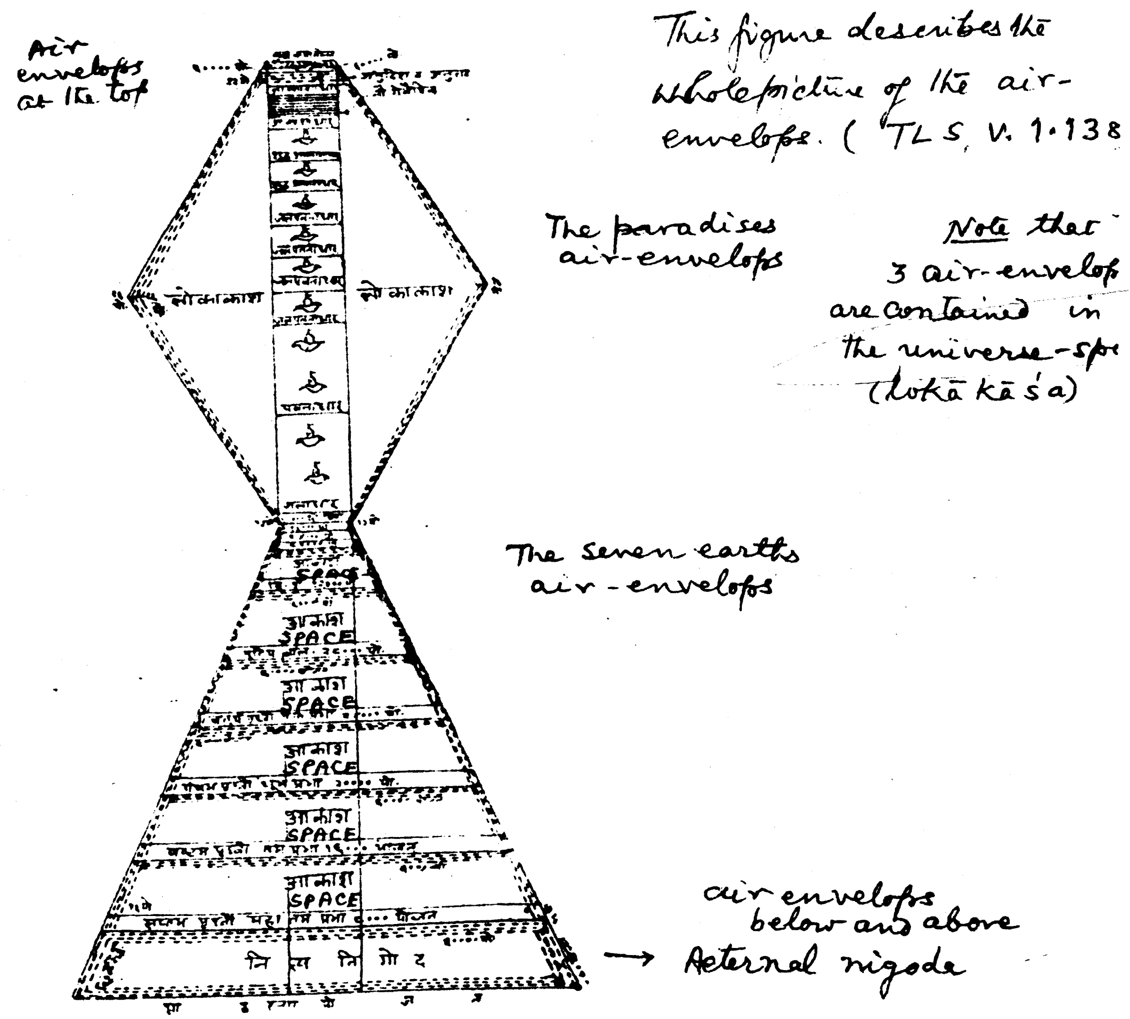


Figure: 1.76

(v.1.143)

The Mobile-Bios-channel

The volume of the channel in the central-most of the universe-space is given by that of the cuboid with length, breadth as 1 rāju and height as 14 rāju.

$\therefore$ volume = $1 \times 1 \times 14 = 14$ cubic rāju ......(1.276)

As the total volume of the universe is = 343 cubic rāju , ...(1.277)

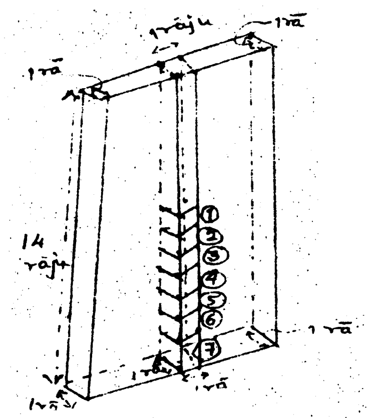


Figure 5.22

Hence the remaining volume of the universe-space is

343 – 14 = 329 cubic rāju.

Symbol for 343 cubic rāju is ≡ and 14 cubic rāju is $\frac{\equiv 14}{343}$ ......(1.278)

out of the trasa nālī (mobile-bios-channel), on trasa-being is found.

In the above diagram, in the lower portion of the trasa nālī are situated the 7 earth as

(1) ratnaprabhā, (2) śarkarāprabhā, (3) bālukāprabhā (4) paṅka prabhā, (5) dhūmaprabhā, (6) tamaḥprabhā (7) mahātamaḥ prabhā.

The brightness in these have been given the same name. These are at a distance of one rāju from one another.

Their other names are

(1) gharmā, (2) vaṁśa, (3) meghā (4) añjanā, (5) ariṣṭā, (6) maghavī, (7) māghavī.

(vv.1.163 et seq.)

Now descriptions of the indraka holes in the above earths are given, they being 13, 11, 9, 7, 5, 3, 1 in them respectively : and so on.

Inside the spokes the sequentially ordered holes are present and out of them are the scattered hole 5.

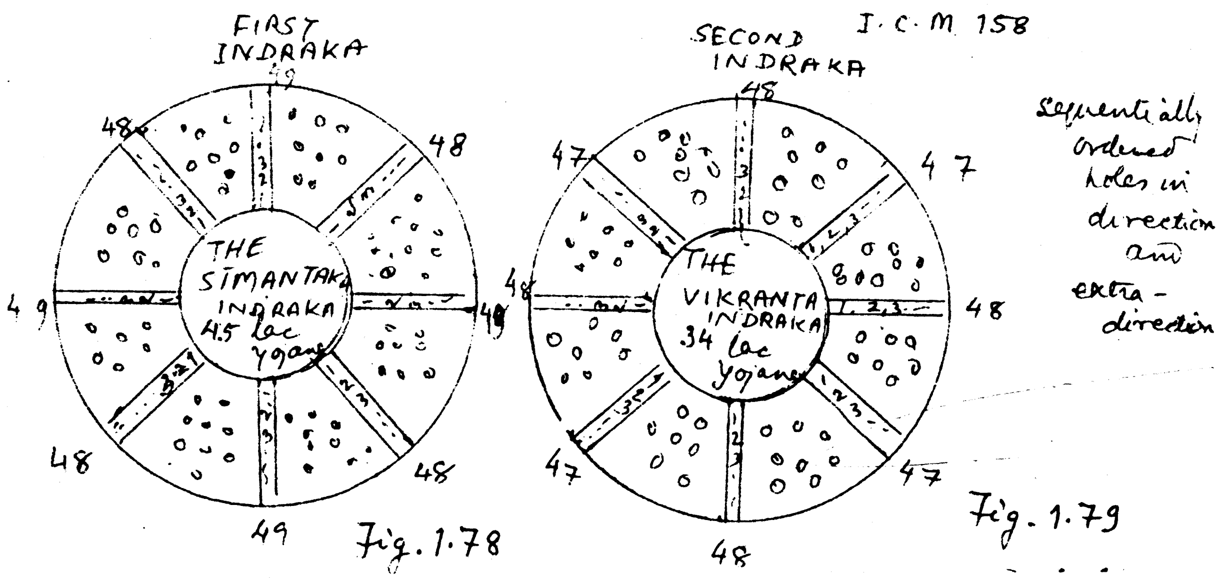


Fig. 1.78 Fig. 1.79

Definition and formula :

Stations are called sthāna, pada, gaccha or number of terms. In these stations, there is increase or decrease which is called the common difference, caya or uttara. In the initial station or at the final station, the minimal measure is called the top or mukha or prabhava, and the maximal measure is called the base, or bhūmi.

top = base - (number of terms -1) (common-difference)

base = top + (number of terms -1) (common-difference)

First Earth:

when the sequentially ordered (śreṇī baddha) holes of the directions and extradirection in the first disc of the first earth are added, and multiplied by 4, then the base is produced. for example,

$$\text{base} = (49 + 48) \times 4 = 388 \qquad \text{.......(1.276)}$$

Similarly, when the sequentially ordered (śreṇībaddha) holes of the directions and extra directions in the last disc are added and multiplied by four, the top is produced. For example,

$$\text{top} = (37+36) \times 4 = 292 \qquad \text{......(1.277)}$$

Further, we can also get the

top = base − (number of terms - 1) × common difference

$$=388 - (13-1)\,8 = 388 - 96 = 292 \qquad \text{......(1.278)}$$

and base = top + (number of terms − 1) × common difference

$$= 292 + (13-1) \times 8 = 292 + 96 = 388. \qquad \text{......(1.279)}$$

Now, the sum of the sequentially ordered holes of each earth can be calculated from the formula

$$\text{Sum} = \frac{\text{base}+\text{top}}{2} \times \text{number of terms} \qquad \text{......(1.280)}$$

$$= \frac{\text{bhūmi}+\text{mukha}}{2} \times \text{pada} \qquad \text{............(1.281)}$$

This is the same as the arithmentical series sum

$$s = \left(\frac{a+l}{2}\right) n \text{ or } \left(\frac{l+a}{2}\right) n \text{ or } \frac{n}{2}\,[2a + (n-1)d]. \qquad \text{.........(1.282)}$$

Thus, the sum of the sequentially ordered holes in the first earth

$$= \frac{388+292}{2} \times 13 = 4420 \qquad \text{......(1.283)}$$

Similarly those for the remaining earths are

$$\frac{284+204}{2} \times 11 = 2684 \text{ for second earth}$$

$$\frac{196+132}{2} \times 9 = 1476 \text{ for third earth}$$

$$\frac{124+76}{2} \times 7 = 700 \text{ for fourth earth}$$

$$\frac{68+36}{2} \times 5 = 260 \text{ for fifth earth}$$

$$\frac{28+12}{2} \times 3 = 60 \text{ for sixth earth}$$

$4 + 0 = 4$ for seventh earth.

(v.1.164)

Another formula:

Here, uttara = caya = common difference.

prabhava = mukha = first term

Here the formula for sum is

$$\text{Sum} = [(\frac{\text{pada} - 1}{2}) \times \text{uttara} + \text{prabhava}] \times \text{pada}$$

$$= [(\frac{\text{number of terms} - 1}{2}) \times \text{common difference} + \text{first term}] (\text{number of terms})$$

......(1.285)

For the first earth pada = 13, uttara = 8 , prabhava = 292 .

Hence,

$$\text{pada dhana} = [(\frac{13-1}{2}) \times 8 + 292] \times 13 = 4420$$ ......(1.286)

Similarly for other remaining earths.

(v.1.165)

Alternative formula:

The number of sequentially ordered holes in the rth earth

$$= [\{(\frac{\text{amount of indraka in rth earth-1}}{2})^2$$

$$+ \sqrt{(\frac{\text{amount of indraka in earth - 1}}{2})^2} \times 8 + 4] \times [\text{amount of indraka}] \text{......(1.287)}$$

$$= [\{(\frac{n_r - 1}{2})^2 + (\frac{n_r - 1}{2})\} \times 8 + 4] \times 13$$

$$= [\{(\frac{13-1}{2})^2 + (\frac{13-1}{2})^2\} \times 8 + 4] \times 13 \qquad \text{for } n_r = n_1 = 13$$

$= 4420.$

Rationale of the formula - This has not been so clear

The number of indrakas are respectively 13,11, 9, 7, 5, 3,1. There are also called number of terms. Common difference is 8 every where, (called caya).

top (mukh) for all excluding indraka = 4

and including indraka = 5.

Regarding the first earth, indraka are 13, On reducing by unity it is 13 − 1 =12. In the first disc, for want of decrease-increase, after reducing by unity the common-difference reckoning rods are 12. Half of this is 6. In every disc, there is decrease of 8 sequantially ordered holes. In this way, the total common difference (caya-dhana) is 6 × 8 = 48. Thus, the word "addhakayaṁ" or half-made has been stated.

Here, in 4 directions and 4 extra directions, every where 4 celestial-planes are to be reduced, and placed separete. In this way, from 4 directions, if one celestial plane is reduced in each case, the number of the celestral planes in every direction and extra-direction for the last disc of the first earth becomes 36, which is $\frac{1}{2} \times 12 \times 6 = 36$.

As the total directions are 8, in all directions and extra directions the number of planes is found to be $36 \times 8 = 288$, which is the initial sum (or the sum of the first terms in the sequence). Evey where the same number 36, the words "vaggiyaca" or (half of $12)^2$ has been stated.

In the initial sum or 36×8, is added the product of the common-difference reckoning rods and 36, giving

$(36 \times 8) + (\sqrt{36} \times 8) = (36 \times 8) + (6 \times 8) = 8\,(36+6) = 8 \times 42 = 336$ = number of sequentially ordered holes in directions and extra-directions.

In the directions, the number of holes are in excess by 4, hence the 4 separately placed are now added to the initial sum 336, getting $336 + 4 = 340$, the number of sequentially ordered holes. This is the middle sum (madhya dhana).

For the purpose of equation (samīkaraṇa), the number of sequentially ordered holes in all the discs have been taken to be equal. If in adisc there are 340 sequentially ordered holes, then how many would there be in 13 discs ? The rule of 3 gives the value $340 \times 13 = 4420$ as the number of sequentially ordered holes in the first earth.

Note : The above is the application of the simulated formula

$$S = \frac{n}{2}[2a + (n-1)\,d] = an + \frac{n(n-1)}{2}d$$

$$= [a + \frac{(n-1)}{2}d\,]\,n = [\,(\frac{n-1}{2})^2 \times 8 + 4 + (\frac{n-1}{2}) \times 8]\,n$$

$$\frac{n-1}{2} = \frac{13-1}{2} = 6\,,\ d = 8$$

where, $n = 13$,

$$a = 288 + 4$$

$$= (36 \times 8) + 4$$

$$= (\frac{13-1}{2})^2 \times 8 + 4 = (\frac{n-1}{2})^2 \times 8 + 4 = \sqrt{36}$$

4 has been keps separate. Thus the formula has been used as

$$S = [(36 \times 8) + 4 + (\frac{13-1}{2}) \times 8] \times 13$$

$$= [(36 \times 8) + 4 + \sqrt{36} \times 8] \times 13 , \qquad ......(1.288)$$

$$= 4420$$

This explains the rationale.

Similarly in the second-earth, applying the same formula, we get the sum of the sequentially ordered holes

$$= [\{ (\frac{11-1}{2})^2 + (\frac{11-1}{2})\} \times 8 + 4] \times 11$$

$$= 2684 \qquad ....(1.289)$$

(v.1.166)

This verse gives the method for finding out the number of scattered holes, when the total number of holes in any earth is given out of which the number of sequentially ordered holes and the indraka holes are to be subtracted.

Scattered Holes = all holes on first earth – (sequentially ordered and indraka)

$$= 3000000 - (4420 + 13) = 2995567 \qquad ......(1.290)$$

Similarly, those for other earths the same procedure is to be followed.

(v.1.167)

For the first earth, the indraka and scattered holes are of $\frac{3000000}{5}$ or 600000 in number and they are of numerate yojanas. Remaining $\frac{3000000 \times 4}{5} = 2400000$ are of innumerete yojanas width and are sequentially ordered holes in addition to the scattered holes.

Similarly for all the earths.

Now out of 600000 of numerate yojanas width, subtracting 13 indrakas, the remaining 599987 are scattered holes. Out of 2400000 of innumererate yojanas width, 4420 are sequentially ordered hence on subtracting them the remaining 2395580 are scattered holes.

Similarly, numbers may be calculated for other earths

(v.1.169)

This verse gives the width of the indraka holes.

The first indraka: Its width = the human region = 4500000 yojanas.

The last indraka: Its width is = width of Jambū island.

The (49th) = 100000 yojanas

Here, the decrease common difference (hāni caya)

$$= \frac{4500000-100000}{49-1} = \frac{44000000}{48} = 91666\frac{2}{3} \text{ yojanas}$$

Hence the width of the second indraka ....(1.291)

$$= 4500000 - 91666\frac{2}{3} = 4408333\frac{2}{3} \quad \text{yojanas}.$$

Similarly, width of other indraka may be obtained.

(v.1.170)

In this verse, the thickness of each of the indraka, sequentially ordered and scattered holes has been calculated.

The thickness means bāhalya or mukha, the height of their ceiling from the floor. The number of earths is 7.

In the first earth:

The thickness of indraka holes $= 6 \div 6 = 1$ kośa

The thickness of sequentially ordered hole $= 8 \div 6 = \frac{2}{3}$ kośa

The thickness of secttered holes $= 14 \div 6 = \frac{7}{3}$ kośa. ......(1.292)

In the second earth

The thickness of the indraka holes $= \frac{6+\frac{6}{2}}{6} = \frac{3}{2}$ kośa

The thickness of the sequentially ordered holes $= \frac{6+\frac{8}{2}}{6} = \frac{2}{1}$ kośa

The thickness of the scattered holes $= \frac{14+\frac{14}{2}}{6} = \frac{7}{2}$ kośa. ....(1.293)

And soon.

With the help of the above method, the first terms are 6, 8 and 14 respectively. The number of earths is 7. If the first term is a, then the thickness of the nth earth hole can be calculated as per following formula :

$$\text{Thickness of hole of nth earth} = \left[\frac{a + n.\frac{a}{2}}{7-1} \right], \quad \text{......(1.294)}$$

where a = 6, or 8, or 14 for indraka or sequentially ordered, or scattered respectively. This is the same as the depth.

(v.1.171)

This verse gives the alternative method or formula for finding out the thickness of the 3 types of holes:

The depths of the holes are in arithmetical progressions. The total number of earths is 7. If the thickness of the indraka hole of the nth earth is required to be known, the formula is-

$$\text{Thickness of indraka hole of nth earth} = \frac{(n+1)\times 3}{7-1}$$

$$\text{Thickness of sequentially ordered hole of nth earth} = \frac{(n+1)\times 4}{7-1}$$

$$\text{Thickness of scattered hole nth earth} = \frac{(n+1)\times 7}{7-1} \quad \text{......(1.295)}$$

Hence in the first earths n = 1,

$$\therefore \text{ Thickness of indraka} = \frac{(1+1)\times 3}{6} = 1 \text{ kośa}$$

$$\text{Thickness of sequentially ordered holes} = \left(\frac{(1+1)\times 4}{6}\right) = \frac{4}{3} \text{ kośa}$$

$$\text{Thickness of scattered holes} = \left(\frac{(1+1)\times 7}{6}\right) = \frac{7}{3} \text{ kośa}. \quad \text{.........(1.296)}$$

Similary, in the second earth n = 2,

Thickness of indraka holes $= (\frac{(2+1)\times 3}{6}) = \frac{3}{2}$ kośa

Thickness of sequentially ordered holes $= (\frac{(2+1)\times 4}{6}) = \frac{2}{1}$ kośa

Thickness of scattered holes $= (\frac{(2+1)\times 7}{6}) = \frac{7}{2}$ kośa. ....(1.297)

And so on.

(v.1.172)

The interval between the indraka etc. holes has been calculated in this verse. This is vert ical interval.

The formula is as follows:

Vertical Interval between indraka etc. holes

$$= \frac{\text{Hellisheαrth surface base - [surface measure} \times \text{thickness of indraka etc.]}}{\text{(number of terms in form of disc measure -1)}}$$ ....(1.298)

First Earth-discs = 13.

Thickness of indraka holes $= 1$ kośa $= \frac{1}{4}$ yojanas

Thickness of sequentially ordered holes $= \frac{4}{3}$ kośa $= \frac{1}{3}$ yojanas

Thickness of scattered holes $= \frac{7}{3}$ kośa $= \frac{7}{12}$ yojanas

surface situated base = 78000 yojanas

no. of discs less one = 13 − 1 = 12

Interval in vertical, relating to indrakas

$$= \frac{78000 - 13 \times \frac{1}{4}}{12} = \frac{311987}{48} \text{ yojanas} \qquad \text{........(1.299)}$$

Interval in vertical, relating to sequentially-ordered holes

$$= \frac{78000 - 13 \times \frac{1}{3}}{12} = \frac{233987}{36} \text{ yojanas} \qquad \text{.........(1.300)}$$

vertical interval, relating to scattered holes

$$= \frac{78000 - 13 \times \frac{7}{12}}{12} = \frac{935909}{144} \text{ yojanas.} \qquad \text{.........(1.301)}$$

Similarly, the vertical intervals for these types of holes in the remaining earths may be found out.

Note: The Abbahula part is 80000 yojanas thick, but 1000 below and 1000 above, yojanas, there is no hole, hence 78000 is taken.

Converted into integers the results are $6499\frac{35}{48}$ yojanas, $6499\frac{23}{36}$ yojanas, and $6499\frac{53}{144}$ yojanas.

(v.1.173)

Now. the interval between last disc of first earth and first disc of second earth is determined-

(v.1.173)

The thickness of the first earth is 180000 yojanas and that of second earth is 32000 yojanas. The sum of these both is 212000 yojanas. Out of these, the 2000 yojanas of the first earth and 1000 yojanas of the second earth should be reduced, i.e. 3000 yojanas be reduced, because the thickness of Citrā earth is 1000 yojanas, which is included in thickness of first earth, but its calculation has been included in the upper-universe thickness. Hence 1000 yojanas of Citrā earth and 1000 yojanas below first earth and 1000 yojanas above second earth, there being no hole, hence 3000 yojanas is to be reduced from 212000 thickness in yojanas. We get (212000 - 3000) = 209000 yojanas. When one rāju is reduced by 209000 yojanas, the remainder gives the vertical interval between the last disc of first earth and first disc of second earth.

(v.1.174)

Similarly, thickness of Meghā earth is 28000 yojanas and leaving 1000 yojanas each of upper part of Meghā and 1000 yojanas of lower part of Vaṁśā, 2000 yojanas are obtained. This is reduced from 28000 getting 28000 – 2000 = 26000 yojanas, as remainder. On subtracting this from one rāju, remainder 1 rāju – 26000 yojanas is the vertical interval between the last disc of Vaṁsā and last disc of Meghā earth.

Similarly for other earths.

Ultimately we prove that the vertical interval between the last disc of Maghavī earth and first disc of Māghavī earth is $3000\frac{2}{3}$ yojanas less a rāju.

We know that the thickness of seventh earth is 8000 yojanas and thickness of sequeutially ordered holes is $\frac{16}{3}$ kośa, or $\frac{16}{12}$ yojana. On dividing numerator and denominotor (these) by 4, the thickness of the sequentially ordered is $\frac{4}{3}$. The thickness of the upper floor of the disc of seventh

$$\text{earth} = \frac{8000 - \frac{4}{3}}{2} = 3999\frac{1}{3} \text{ yojanas.} \qquad \text{.........(1.302)}$$

This is the thickness of the upper floor of the disc of the 7th earth. There is also 1000 yojana thick floor 1000 yojanas below the last disc of the Maghavī earth. On adding both, one gets $1000 + 3999\frac{1}{3} = 4999\frac{1}{3}$ yojanas. On subtracting this from the thickness of 7th earth, remainder is $(8000 - 4999\frac{1}{3})$ or $3000\frac{2}{3}$ yojanas. This is to be subtracted from one rāju, getting 1 rāju - $3000\frac{2}{3}$ yojanas, which is the vertical interval between the last disc of Maghavī earth and avadhi patala (disc) of the Māghavī earth.

(vv.1.199 et seq.)

These verses describe the minimal and maximal longevity for every one of the disc.

The measurce of increase for disc from the lower disc

= decreasing common difference

$$= \frac{\text{measure of the last - measure of the initial}}{\text{number of terms in disc measure - 1}} \quad ......(1.303)$$

Here in the case of the first earth

The initial = $\frac{1}{10}$ sāgara (longenvity in fourth disc)

The last = 1 sāgara (longevity in the last disc) number of terms for discs = 10, hence

$$\text{decreasing common difference} = \frac{1-\frac{1}{10}}{10-1} = \frac{1}{10} \quad ....(1.304)$$

Thus, when $\frac{1}{10}$ sāgara is added to the longevity of 4th disc, the longenvity of the 5th disc,

$\frac{2}{10}$ is the result. Similarly, in the subsequent discs the longevity in sāgara is given by $\frac{3}{10}, \frac{4}{10}, \ldots \frac{10}{10}$.

Similarly the common-difference and the subsequent series may be obtained for second etc. earths, the minimal and maximal values follow automatically.

(v.1.201) The description of the height of the body of the hellish beings in every one of the discs is given here. For getting the decreasing common-difference in the first earth, initial = 3 hands, which is the height in the first disc of first earth last = 7 dhanuṣ as 3 hands 6 aṅgulas, which is the height in the last disc.

last-initial = 7 dhanuṣa 6 aṅgula

number of terms = number of discs = 13

4 hands = 1 dhanuṣa and 1 hand = 24 aṅgula

$$\therefore \text{ decrease-common difference} = \frac{\text{last-first}}{\text{number of term-1}}$$

$$= \frac{\text{7dhanuṣa 6 aṅgula}}{12} = 2 \text{ hands } 8\frac{1}{2} \text{ aṅgulas.} \qquad \text{.........(1.305)}$$

For the second earth

first term = 7 dhanuṣa 3 hands 6 aṅgula

last term = 15 dhanuṣa 2 hands 12 aṅgula

first-last = 7 dhanuṣa 3 hands 6 aṅgula

Hence decrease common difference

$$= \frac{\text{first+last}}{\text{number of term-1}} = \frac{\text{7dhanuṣas 3hands 6 aṅgulas}}{11}$$

$$= 2 \text{ hands } 20\frac{2}{11} \text{ aṅgula} \qquad \text{.........(1.306)}$$

Similarly the calculations for third etc. earths.

SECOND CHAPTER

BHAVANĀDHIKĀRA

(vv.1.230 et seq.)

Every indra has an army of seven types. Every army has seven classes. The measure of the initial class is equal to the number of Sāmānika deities. Ahead of this the measure of the subsequent is twice of the preceding. For example, the first family of Bhavanavāsī is Asurakumāra deities, which have seven armies of buffalows, horses, chariots, elephants, infantry, singers and dancecs. Cāmerendra of Asurakumāras have 64000 Sāmānika deities, hence the first army of buffalows is 64000. The second class of buffalows is $64000 \times 2 = 128000$ and so on. All these form geometrical progressions. They are then summed by application of formula. The measure of the stations is called the number of terms called gaccha or pada. At every station (sthāna), there is a common multiplier, called the common ratio or guṇakāra. The first term is called the mukha or ādi.

The formula is

$$\text{guṇa saṁkalana} = \frac{\{(\text{guṇakāra})^{(\text{pada})} - 1\}\,(\text{mukha})}{\text{guṇakāra} - 1}$$

$$\text{or sum of the geometrical progression} = \frac{(\text{first term})\,(\text{common ratio})^{(\text{number of terms})} - 1}{\text{common ratio} - 1}$$

It is the same as

$$\text{Sum} = a\,(\frac{a\,(r^n - 1)}{r - 1}$$

For example in case of first class, $r = 2$, $n = 7$, $a = 64000$,

$$\text{hence army of one class} = \frac{(64000)\,(2^7 - 1)}{2-1} = 8128000$$

Hence all the 7 armies.

contain 8128000 × 7 = 56896000

Let the first term be a, then this forms a geom progression of the following type-

$$S = a + ar + ar^2 + ...+ ar^{n-1}$$

$$_-Sr = _-ar \pm ar^2 \pm ....\pm ar^n$$

$$S (1- r) = [a (r -1) + ar (r - 1) + ar^2 (r -1) ......+ ar^{n-1} (r -1)$$

or $$S = \frac{a (r^n - 1)}{r - 1} \qquad ....(2.1)$$

Rationale given in the text-

Let first term (ādi) be = 2, guṇottara = 5, gaccha = 4.

The series is

2, 2 × 5 , 2 × 5 × 5, 2 × 5 × 5 × 5, ...

which are respectively the first sum, second sum, third sum, fourth sum, ...etc., where sum = dhana.

Thus, sum $$= \frac{2(5^4 -1)}{5 - 1} = 2(624)\frac{1}{4} \qquad ....(2.2)$$

The above is given is

2 , 2 | 5 , 2 | 5 | 5 , 2 | 5 | 5 | 5,......

The summation method is as follows-

the initial sum 2 | 1

$$= \frac{+2 \mid 4 \qquad -2 \mid 4}{+2 \mid 5 \qquad -2 \mid 4}$$

+ second sum $\quad + 2 \mid 5$

$2 \mid 5 \mid 2 \qquad - 2 \mid 4$

$+ 2 \mid 5 \mid 3 \qquad - 2 \mid 5 \mid 3$

$+ 2 \mid 5 \mid 5 \qquad - 2 \mid 4 - 2 \mid 5 \mid 3$

+ third sum $\quad + 2 \mid 5 \mid 5$

$+ 2 \mid 5 \mid 5 \mid 2 \qquad - 2 \mid 4 - 2 \mid 5 \mid 3$

$+ 2 \mid 5 \mid 5 \mid 3 \qquad - 2 \mid 5 \mid 5 \mid 3$

$+ 2 \mid 5 \mid 5 \mid 5 \qquad - 2 \mid 4 - 2 \mid 5 \mid 3 - 2 \mid 5 \mid 5 \mid 3$

+ fourth sum $\quad + 2 \mid 5 \mid 5 \mid 5$

$+ 2 \mid 5 \mid 5 \mid 5 \mid 2 \qquad - 2 \mid 4 - 2 \mid 5 \mid 3 - 2 \mid 5 \mid 5 \mid 3$

$+ 2 \mid 5 \mid 5 \mid 5 \mid 3 \qquad - 2 \mid 5 \mid 5 \mid 5 \mid 3$

total sum = $\quad + 2 \mid 5 \mid 5 \mid 5 \mid 5 \qquad - 2 \mid 4 - 2 \mid 5 \mid 3 - 2 \mid 5 \mid 5 \mid 3$

$- 2 \mid 5 \mid 5 \mid 5 \mid 3 \mid$

$= (2)(5 \mid 5 \mid 5 \mid 5 \mid) - 2 \mid 1 - 2 \mid 3 - 2 \mid 5 \mid 3 \mid$

$- 2 \mid 5 \mid 5 \mid 3 - 2 \mid 5 \mid 5 \mid 5 \mid 3$

$= 2(5 \mid 5 \mid 5 \mid -1) - 2 \mid 3 (1 + 5 + 5 \mid 5 + 5 \mid 5 \mid 5 \mid$

$$= 2(5^4-1) - 2(5^4-1)\ \frac{3}{5-1}$$

$$= 2(5^4-1)\cdot\frac{1}{5-1} \qquad = 312 \qquad \text{.........(2.3)}$$

This may be generalized in the form :

$$S = a\,(r^n-1)\cdot\frac{1}{r-1}$$

In this way, every where the equal quanity is divided by the multiplier as reduced by unity, and what-ever is obtained, out of it the major part 1 or multiplier as reduced by unity is the negative quantity and one part is the pure quantity. This is to be applied every where.

(v.2.248)

In this verse, the period of interval between food intake and respiration :

Name of deity	Interval between food in take	Interval between respiration
Asurakumāra	1000 years	1 fort night
Nāga kumāra, Suparṇa kumāra,	12 days	12 muhūrta
Dvīpakumāra Udadhikumāra, stanita kumāra,	12 days	12 muhūrta
Vidyut kumāra Dikkumāra, Agni kumāra, Vāyu kumāra	7 days	7 muhūrta

THIRD CHAPTER

VYANTARA LOKĀDHIKĀRA

(v.3.250)

Here, the total number of Jaina temples in the vyantara-universe has been given in ancient notation as

=
४ । ६५ = ८१ । १० शून्य । १

and in working symbols this may be written

as $$\frac{L^2}{(F)^2(65536)\,81\,(10)^{10}F^2\vartheta}$$ ....(1.31)

We have the following calculation.

The number of Jaina temples in Vyantara-universe

$$\frac{L^2 \div (300 \text{ yojanas})^2}{\text{numerate}} = \frac{L^2 \div (90000 \text{ square yojanas})}{\text{numerate}}$$ ....(3.2)

This number has been said to be beyond counting.

Now, 1 yojana = 768000 aṅgula

∴ 1 square yojana = 768000 × 768000 square aṅgula

90000 square yojanas = 90000 × 768000 × 768000 square aṅgula

= $9 \times 9 \times 65536 \times (10)^{10}$ square aṅgula

= $81 \times 65536 \times (10)^{10}$ F^2 square aṅgula

= $81 \times 65536 \times (10)^{10} F^2$. ....(1.313)

Hence, the above expression (1.312), by virtue of (1.313) becomes

$$\frac{L^2}{(90000 \text{ square yojanas})\vartheta}$$

$$= \frac{L^2}{(81)(65536)\,(10)^{10} F^2 \vartheta}$$

$$= \frac{L^2}{(F)^2 (65536)\, 81\, (10)^{10} \vartheta} \qquad \text{............(3.3)}$$

(v.3.282)

Here, the use of geometrical progression summation formula hasbeen used. $S = a\,(r^n - 1) \div (r - 1)$. Here $a = 28000$, $r = 2$, and $n = 7$.

Hence $S = 28000\,[(2^7 - 1)] \div (2-1)$

$= 3556000.$ ....(3.4)

Then the measure for 7 armies is

$3556000(7) = 24892000$

(v.3.298)

Maximal extension of houses or buildings is 12000 yojanas and depth 3000 yojanas. Minimal extension is 25 yojanas and depth $\frac{3}{4}$ yojana. In the centre, there are $300 \times \frac{1}{3}$ or 100 yojanas and 1 kośa high peaks.

(v.3.299)

They are surrounded by $\frac{1}{2}$ yojaṇa high wall for high buildings and by 25 dhanuṣa high wall for low buildings

(v.3.300)

Round shaped or spherical shaped buildings have maximal and minimal extensions as 100000 yojanas and 1 yojana respectively. Houses are similarly 12200 yojana and 3 kośa respectively.

(v.3.301)

There is the following data of different types of Vyantara deities

	Age	**Food interval**	**Respiration interval**
first type	palya	5 days	5 muhūrta
Second type	10000 years	2 days	7 respirations (pāṇā pāṇa)

(vide TPT; ch.6, vv.88-89).

Comparison may be made with the verse 248 of chapter 2 on the Bhavanādhikāra, regarding food intake intervals and respiration intervals, along with the longevity. The point of research is whether longer period of respiration and interval in food any relation with longevity.

♦ ♦ ♦

FOURTH CHAPTER

JYOTIRLOKĀDHIKĀRA

(v.4.302)

The measure of the astral bodies of the astral universe

$$= \frac{\text{jagapratara}}{(256 \text{ aṅgula})^2} = \frac{L^2}{65536\,(F)^2} \qquad \text{.........(4.1)}$$

In an astral body numerata astral bodies are obtained.

$$\text{Therefore in } \frac{L^2}{65536\,(F)^2} \qquad \frac{L^2}{65536\,(F)^2(\text{numerate})} \qquad \text{.........(4.2)}$$

In this way the number of temples or images

$$\frac{L^2}{65536\,(F)^2 \text{ numerate}} = \frac{L^2}{65536\,(F)^2\, S} \qquad \text{.........(4.3)}$$

(vv.4.309)

Operational formula for finding out the diameter and width of the ring for an arbitrarily chosen island or sea.

The width of the ring is obtained as distance between the shores of the preceding and succeeding island or sea. The diameter of an island or sea is the distance between the opposite ends of the diameter of the chosen island or sea.

For example let our number of terms be 4, so that we consider the fourth from Jambū island, named the Kālodaka sea. This may be established on considering one less and one more, for example-width of ring = (number of island - sea upto Kālodaka sea = 4) - 1 = 4-1 = 3

linear diameter = (number of islands seas upto Kālodaka sea = 4) + 1 = 5

The number of island or sea which is chosen here as order number is called the gaccha or number of terms. On subtracting from it unity, the remainder is spread and to each unity 2 is given, and they are mutually multiplied and then the result, for example here, 2^3 is multiplied by one lac

1 1 1
2 2 2 getting $2^3 (10)^5$ which gives the width of the ring. This is thus 8 lac yojanas.

Again whatever is the order number of the island or sea, one is added to that gaccha. Then to every unity 2 is given and they are mutually multiplied and multiplied by 1 lac and from the result, three lac is subtracted, the result is the linear diameter of the chosen one. Let here the chosen is the 4th Kālodaka sea. Then we get

1 1 1 1 1
2 2 2 2 2 or $(2)^5$ lac from which on subtracting $3(10)^5$ we get $(2)^5 (10)^5 - 3 (10)^5 = 29 (10)^5$ yojanas

$= 2900000$ yojanas

Rationale of the first formula :-

The diameter of the Jambū island is 100000 yojanas. The widths of the subsequent rings, Lavaṇa, etc. are double of its preceding. Hence (as in summation of a geometric progression), t_n is 2^{n-1} or 2 multiplied as many times in itself as is the number of the chosen island or sea as reduced by unity gives the width of the ring when the product is multiplied by 100000. Here the verse notes, " rūūṇapadamida duga saṁvagge". Further as nothing is to be subtracted hence "gagana hīna" or without zero, or as reduced by zero has been stated.

Rationale of the second formula

Whatever is the width of the ring, in it the widths of the islands and seas in both opposite ends, we first establish them as follows : for example, in case of the 4th,

Kālodaka	width	$16 (10)^5$	or	$8(10)^5 \times 2$
Dhātaki khaṇḍa	width	$8 (10)^5$	or	$4(10)^5 \times 2$
Lavaṇodaka	width	$4 (10)^5$	or	$2 (10)^5 \times 2$

As Jambū island has not got two sides, is not a ring hence for it there is absence of product of two, hence for this purpose zero is established:

.........,	$0\,(10)^5$
or	$1\,(10)^5 \times 0$

And in the end

Jambū island	$1(10)^5$
or	$1\,(10)^5$.

Hence the linear diameter upto kālodaka is given by

$16(10)^5 + 8\,(10)^5 + 4\,(10)^5 + 0 + 1\,(10)^5$

$= 29\,(10)^5$ yojanas.

Now it is evident that at the second place, in place of 2 lac, for want of it, one should take negative 2 lac, making the gaccha (number of terms) as greater than 4 by unity, as in geometrical progression summation.

That is why in the verse, "rūvāhiya pada duganṁsavagge" has been noted, that is the number of terms be treated as increased by unity.

Then there is stated, "padamete guṇayāre" , the summation formula, or 2^{n+1} , where n is the number of terms, and from this we have to subtract not only 1 but also 2 lac which was a fictitious term taken for granted as 2 lac.

Thus,

3 lac is to be reduced every time, "tilakkha vihīṇaṁ ", and this is what the verse states.

This gives the linear diameter of the requisite island or sea.

We give the diagram on the next page, for explaining the example of the 4th sea - the kālodaka sea.

The diagram gives only right hand view:
The left side will have points as A', B', C', D' and
their middle points as O, L', M', N' and the
right names are A, B, C D, O, L, M, N
as shown in the diagram.
Here Width of the ring of Dhātakī khaṇḍa = 400000 yo
and Diameter of its ring = 1300000 yo.

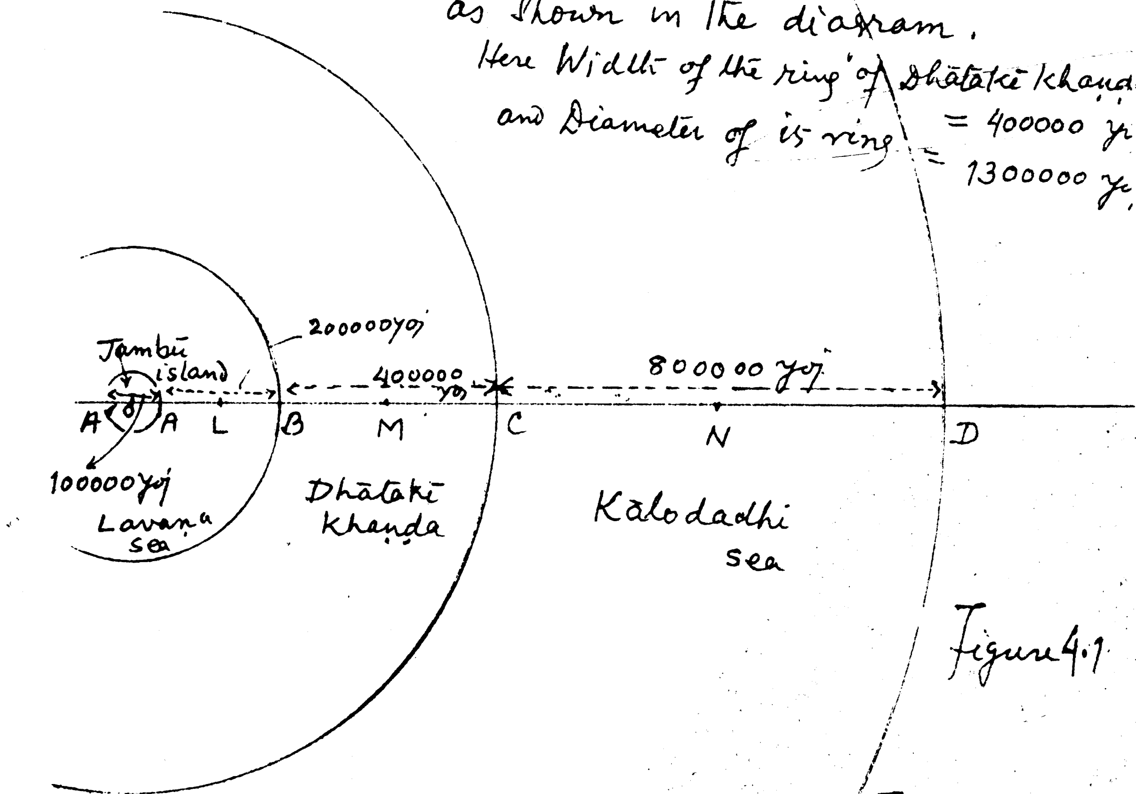


Figure 4.1

Name of island or sea	order of number of terms (gaccha)
Jambū island	1
Lavaṇa sea	2
Dhataki khaṇḍa	3
Kālodadhi	4

The width of the ring of the Kāloda is = 800000 yoj
The diameter = 2900000 yojana

Scale is here 1 cm = 10000 y

Thus the ring width (valaya vyāsa) of nth island or sea = $2^{(n-1)} \times 100000 - 0 = 2^{n-1}(10)^5$ yojanas. ....(4.4)

Similarly, diameter (sūci vyāsa) of nth island or sea

$= 2^{(n+1)} \times 100000 - 300000 = 2^{(n+1)}(10)^5 - 3(10)^5$ yojanas ....(4.5)

(v.4.310)

For this verse vide thefigure 4.80

For Dhātakikhaṇḍa

Internal diameter = BB' = 2 (width of ring) – 300000 yojanas

= 2 (400000) – 300000 yojanas

= 500000 yojanas ....(4.6)

Middle diameter = MM' = 3 (width of ring) – 300000 yojanas

= 3 (400000) – 300000 yojanas

= 900000 yojanas ....(4.7)

External diameter = CC' = 4 (width of ring) – 300000 yojanas

= 4 (400000) – 300000 yojanas

= 1300000 yojanas ....(4.8)

(v.4.311)

The above diameters are required for finding out the circumferences and areas of the corresponding circles with the help of the following formulae

gross circumference = diameter × 3 ....(4.9)

fine circumference = $\sqrt{10 \times (\text{diameter})^2}$ ....(4.10)

$$\text{gross area} = \frac{\text{gross circumference} \times \text{diameter}}{4} = 3\left(\frac{\text{diameter}}{2}\right)^2 \qquad \text{.........(4.11)}$$

$$\text{fine area} = \frac{\text{fine circumference} \times \text{diameter}}{4} = \sqrt{10}\left(\frac{\text{diameter}}{2}\right)^2 \qquad \text{........(4.12)}$$

Taking the case of the Jambū island, the

$$\text{gross circumference} = \text{diameter} \times 3 = 100000 \times 3 = 300000 \text{ yojanas} \qquad \text{........(4.13)}$$

$$\text{Its fine circumference} = \sqrt{10\,(\text{diameter})^2} = \sqrt{100000000000} \text{ yojanas} \text{......(4.14)}$$

The calculation of the squareroot is given as follows:

3	100000000000	316227 yojanas
6 1	9	
	100	
	61	
626	3900	
	3756	
6322	14400	
	12644	
63242	175600	
	126484	
632447	4911600	
	4427129	
	484471	
	× 4	remaining yojana
632454	1937884	3 koṣa
(twice the	1897362	
measure of	40522	
original row)	× 2000	remaining koṣa

to be cont...

81044000	128 dhanuṣa
632454	
1779860	
1264908	
5149520	
5059632	
89888	
$\times 4$	remaining dhanuṣa
359552	hand

As this is indivisible by the divisor, hence we convert the remainder into aṅgula.

Hence	359552	hands (hasta)
	$\times 24$	
632454	8629248	aṅgula 13
	632454	
	2304708	
	1897362	
	407346	

If this number of aṅgula is divided by 316227, then slightly greater than unity is obtained and on dividing 632454 divisor by 316227, we get 2, hence we get slightly greater than $\frac{1}{2}$. Thus we get slightly greater than $13\frac{1}{2}$. Hence we say that the fine circumference of the Jambū island is 316227 yojanas 3 kośa 128 dhanuṣa and slightly greater than $13\frac{1}{2}$ aṅgula. ......(4.15)

Note the denominator 632454, which divides 407346, the denominator is divisible by 316227, perhaps this might havebeen the basis for getting the calculation upto uvasannāsanna, (as in TPT), where divisor is 105409 and when multiplied by 6 it gives 632454. Dr. R.C. Gupta has worked this out completely and it has been given in appendix at the end.

Further

gross area of the circular region of Jambū island

$$= \text{gross circumference} \times \frac{\text{diameter}}{4}$$

$$= 300000 \times \frac{100000}{4} = 75000\ 000\ 00 \text{ square yojanas.} \qquad \text{........(4.16)}$$

Now,

fine area of the Jambū island

$$= \text{fine circumference} \times \frac{\text{diameter}}{4} \qquad \text{..........(4.17)}$$

= [316227 yojanas 2 kośa 128 dhanuṣa and slightly greater than $13\frac{1}{2}$ aṅgula]

$\times \frac{100000}{4}$ square yojanas

= (316227 25000 square yojanas)

+ ($\frac{3}{4} \times 25000$ square yojanas)

+ ($\frac{128}{8000} \times 25000$ square yojanas)

+ ($\frac{27}{2\times4\times192000} \times 25000$ square yojanas)

= 7905675000 square yojanas + 18750 square yojanas + 400 square yojanas + slightly greater than $\frac{1}{4}$ square yojanas.

= 7905694150 and slightly greater than $\frac{1}{4}$ square yojanas

= 7905694150 yojanas. 1 square kośa, 1515 square dhanuṣa, 2 square hasta and 12 square aṅgula . ...(4.18)

The slightly greater than $\frac{1}{4}$ square yojana is approximate. In order to carry it still further, in place of $13\frac{1}{2}$ aṅgula, one should take up $13\frac{407346}{632454}$ aṅgula.

For $\frac{1}{4}$ square yojana, pt. Ṭoḍaramala has written 1 (square) kośa, as also implied in the original work.

(v.4.314)

The following are the formulas for finding out the circumference of arbitrary island or sea based on the circumference of the Jambū island:

Circumference (gross) of arbitrary island or sea

$$= \frac{\text{(gross circumference of Jambū island)} \times \text{(diameter of orbitrary island area)}}{\text{diameter of Jambū island}}$$

.........(4.19)

fine circumference of arbitrarily chosen island or sea

$$= \frac{\text{(fine circumference)} \times \text{(desired island's or sea's diameter)}}{\text{diameter of Jambū island}}$$

.........(4.20)

Example there of :

gross circumference of Lavaṇa sea

$$= \frac{\text{(gross circumference of Jambū island)} \times \text{(diameter of Lavaṇa sea)}}{\text{diameter of Jambū island}}$$

$$= \frac{300000 \times 500000}{100000} \text{ yojana } = 1500000 \text{ yojanas} \qquad \text{...........(4.21)}$$

gross circumference of Dhātakī khṇḍa

$$= \frac{\text{(gross circumference of Jambū island) (diameter of Dhātakīkhaṇḍa)}}{\text{diameter of Jambū island}}$$

$$= \frac{300000 \times 1300000}{100000} \text{ yojana } = 3900000 \text{ yojana.} \qquad \text{...........(4.22)}$$

Similarly,

fine circumference of Lavaṇa sea

$$\frac{[\ 316227 \text{ yojanas 3 kośa 128 dhanuṣa } 13\frac{1}{2} \text{ aṅgula}] \times 500000,}{100000},$$

where " → " denotes Hightly greater than".

= 1581138 yojanas, 3 kośa, 640 dhanuṣa, 2 hasta, and 19 aṅgula. ....(4.23)

and fine circumference of Dhātakīkhaṇḍa

= [316227 yojanas, 3 kośa, 128 dhanuṣa, $13\frac{1}{2}$ aṅgula] × {1300000} ÷ 100000 yojana.

= 4110960 yojanas, 3 kośas, 1665 dhanuṣas, 3 hastas, and 7 aṅgulas . ...(4.24)

(v.4.315)

Now the formulae for finding out the gross and fine areas are being given as follows:

gross area = [external diameter + initial diameter]

$\times \frac{\text{width of ring}}{2} \times 3$ ....(4.25)

fine area = [{ (external diameter + internal diameter)

$\times \frac{\text{ring-width}}{2} \}^2 \times 10]^{1/2}$ . ...(4.26)

Example there of

gross area of Lavaṇa sea

$= (500000 + 100000) \times \frac{200000}{2} \times 3$

= 18000 000 0000 square yojanas ....(4.27)

fine area of Lavaṇa sea

$= [\{(500000 + 100000) \times \frac{200000}{2} \}^2 \times 10]^{1/2}$

= 189736659610 square yojanas (approximately). ....(4.28)

The above quantity in other form $\sqrt{(36)(10)^{21}}$

or

$(6\,(10)^5\,(10)^5\,6(10)^5\,(10)^5\,10]^{1/2}$ can be written. ....(4.29)

The method for finding out the square root is given as below:

	1 8 9 7 3 6 6 5 9 6 1 0
1	36 000 000 000 000 000 000 000
	1
28	260
	224
369	3600
	3321
3787	27900
	26509
37943	139100
	113829
	2527100
379466	2527100
	2276796
3794726	25030400
	22768356
37947325	226204400
	189736625
379473509	36467775500
	3415261581
3794735186	23151591900
	22768411116
37947351921	38318078400
	37947351921
37947351922	37072647900

As further division is not possible hence the quotient is taken zero at the end.

Then the fine area is thus 1897366596610 square yojanas.

(v.4.316)

To find out the number of Jambū islands equivalent pieces contained in any arbitrary island or sea.

The number of pieces equivalent to Jambū island in the given island or sea

$$N^{J} = \frac{(\text{external diameter})^2 - (\text{internal diameter})^2}{(\text{diameter of Jambū island})^2} \quad \text{.........(4.30)}$$

for Lavaṇa sea

$$N^{J}_{L} = \frac{(500000)^2 - (100000)^2}{(100000)^2} = \frac{24}{1} \quad \text{.........(4.31)}$$

In the above the following principle has been used. The ratio between areas of two cricles are proportional to ratio between the squares of their diameters. Let diameters of two circles be D_1 and D_2 and let their areas be A_1 and A_2.

Then

$$\text{or} \quad \frac{A_2}{A_1} = \frac{\pi\left(\frac{D_2}{2}\right)^2}{\pi\left(\frac{D_1}{2}\right)^2} = \frac{D_2^2}{D_1^2} = \quad \text{........(4.22)}$$

(v.4.317)

Whatever is the width of ring in lac yojanas of any arbitrary island or sea, that is called the measure of their reckoning rods. The ring-width of Lavaṇa sea is two lac yojanas hence the Lavaṇa sea has 2 reckoning rods. Now reckoning rods less unity is multiplied by 12, and again by 2 reckoning rods, getting 24 as the 24 Jambū island are contained in Lavaṇa sea.

Whatever, is the external diameter in lacs of yojanas square of that very is the measure of its reckoning rods. The measure of external diameter of Lavaṇa sea is 5. Its square is $(5 \times 5) = 25$. From Jambū island upto Lavaṇa sea, there are 25 pieces. Out of there one piece is Jambū island, and remaining 24 equal to Jambū island, are of Lavaṇa sea. Elsewhere, the same is to be known.

Let x lac be the ring-width (diameter) of an arbitrary island or sea,

The $N^J = (x - 1)12 \times x = 12x^2 - 12x$ ....(4.23)

If y lac denotes the full stretch of the diameter in lacs of yojanas,

$$N^J = [y]^2 - 1, \qquad ......(4.24)$$

where N^J is the number of Jambū islands contained in the said area. This formula fits for Lavaṇa sea.

(v.4.318)

This gives an alternative formula:

$$N^J = \frac{[(\text{external diameter of chosen island or sea}) - (\text{ring width}) \times 4(\text{chosen ring-width})}{(100000)^2} \qquad ....(4.25)$$

Example there of - External diameter of Lavaṇa sea = 500000 yojanas

ring-width = 200000 yojanas

desired ring-width = 200000 yojanas

$$N^J = \frac{[(500000) - (200000)] \times 4\,(200000)}{(100000)} = \frac{24}{1} \qquad ....(4.26)$$

(v.4.321)

Where the river enters in to the sea shore is called river-mouth. The volume contains of the bodies of fishes residing in the Lavaṇa, kālodaka, and svayaṁbhūramaṇa seas are respectively 9 yojanas in length, $4\frac{1}{2}$ yojanas broad, and $2\frac{1}{4}$ yojanas high, at the shore of the Lavaṇa sea. In the middle of Lavaṇa sea, the volume is 18 yojanas long, 9 yojanas broad, and $4\frac{1}{2}$ yojanas high.

At the shore of kālodaka, length is 18 yojanas, breadth is 9 yojanas and height is $4\frac{1}{2}$ yojanas.

At the centre, they are 36 yojanas in length, 18 yojanas in breadth and 9 yojanas in height.

At the shore of Svayaṁbhūramaṇa sea, the length etc. are 500 yojanas, 250 yojanas and 125 yojanas, respectively.

At the centre, the length etc. are 1000 yojanas, 500 yojanas and 250 yojanas, respectively.

(vv.4.322 et seq.)

These verses define the humen region and non human region, the karma land and the pleasure land, and the boundary demarcating mountains.

Just as in half the portion of kuṇḍalavara island There is Rucakagiri in the centre of Kuṇḍalagiri and Rucakavara islands.

Similarly, in the half portion of the Puṣkaravara island, there is Mānuṣottara mountain and there is Svayaṁprabhagiri in half portion of Svayaṁbhūramaṇa island.

These mountains surround all islands and seas which are inner ones.

The human beings are unable to cross the Mānuṣottara mountain hence the human region is upto the Mānuṣottara mountain.

Beyond this Mānuṣottara mountain, upto the Svayaṁprabha mountain, only the subhuman class of mininal pleasure land is found.

(v.4.325)

The maximal volume-contents or immersions (avagāhanā) of one-sensed beings etc. are as follows:

TABLE - 4.1

Name of beings	maximal length	breadth	height
lotus among one sensed	1000 yojanas	1 yojana circ.	1 yojana thick
conch among two-sensed	12 yojanas	4 yojanas	1 yojana
ant among three-sensed	$\frac{3}{4}$ yojana	$\frac{3}{32}$ yojana	$\frac{3}{64}$ yojana
humming bee among four sensed	1 yojana	$\frac{3}{4}$ yojana	$\frac{1}{2}$ yojana
great fist among five-sensed	1000 yojanas		

(.) The lotus tube is cylindrical, and its volume is given by

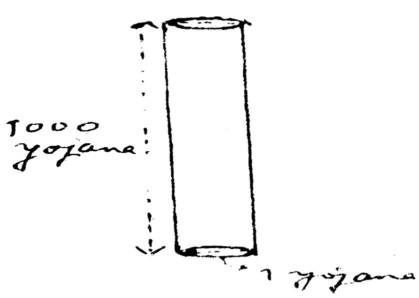


Figure 4.2

$$V = 3 \times \text{diameter} \times \frac{\text{diameter}}{4} \times \text{height}$$

$$= 3 \times 1 \times \frac{1}{4} \times 1000 = 750 \text{ cubic yojana .} \quad \text{.........(4.27)}$$

Now we come to the detailed description of the conch's volume, which is for want of a figure appears to be complicated.

(.) We shall discuss it on the basis of the Mādhava candra's commentary.

This is just the possible shape of a conch.

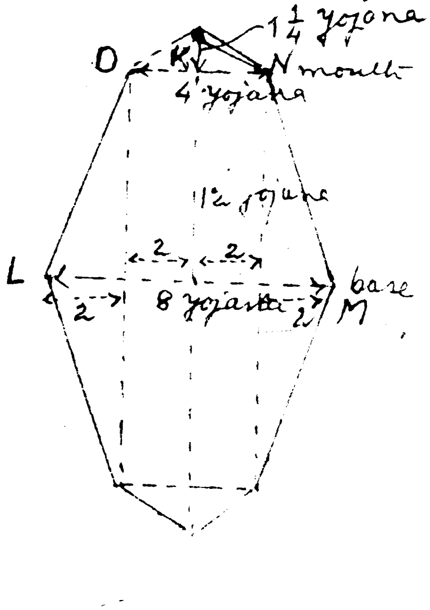


Figure 4.3

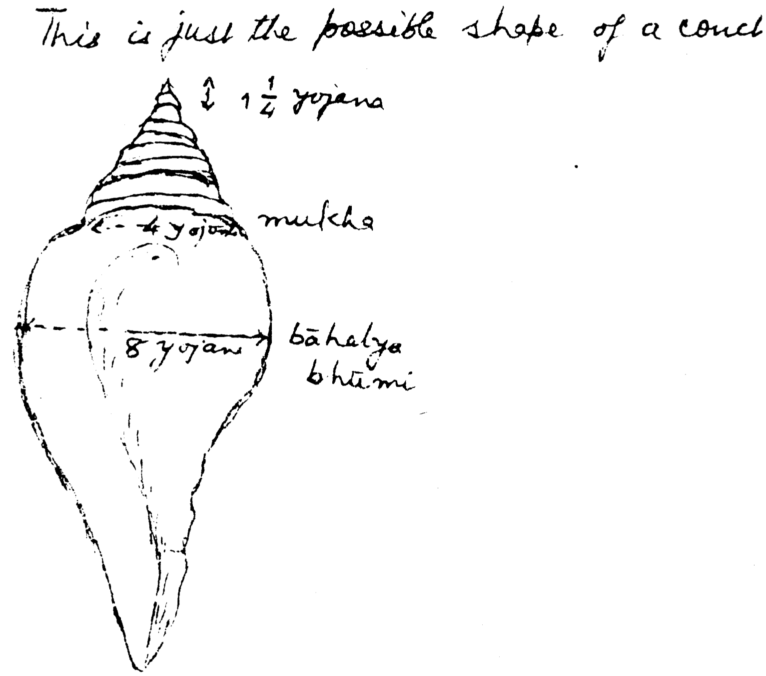


Figure 4.4

At the end of innumerate islands and seas, there is Svayaṁbhūramaṇa sea, in which the maximal volume conch is 12 yojanas long, and its circular mouth is 4 yojanas. That conch is not perfectly drumshaped and in order to do so, its negative projection or injection $\left[\frac{\left(\frac{5}{4}\right)^2}{2}\right]$ should be affected, so that it becomes perfectly drum shaped. Mouth 4 and length 12 are added $(4 + 12 = 16)$, and on halving $(16 \times \frac{1}{2})$, we get 8 yojanas, as the middle width. From the middle of this drumshaped conch two sections are separated out. Out of these two sectiona, one section is used for finding out the volume.

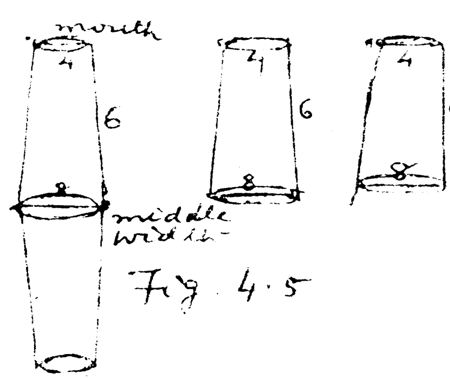


Figure 4.5

On cutting the two sections from the middle, the drum shaped conch has $\left[\frac{[\frac{5}{4}]^2}{2}\right]$ halved for each section as $\left[\frac{[\frac{5}{4}]^2}{1}\right]$. The mouth and base of each section is circular. The diameter of one part is 4 yojanas and base diameter is 8 yojanas. According to verse 17, the mouth diameter 4 yojana and the base diameter 8 yojanas are squared and multiplied by 10, getting $16 \times 10 = 160$ yojanas respectively. The square roots of these two give the circumferences as $12\frac{2}{3}$ and $24\frac{4}{3}$ yojanas respectively, or $12\frac{2}{3}$ and $24\frac{4}{3}$. Here on tearing and expending the extension 8, upto 4, we get the trapezium shaped figure with a top and a base. On the angles, the vedha (vertex) mouth is zero, and on extending it, becomes 4 in the middle. On adding 0 and 4 and dividing by 2, the middle fruit is $4 \times \frac{1}{2} = 2$ yojanas.

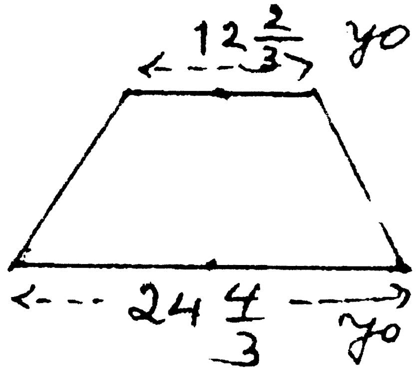
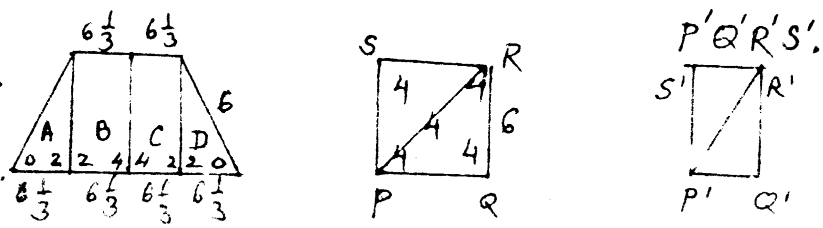


Figure 4.6

for finding out the height of the vertex (vedha), the mouth is divided into two parts, and we get four areas as follows: A,B,C,D. A and D are taken and placed to form a quadilateral The heights of the triangles are 2 yojanas each, and the vertex has mouth zero.

Fig. 4.7



Even if, out of the 2 yojana region placed in the corners P',Q', if one yojana each is taken, and placed in the P'S', still the wanting place is not filled or the height does not become one yojana every where. Hence in order to fill that unfilled wanting place, we should give $[\frac{5}{4}]\ 2 \div 2$, so that the ditch (khāta) is filled up. That is all the four corners, P',Q',R',S' have similar heights of one yojana each.

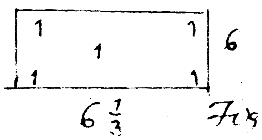


Fig. 4.8

Now the area without areas trangles A and D, form the area P Q R S as shown. On angle P, the area B has mouth height zero, and on adding the base 4, we get (0 + 4) = 4. Similarly on Q, the mouth vedha is 2 and base of C area is 2, on adding give (2 + 2) = 4. On R angle again mouth is zero and base is 4, total gives (4 + 0) = 4. On S angle, B has base 2 and C has mouth 2, tota. 2 + 2) = 4.

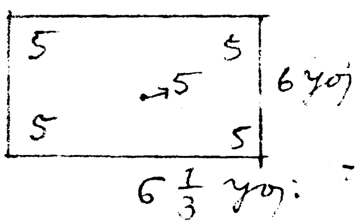


Fig. 4.9

In this way, in the figure PQRS, every where the height (vedha) of 4 yojanas is obtained by placing (B) and (C) regions opposite to each other. Over this region, the above mentioned P'Q'R'S' is placed to obtain the adjoining figure The vedha of the P Q R S was 4 every where and that of P'Q'R'S' was 1, both combined to give the vedha = 4 + 1 = 5. On establishing one region over the other, this is obtained. Out of the side of this region, the side being $6\frac{1}{3}$ yojanas, its one third part is established separate, the remainder region becomes as in the figure 4.10.

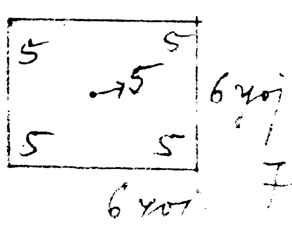


Fig. 4.10

The separated $\frac{1}{3}$rd part is divided into 3 parts, of 2 yojana each and placed again so as to make a figure with side of $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$ yojana, breadth 2 yojanas, and height 5 yojanas.

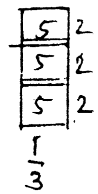


fig.4.11

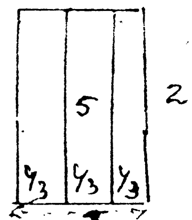


Fig. 4.12

This is then bisected and placed in order to form a square with a side of 2 yojanas each and of height $\frac{5}{2}$ as in figure 4.13. This can again be converted into two pieces with ~~the same~~ square base but haveing now a height of $\frac{5}{4}$ each.

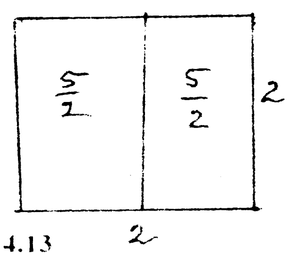


Figure 4.13

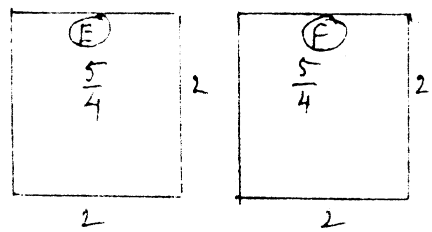


Figure 4.14

These may be called (E) and (F) respectively, out of which the E region $\left[\frac{(\frac{5}{4})^2}{2}\right]$ is equal to the other negative $\left[\frac{(\frac{5}{4})^2}{2}\right]$, hence one region should be given to the second negative.

The part which is without the $\frac{1}{3}$ rd part be taken up now and bisecting its height (vedha) of 5, the two regions so obtained be place side by side as in figure, with a height of 5/2 yojanas, length 6 + 6 = 12, and breadth 6 alone. Out of this the region $\left[\frac{5}{2}\right]$ 6 may again be bisected from the height side and placed above, side by side with figure 4.16, in order to get the breadth as equal to 12, forming a square base, and a height of $\frac{5}{4}$ yojanas.

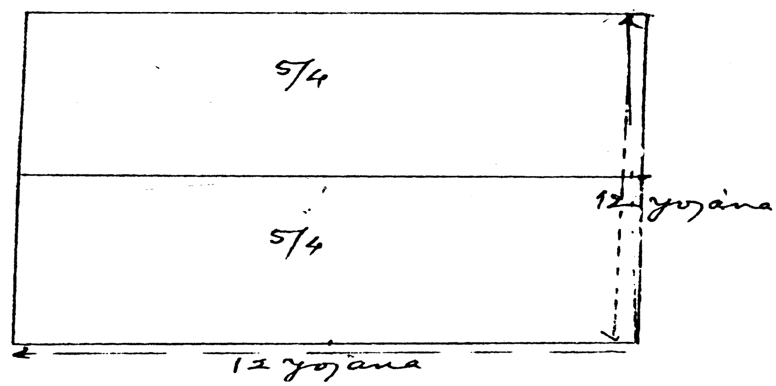


Figure 4.17

This 12 yojanas is the same as the length of the conch. When this side 12 of the square is squared, we get 144 square yojanas. Similarly the square of side of the conch is also $12 \times 12 = 144$ square yojanas. Now the height of the first half negative is $\frac{5}{4}$ and the height of this square island $\frac{5}{4}$. Thus, on looking at the similar height (vedha) of $\frac{5}{4}$, in order to reduce the area of the first half negative area (2×1) or 2 square yojana from the area of the square, it has been instructed in the verse as "muha dala hina", or to reduce half of 4, i.e. 2. Thus on subtracting 2 square yojana from the area of the square, is 144 square yojana, we get $144 - 2 = 142$ square yojanas.

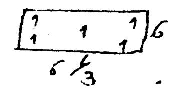
Now regarding the second negative, after giving into it the (E) region, only the (F) region $[\frac{5}{4}]$ 2 is left whose base-area is $2 \times 2 = 4$ square yojanas. 2 The height of this (F) region is and the height of the big square region is also $\frac{5}{4}$, hence looking at the equal height both, we add 4 square yojana to 142, as stated in the verse as, "muhavāsa addha vaggajudā", getting $142 + 4 = 146$ square yojanas. When one drum region has an area of 146 square yojanas, the two regions will have the area givin as "viguṇā" or $146 \times 2 = 292$ square yojanas. On multiplying by height $\frac{5}{4}$, we get the volume as $292 \times \frac{5}{4} = 73 \times 5 = 365$ cubic yojanas. ....(4.28)

Note: 1. The four parts, A, B,C, D are respectively the sections obtained by cutting the frustrem of the cone by vertical planes, at O and N in figure 4.3 . The section A and D are thus obtained. The vertical plane through K gives B and C parts. These form, be deformation, frustrums of pyramids with rectangular bases and tops, and their over lapping of various corner and middle sectioned portions result in cubes or cuboids, which have square or rectangular bases and equal heights.

2. The principle of deformation and congruence or similarity of figures, when overlapping, placing on each other similar parts is adopted, ultimately the duboids are obtained.

3. This method differs from the method adopted by virasenācārya, who adopted the method of exhaustion.

4. In order to make the conch perfectly drum shaped or a frustrum of a cone type, the height $\frac{5}{4}$ yojana, called vedha, is not only associated with the drums area as its height of the cuboid, but also with subtraction of 2 square yojanas from 144 square yojanas and addition of 4 square yojana into the remainder 142 square yojanas. It seems that $[\frac{5}{4}]2$ denotes two pieces removal from lower and upper portions of the conch each standing on a base $[\frac{5}{4}]2$ and $[\frac{5}{4}]2$. Hence from one portion of the upper side we take one into our calculations. Now this one region is required to be negated from $144 \times \frac{5}{4}$ so that we get $(144 \times \frac{5}{4}) - (1 \times 2 \times \frac{5}{4}) = 142 \times \frac{5}{4}$ ultimetaly. Further two already separately placed $1 \times 2 \times \frac{5}{4}$ and $2 \times 2 \times \frac{5}{4}$ are disposed this. The first is used

to fill up the rectangle $6\frac{1}{3} \times 6$ already given, which now becomes 

.

to make the height unity as uniform by adding to the two tetrahedrons on triangular base with 6 and $6\frac{1}{3}$ sides, a coincident diagonal and height 2. This makes the volume approximately coincident with the third part of $6 \times 6\frac{1}{3} \times 1$, which is said to have been filled up by $[\frac{5}{4}]2$ or 5 cubic yojanas.

5. The addition is stated by "muhavāsa addha vaggajudā". Hence 4 of the remaining part $[\frac{5}{4}]2$ is added to 142, getting 146 of similar height $\frac{5}{4}$. Now the symmetric lower part will also have an area of 146 and height $\frac{5}{4}$. Hence the volume is given by

$$146 \times 2 \times \frac{5}{4} = 365 \text{ cubic yojanas.}$$

6. Thus the approximation seems tobe in assuming to filling up the third part of the cuboid $6 \times 6\frac{1}{3} \times 1$ by the $[\frac{5}{4}]2$. O, ABC + O'A' BC volumes are added to + $[\frac{5}{4}]2$ or $+\frac{5}{4} \times 2 \times 2$

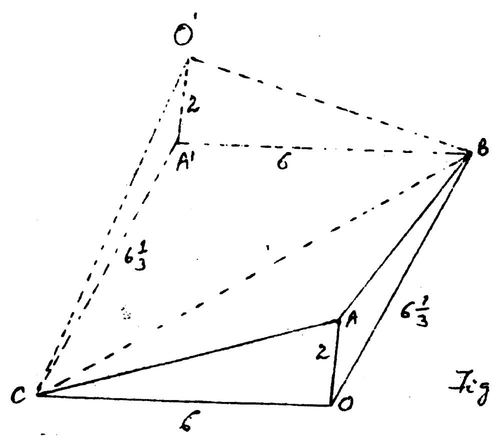


Figure 4.18

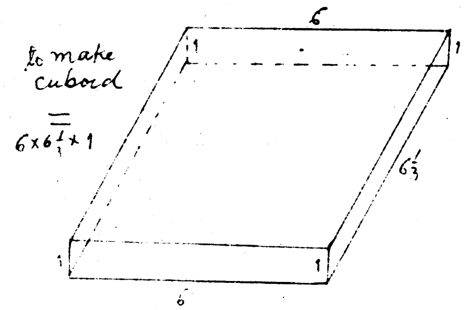


Figure 4.19

(.) Three sensed ant has volume given by the volume of a cuboid

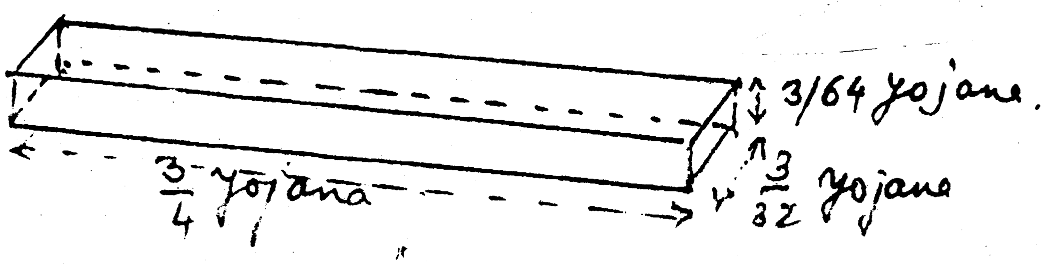


Figure 4.20

Here length $= \frac{3}{4}$ yojana

breadth $= \frac{3}{32}$ yojana

and height $= \frac{3}{64}$ yojana

Hence volume $= \frac{3}{4} \times \frac{3}{32} \times \frac{3}{64} = \frac{27}{8192}$ cubic yojana.

............(4.29)

This is the smallest among the comparability (alpabahutva) of one, two etc. sensed.

Now 1 yojana contains 768000 aṅgula

$\therefore$ 1 cubic yojana contain $(768000)^3$ cubic aṅgula

$\because \frac{27}{8192}$ cubic yojana .... $\frac{27}{8192} \times (768000)^3$ cubic aṅgula

Further 500 vyavahāra aṅgula make one pramāṇa aṅgula

$\therefore$ $(500)^3$ vyahāra cubic aṅgula make $(1)^3$ cubic pramāṇa aṅgula.

$\therefore \frac{27}{8192} \times (768000)^3$ vyahāra cubic aṅgula make $\frac{27}{8192} \times \frac{(768000)^3}{(500)^3}$ cubic pramāṇa aṅgula

$= 27 \times 6144 \times 8 \times 9$ cubic pramāṇāṅgula ......(4.30)

This amount has been shown as numerate cubic pramāṇa aṅgula or 6 ९ ......(4.31)

(and in ancient symbol) or ६ ९

where 6 stands for cubic aṅgula (ghanāṅgula) and ९ stands for numerate.

(.) The four sensed is the big black bee (bhramara) with the shape as shown in the figure, being a rough semi cylinder, bisected at its diameter, with $\frac{1}{2}$ yojana as radius and length 1 yojana and breadth $\frac{3}{4}$ yojana. Thus forming a cuboid of volume $1 \times \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$ cubic yojana. Vide also DVL, book-4.

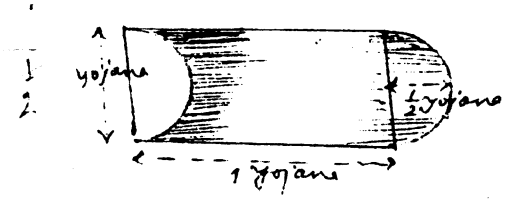


Figure 4.21

The figure as shown here in 4.22, has been assumed in TLS here. The form of a cuboid, with a volume of $\frac{3}{8}$ cubic yojana. This when converted into vyavahāra cubic aṅgula on being multiplied by $6144 \times 65536 \times 9$ as above.

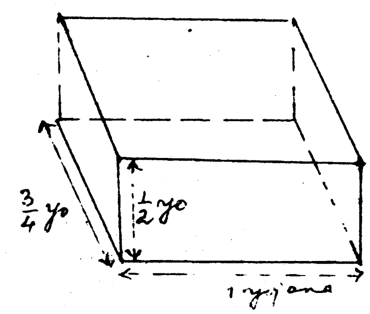


Figure 4.22

This gives $3 \times 6144\ 65536 \times 9$ vyahāra ghanāṅgula. ....(4.32)

As this number is numerate times the preceding it is written as numerate numerate ghanāṅgula, or in ancient symbol as ६ २ २ where ६ or 6 stands for ghanāṅgula.

Actually, $\frac{3}{8} \times \left(\frac{768000}{500}\right)^3 = \frac{3}{8} \times 6144 \times (768)^2$ cubic pramāṇa aṅgula.

Here $\frac{3}{8}$ is $\frac{1024}{9}$ times the $\frac{27}{8192}$,

hence it is $= \frac{27}{8192} \times \frac{1024}{9} \times 6144 \times (768)^2$ ....(4.33)

Here $\frac{1024}{9}$ has been taken as numerate २,

that is why the measure is ६ २ २ ....(4.34)

Now the two sensed volume is २ times this,

hence it is written ६ २ २ २ ....(4.35)

(.) Further the volume of the great fish is again a cuboid's volume given by

length =1000 yojanas, breadth = 250 yojanas and height = 500 yojanas.

Hence its volume = $1000 \times 250 \times 500 = 125000000$ cubic yojanas. ....(4.36)

This on being converted into pramāṇa cubic aṅgula, it is clear that this will be numerate times the preceding and written as ६ ९ ९ ९ ९ ९. ....(4.37)

because the the number of cubic aṅgula in one sensed volume in numerate times that in the two sensed and hence written as ६ ९ ९ ९ ९ ९ and still numerate times is ....(4.38)

the volume of the great fish, that is why it has been written as ६ ९ ९ ९ ९ ९ ......(4.39)

We denote this in modern working symbols, respectively as (F^3) S, $(F)^3$ S S, $(F)^3$ S S S, $(F)^3$ S S S S and $(F)^3$ S S S S S, ...(4.40)

(vv.4.328-330)

The earth, originally, is of two types: 1) The pure earth (śuddha pṛthvī) and 2) The rough earth (khara pṛthvī). The maximal age of the various bios is as follows:

TABLE - 4.2

The pure earth	12000 years
The rough earth	22000 years
The water-bodied	7000 years
The fire-bodied	3 days
The air bodied	3000 years
The vegetable bodied	10000 years
The two sensed bios	12 years
The three sensed bios	49 days
The four sensed bios	6 months
The fish	pūrva koṭi
The sarisṛpa (reptiles)	nava pūrvāṅga
The birds	72000 years
The serpents	42000 years

Note : 1. One pūrvāṅga is equal to 84 lac years

2. One pūrva is equal to 84 lac pūrvāṅga

3. 9 pūrvāṅga is equal to 84 lac × 9 years

4. One pūrva koti is equal to $(84\ lac)^2 \times (10)^7$ or $(84)^2 \times (10)^{10} \times (10)^7$

5. The minimal age of the bios beginning with the pure earth upto all the human and subhuman born in karma land is inter-muhūrta alone.

(v.4.332)

The data for planetary bodies have been stated as follows : As already explained in TPT, Dr. Lishk has found these to be in angular measure, as the inclination of their orbital planes with the plane of ecliptic.

TABLE - 4.3

Ser. No.	Name of heavenly bodies	Height of the heavenly body above Citrā earth
1	stars,	790 yojana above citrā earth
2.	The Sun	790 + 10 = 800 yojana above citrā earth
3.	The Moon	800 + 80 = 880 yojana above citrā earth
4.	The Constellation	880 + 4 = 884 yojana above citrā earth
5.	The Mercury	884 + 4 = 888 yojana above citrā earth
6.	The Venus	888 + 3 = 891 yojana above citrā earth
7.	The Jupiter	891 + 3 = 894 yojana above citrā earth
8.	The Mars	894 + 3 = 897 yojana above citrā earth
9.	The Saturn	897 + 3 = 900 yojana above citrā earth
10.	The remaing 83 planets	888 to 900 yojana above citrā earth

Lishk has discussed this topic on the height of the heavenly bodies in his Jaina Astronomy, pp.71 et seq. According to him, "The height implies a different concept other than the traditional notion of vertical distance above the earth. The very fact has been the root cause for the disillusion about the concept of height of Jyotiskas (astral bodies) above samatala bhūmi (earth having plane surface denoting circular area with centre at the projection of pole of ecliptics. It is exposed that notion of celestial latitude in implied therein." Vide TPT, mathematical contents. He takes 800 yojanas to be 73.7, angular distance between ecliptic and periphery of samtala bhūmi is $73^{\circ}.7$. Radius of samatala bhūmi = $90^{\circ} - 73^{\circ}.7 = 16^{\circ}.3$. Thus 510 yojanas = $47^{\circ} = 47 \times 69^{\circ}.09$ miles and calculates 1 yojana = 6.37 miles. Thus finding 80 yojanas = $7^{\circ}.37$, is the height of the moon above the sun, or the inclination of the lunar orbit with the plane of ecliptic. He gives the following table. Vide ibid. p.77.

TABLE - 4.4

Ser. No.	Planet	Height over sun (yoj.)	Maximum lititude (degrees of arc)	Modern value of Inclination of orbit to the ecliptic		Remarks
				Geocentric degrees of arc	Heliocentric degrees of arc	
1.	Moon	80	$7^{\circ}22'$	$5^{\circ}15'$	$5^{\circ}9'$	T* is
2.	Mercury	88	$8^{\circ}7'$	$2^{\circ}42'$	$7^{\circ}00'$ to $10^{\circ}37 + 6^{\circ}$. T	measured
3.	Venus	91	$8^{\circ}23'$	≈ from $2^{\circ}27'$ to $7^{\circ}0'$	3.23'37" + 3" . 6T	in Julian
4.	Jupiter	94	$8^{\circ}40'$	$1^{\circ}18'$	$1^{\circ}18'$ 31" - 20".5T	centuries
5.	Mars	97	$8^{\circ}56'$	$1^{\circ}51'$	$1^{\circ}51'$ 1"- 2".4T	from
6.	Saturn	100	$9^{\circ}13'$	$2^{\circ}29'$	$2^{\circ}29'$ 33" - 14".1T	1900A.D.

Note: Mutual difference seems more approximate.

(v.4.333)

It is important to note that 83 planets, excepting the 7 planets already mentioned, lie between the planets Mercury and Saturn, may be asteroids. The total planets are 88 and the excluded are the Mercury, the Venus, the Jupiter, the Mars and the Saturn. Remaining 83 are as follows :

TABLE - 4. 5 TABLE OF 83 PLANETS

1	Kāla vikāla	29	Vikaṭa	57	Svyaṁprabha
2	Lohita	30	Abhinna saṅdhi	58	Bhāsura
3	Kanaka	31	ganthi	59	Viraja
4	Kanaka saṁsthana	32	Māna	60	Nirduḥkha
5	Antarada	33	Catuḥpada	61	Vītaśoka
6	Kacayava	34	Vidyujjihvā	62	Sīmaṅkara
7	Dundubhiḥ	35	Nabha	63	Kṣemaṅkara
8	Ratnanibha	36	Sadṛśa	64	Abhayaṅkara
9	Rūpa nirbhāsa	37	Nilaya	65	Vijaya
10	Nīla	38	Kāla	66	Vaijayanta
11	Nīlābhāsa	39	Kāla ketu	67	Jayanta
12	Aśva	40	Anaya	68	Aparājita
13	Aśvasthāna	41	Siṁhāyu	69	Vimala
14	Kośa	42	Vipula	70	Trasta
15	Kaṁsavarṇa	43	Kāla	71	Vijayiṣṇu
16	Kaṁsa	44	Mahākāla	72	Vikasa

17	Śaṅkha parināma	45	Rudra	73	Karikāṣṭa
18	Śaṅkha varṇa	46	Mahārudra	74	Ekajaṭi
19	Udaya	47	Santāna	75	Agnijvāla
20	Pañcavarṇa	48	Sambhava	76	Jalaketu
21	Tila	49	Sarvārthi	77	Ketu
22	Tilapucha	50	Diśā	78	Kṣīrasa
23	Kṣārarāśi	51	Śānti	79	Agha
24	Dhūma	52	Vastūna	80	Śravaṇa
25	Dhūmaketu	53	Niścala	81	Rāhu
26	Eka saṁsthāna	54	Pralambha	82	Mahāgraha
27	Akṣa	55	Nirmantri	83	Bhāvagraha
28	Kalevara	56	Jyotiṣmān		

The Jñāna pradīpikā text* mentions five non-luminary planets for prediction, the Dhūma, the Vyatipāta, the Pariveṣa, the Indradhanu and the Dhvaja. The position for location is, for example when the sun is 2 | 4 | 28 | 1, then

the Dhūma	2 | 4 | 28 | 1 + 4 | 13 | 20	= 6 | 17 | 48 | 1
the vyatipāta or Aṇu	= 12 - 6 | 17 | 48 | 1	= 5 | 12 | 11 | 59
the Priveṣa	= 5 | 12 | 11 | 59 + 6	= 11 | 12 | 11 | 59
the Indradhanu	= 12 - 11 | 12 | 11 | 59	= 0 | 17 | 48 | 1
the Dhvaja	= 0 | 17 | 48 | 1 + 0 | 16 | 40	= 1 | 4 | 28 | 1
the Sun	= 1 | 4 | 28 | 1 + 1	= 2 | 4 | 28 | 1

* Vide Jñāna pradīpikā and Sāmudrika Śāstram, ed. and prans.by Paṇḍita Rāma Vyāsa Pandey, Jain Siddhānta Bhavana Arrah, 1934, vv. 8 and 14 chapter on Ārūḍha Chatraḥ.

Further

Own fields are

The Vyatipāta and the Indradhanu → Simha rāśi

The Dhūma and the Parivesa → Karka rāśi

The orbits of all the heavenly bodies lie in the range of 110 yojanas, from 790 yojanas to 900 yojanas. This is also angular.

(v.4.335)

The minimal interval between a star to another is $\frac{1}{7}$ kośa, and the inter mediate is 50 yojanas where as the maximal interval is 1000 yojanas. They are all semispherical, pacing vertical, with plane on one side and the curved part below.

(vv.4.337-338)

The following table gives the description of diameter and thickness in yojanas of the heavenly bodies:

TABLE - 4.6

Ser. Num.	Name of heavenly bodies	Diameter in yojanas	Thickness in yojanas
1	the Moon	$\frac{56}{61}$ yojana	$\frac{28}{61}$ yojana
2	the Sun	$\frac{48}{61}$ yojana	$\frac{24}{61}$ yojana
3	the Venus	1 kośa	$\frac{1}{2}$ kośa

4	the Jupiter	slightly less a kośa	slightly less than $\frac{1}{2}$ kośa
5	the Mercury	half a kośa	$\frac{1}{4}$ of a kośa
6	the Mars	half a kośa	$\frac{1}{4}$ of a kośa
7	the Saturn	half a kośa	$\frac{1}{4}$ of a kośa
8	the minimal of stars	$\frac{1}{4}$ kośa	$\frac{1}{8}$ kośa
	the intermediate	$\frac{1}{2}$ or $\frac{1}{4}$	
	the maximal	1 kośa	$\frac{1}{2}$ kośa
9	Constellation	1 kośa	$\frac{1}{2}$ kośa
10	the Rāhu	slightly less than a yojana	slightly less than $\frac{1}{2}$ yojana
11	the Ketū	slightly less than a yojana	slightly less than $\frac{1}{2}$ yojana

The above shows that the bodies are hemispherical.

(vv.4.339-340)

The Rāhu and Ketu, have their celestial planes, slightly less than a yojana, in diameter. The celestial plane of Rāhu moves below the celestial plane of the Moon and the Sun, and after 6 month, every time at the end of the parva, i.e., on the full Moon and the new moon (amāvasyā), the Rāhu covers Moon and the Ketu covers the Sun. This is called the eclipse. The distance (vertical interval) between the celestial planes of the Rāhu and ketu below the Moon and the Sun is 4 pramāṇāṅgula.

(v.4.341)

The number of rays of the moon are 12000, and are cool. The number of rays of the sun are also 12000, but they are sharp (hot). The number of rays of Venus are 2500, and they are sharp. The remaining astral deities (bodies) have rays will less illumination.

(v.4.342)

There are sixteen parts of the moon. Day by day, each one of the subsequent part, through its 16 phases, it gets transformed into darkness, till it completely becomes dark. Then one by one white phases appear, till the next 15 days make it fully white.

(v.4.343)

The careers of various celestial planes of the heavenly bodies are given as follows:

TABLE - 4.7

Name of heavenly body	Vehicle of EAST	Vehicle of SOUTH	Vehicle of WEST	Vehicle of NORTH	Total
Moon	Lions 4000	Elephants 4000	Bullocks 4000	Horses 4000	16000
Sun	Lions 4000	Elephants 4000	Bullocks 4000	Horses 4000	16000
Venus	Lions 2000	Elephants 2000	Bullocks 2000	Horses 2000	8000
Jupiter	Lions 2000	Elephants 2000	Bullocks 2000	Horses 2000	8000

Mercury	Lions 2000	Elephants 2000	Bullocks 2000	Horses 2000	8000
Saturn	Lions 2000	Elephants 2000	Bullocks 2000	Horses 2000	8000
Mars	Lions 2000	Elephants 2000	Bullocks 2000	Horses 2000	8000
Constellation	Lions 1000	Elephants 1000	Bullocks 1000	Horses 1000	4000
Stars	Lions 500	Elephants 500	Bullocks 500	Horses 500	2000

(v.4.344)

The motion of the Abhijita constellation is in the north, that of Mūla is in the south, that of Svāti is vertically up, that of Dharaṇī vertically down, and that of Kṛtlikā is in the middle. Such is the state of these five constellations.

(v.4.345)

The astral bodies move around the Sudarśana Meru leaving 1121 yojanas, and in this interval no astral body is found. Leaving the Moon, the Sun, and planets, remaining constellations and stars move always in the same path.

(v.4.346)

There are two Moons and two Suns in the Jambū island, four Moons and four Suns in the Lavaṇa sea, 12 Moons and 12 Suns in the Dhātakī island, 42 Moons and 42 Suns in the Kālodaka sea, and 72 Moons and 72 Suns in the Puṣkaravara island. Thus in the $2\frac{1}{2}$ islands, there are (2 + 4 + 12 + 42 + 72) = 132 Moons and similary 132 Suns. In the figure, without scale, the Suns and the Moons have been shown upto the Dhātaki khaṇḍa.

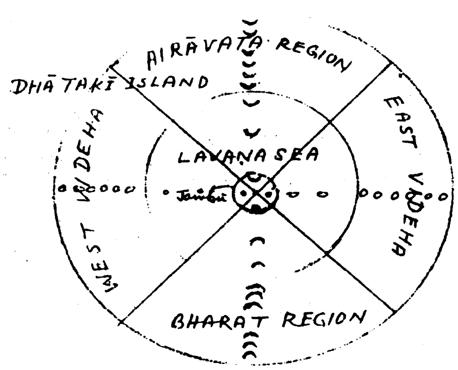


Figure 4.23

(v.4.347)

In the Jambū island the fixed stars are 36, then 139 in Lavaṇa sea, 1010 in Dhātaki khaṇḍa, 41120 in Kālodaka, and 53230 in Puṣkarārdha.

(v.4.348)

Whatever are the astral deities in corresponding islands, half of them move in their own island or move in a part of the sea, and remaining one half in other part. The motion is orbital-ordered.

(v.4.349)

There is the first ring (of the Moon and the Sun) in the outer Puṣkara-half, after moving 50000 yojanas ahead of the Mānuṣottara mountain. After going one lac yojanas ahead of the first ring there are second etc. rings. Similarly from the origin of the altar of islands and seas, going ahead for 50000 yojanas, there is the first ring. After this, one lac yojanas ahead in each case, there are second etc. rings.

(v.4.350)

The Puṣkara-half island is out of the Mānuṣottara mountain. In its first ring, the number of the Moons and Suns is 144 for each case. In the second, third etc., rings, the number goes on increasing by 4, becoming 148, 152, 156, 160, 164, 168, 172, ... In the preceding islands, seas, whatever the initial number of the Moons and the Suns, in the successive islands and seas the number is double in the beginning. For example, in the first ring of the Puṣkara-half island, the numbers of Moons and Suns are 144 and 144. In the initial of the Puṣkara sea, the number of both is 288 and 288. After this in every ring, there is an increase by 4, and 4.

(v.4.351)

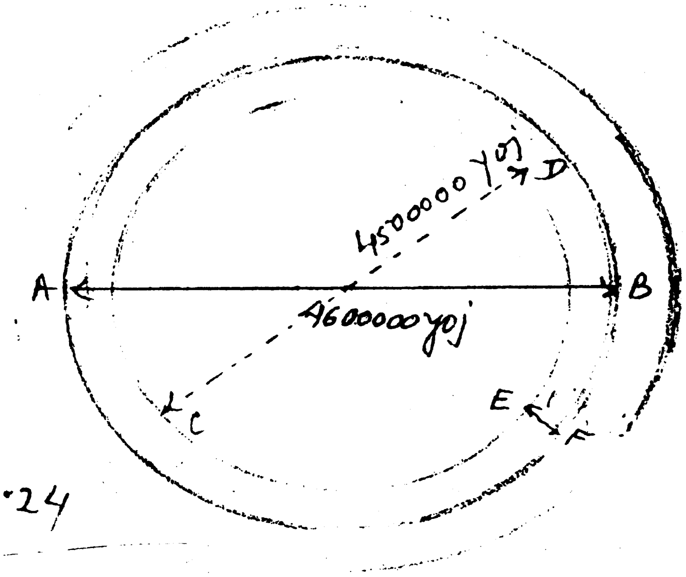
When the fine circumference is divided by the corresponding number of the Suns and Moons situated in the circumference, their own intervals are obtained.

Beginning with the Jambū island. On adding the rings width of the inner islands and seas both the sides, the diameter of 4600000 yojanas of the first ring of outer Puṣkara-half is obtained. For example, the diameter of the Mānuṣottara mountain is 4500000 yojanas, on adding 50000 from both the sides, i.e. in total 1 lac into the above, we get (4500000 + 100000) or

4600000 as the diameter. With the help of the formula. :Vikkhaṁbha vaggadaḥ, the circumference of the 4600000 of diameter is 14546477 yojanas. On dividing this circumference by the given number of the Moon and the Suns, the interval between the Moons and Suns with image is obtained.

Here 14546477 ÷ 144 = 101017yojanas, ...(4.41)

beeing the interval between a Moon with onother Moon and a Sun with another Sun. On reducing this by the diameter of Moon, $\frac{56}{61}$ yojana, and diameter of Sun, $\frac{48}{61}$ yojana, the interval without image's diameter are obtained as $101016\frac{2489}{8784}$ for the Moons and $101016\frac{3641}{8784}$ yojana for the Suns.



4·24

In terval between the Sun and Sun, or the Moon and Moon

$$= \frac{\text{Own line circumference}}{\text{measure of number of Moons or Suns}}$$ ....(4.41)

AB is the diameter of the first ring of Puṣkara-half, which is 4600000 yojanas. Here CD is the diameter 4500000 yojanas of the Mānuṣottara mountain. Thus, the width EF of both sides is 50000 yojanas.

The diameter of the first ring of Puṣkara-half is 4600000 yojanas. Hence its fine circumference = $[(4600000)^2 \times 10]^{1/2}$ ....(4.42)

This is found to be 14546477 yojanas. On dividing by 144 we get $101017\frac{29}{144}$. This is the interval for each with their image measures.

The interval with out Moon's image is $101017\frac{29}{144} - \frac{56}{61} = 101016 + \frac{2461}{8784}$ ......(4.43)

Sing that without Sun's image is $101017\frac{29}{144} - \frac{48}{61} = 101016 + \frac{3641}{8784}$ ....(4.44)

It may be noted that the second ring contain 148, and subsequent rings contain 152, 156, ...etc. for Moons and Suns, thus in the beginning ring of Puṣkara sea, the number is 288.

(vv.4.358-360)

In the following verses, discriptions of number of terms etc. are given in order to find out the number of Moons etc., from the relations between measures of innumerate islands and seas and the placing of Moons and Suns in them.

INTRODUCTION:

In these verses it has been proved that the total number of astral bodies (bimba) is

$$\frac{(\text{universe line})^2}{(256)^2(\text{figure})^2} \text{ or } \frac{\text{Jagapratara}}{(256)^2(\text{aṅgulapratara})^2} \text{ or } \frac{\text{Jagapratara}}{(256)^2(\text{prstarāṅgula})^2}$$

which in symbols set up by us is $\frac{L^2}{(256)^2(F)^2}$ ....(4.45)

In order to calculate this, approximations have been adopted at some places, in order to express the expressions in brief.

The following process has been adopted:

[A] The number of Moons etc. is found first from Jambū island upto Puṣkara-half. Then the number of these is found for islands and seas beyond the Mānuṣottara mountain. In this process the number of Moons in the Puṣkara island has been found out through two methods as the formulas change at two places.

[B] Similarly, after the Puṣkara island, the method for finding out the measure of Moons has a separate process. For that purpose, the number of islands and seas has been determined from the logarithms of universe line (jagaśreṇī). Leaving aside the calculation of astral bodies in the first five islands, in order to calculate the remaining number of astral bodies, the method of summation by geometrical progression has been adopted looking at the respective order of increase in astral bodies. Out of these one is in form of positive summation dhana-saṁkalana) and the other is in form of negative summation (ṛṇa saṁkalana). In this amount, that obtained from [A] is added to get some quantity.

[C] The sum of, [A] and [B] is used to find out the total no of the Moon's images, Sun's images, planets constellations, and stars, of the Moon's family. Thus, amoınt is approximately

$$\frac{L^2}{(256)^2(F)^2} \quad \text{or} \quad \overset{=}{\text{४ । ६५}} = \qquad \text{..........(4.46)}$$

where ४ denotes $(F)^2$ and ६५ = is $(256)^2$.

[D] The diameter of Jambū island is 100000 yojana. The ring diameter of the Lavaṇa sea is now inform of ring-width which is 200000 yojanas. Similarly, the subsequent islands and seas, alternately are each double the preceding in their widths of the rings. In form of units, they may be denoted by 1, 2, 4, 8, ~~16~~ etc. In the family of one Moon there are 1 Sun, 88 planets, 28 constellations and 66975 $(10)^{14}$ stars.

there are 2 Moons in Jambū island, 4 Moons in Lavaṇa sea, 12 Moons in Dhātaki khaṇḍa, 42 Moons in kālodaka sea, and in Puṣkara-half island upto this side of the Mānuṣottara mountain the number is 72. Beyond the Mānuṣottara, in the first row there are 144 moons. The first row beyond the Mānuṣottara in the island is 50000 yojanas aheacl where the number of Moons is 144. Beyond that, one lac yojanas ahead each time, there are 7 rows or rings, where, the measure of Moons is in arithmetical progression with first term as 144 and common difference 4. Thus, the number of Moons upto Puṣkarārdha is 2 + 4 + 12 + 42 + 72 = 132.

Beyond the Mānuṣottara mountain (which is said to be inaccessible for human beings to be crossed over), for finding out the set of Moons, there are 8 rings, i.e. the number of terms (gaccha) is 8, common difference (pracaya) is 4 and the first term (mukha) is 144.

Thus, the sum (saṁkalana)

$$\text{gaccha}\{\text{mukha} + \frac{(\text{gaccha}-1)}{2} \times \text{pracaya}\} \qquad ....(4.47)$$

$$= 8\{144 + \frac{(8-1)}{2} \times 4\} = 1264 \qquad ....(4.48)$$

Thus, the total number of Moons upto Puṣkara island = 132 + 1264 = 1396 ....(4.49)

[E] In this way, the number of Moons will be determind for the seas and islands beyond, after leaving the first three islands (Jambū, Dhātaki and Puṣkara) and two seas (the Lavaṇa and the kālodadhi).

Here we begin with Puṣkaravara sea, where there are located 32 rings, each 1 lac yojanas ahead of the preceding. This 32 is the number of terms (gaccha). The first ring consists of 288 Moons. This 288 is called the first term (ādi, mukha, or guṇyamāna rāśi). Here common difference is 4. In this sea the number by $\frac{32}{2}\{2 \times 288 + (32-1)4\}$ ....(4.51)

by applying $S = \frac{n}{2}[2a + (n-1)d\}$.

$= (64 \times 176) - 64$

In the subsequent Vāruṇivara island the total number of Moons

$$= \frac{64}{2}\{2^2 \times 288 + (64-1) \times 4\}$$

$$= (64 \times 176 \times 4) - 64 \times 2 \qquad ....(4.52)$$

In order to find the total number of Moons in Vāruṇivara sea,

$$\text{Sum} = \frac{128}{2}[2 \times 288 + (128 - 1) \times 4]$$

$$64 \times 176 \times (4)^2 - 64 \times (2)^2 \qquad \text{.........(4.53)}$$

Similarly in the subsequent island the number of total Moons

$$64 \times 176 \times (4)^3 - 64 \times (2) \qquad \text{.........(4.54)}$$

This process of calculation is to be carried for innumerate islands and seas. The above grand summation will require formula for summing up a geometrical progression.

[F] Now, help is taken of the calculation of $\log_2$ (rāju) for finding out the total number of all islands and seas, because one rāju is the diameter of the middle universe, in which the earth is upto the Svayaṁbhūramaṇa sea (or else, according to some preceptors, existent beyond it).

CALCULATION REGARDING $\log_2$ (Rāju) : Let the number of all islands and seas be n. Every see falls on the even integer and that of island falls on the odd integer. If the last sea be taken to be Svayaṁbhūramaṇa, its number will be n or 2 m integer. In this way, the order of the Svayaṁbhūramaṇa island will be $n-1$ or $2m-1$.

For finding out the measure of a rāju, it is known that

"dvir dvir viskaṁbhoḥ pūrva pūrva parikṣepaṇa valayākṛtyaḥ || ".

Hence the measure of rūju in lacs of yojanas (reqarding the Svayaṁbhu sea as the ultimate) will be as follows:

$$1+2\,[2 + 2^2 + 2^3 + \ldots\ldots + 2^{2m-1}] \text{ lac yojanas.} \qquad \text{..........(4.55)}$$

because the 2m th sea has width 2^{2m-1}

The sum of the above series is $2^{m-1} - 3$ ....(4.56)

In this way, the measure of rāju according to first school is $2^{2m-1} - 3$ lac yojanas. When its logarithm are taken out, we are not only required to find $\log_2$ of this number, but also the number of space points in a lac yojanas. In taxts it has been determined upto sūcyaṅgula. It is evident that the first bisection point falls on the central point of Jambū island from where the distance of the outer altar of the Svayaṁbhūramaṇa sea is

$$\frac{1}{2} + [2 + 2^2 + 2^3 + ...+2^{2m-1}] = 2^{2m} - \frac{3}{2} \text{ lac yojana.} \qquad ....(4.57)$$

The logarithm of this distance to the base two or the further bisection point falls out of the Svayaṁbhūramaṇa island or in the sea, because the distance from the centre to the outer circumference of Svayaṁbhūramaṇa island is

$$\frac{1}{2} + [2 + 2^2 + 2^3 + ...+2^{2m-2}] \text{ lac yojanas}$$

$$\text{or} \quad 2^{2m-1} - \frac{3}{2} \text{ lac yojana.} \qquad ....(4.58)$$

On finding bisection of (4.57), we get

$$2^{2m-1} - \frac{3}{4} \text{ lac yojanas.} \qquad ....(4.59)$$

Also

$$2^{2m-1} - \frac{3}{4} > 2^{2m-1} - \frac{3}{2} . \qquad ....(4.60)$$

Hence the second $\log_2$ or bisection of rāju will be in Svayaṁbhūramaṇa sea.

Similarly the third bisection (ardhaceheda) of rāju will fall on Svayaṁbhūramaṇa island, because the distance of the outer circumference from preceding sea centre, or the distance from centre to internal circumference of Svayaṁbhūramaṇa island is

$$\frac{1}{2} + [2 + 2^2 + 2^3 + ...+2^{2m-3}] = 2^{2m-2} - \frac{3}{2} \text{ lac yojanas.} \qquad ....(4.61)$$

The half of the distance in (4.59) is

$$2^{2m-2} - \frac{3}{2^2} \qquad \text{............(4.62)}$$

Also

$$2^{2m-2} - \frac{3}{2^3} > 2^{2m-2} - \frac{3}{2} \qquad \text{............(4.63)}$$

Hence, the third bisection point of rāju falls in **Svayaṁbhūramaṇa island.**

Similarly, it is evident that

$$2^{2m-3} - \frac{3}{2^4} > 2^{2m-3} - \frac{3}{2},$$

$$2^{2m-4} - \frac{3}{2^5} > 2^{2m-4} - \frac{3}{2},$$

....

....

$$2^{2m-(x-1)} - \frac{3}{2^x} > 2^{2m-(x-1)} - \frac{3}{2}. \qquad \text{.........(4.64)}$$

Here x denotes the bisection sequential order of the rāju. If calculation be made taking into consideration of Svayaṁbhūramaṇa sea, then the order of Lavaṇa sea will be (2m-1)th. But as the first bisection point falls on Jambū island, not taking it into account, the order of Lavaṇa sea is (2m-1), and on taking it into account the order of the bisection point happens to be 2mth. Thus putting the value of x in (4.64), as 2m, weget,

$$2^{2m-(2m-1)} - \frac{3}{2^{2m}} > 2^{2m-(2m-1)} - \frac{3}{2}$$

or $2^1 - \frac{3}{2^{2m}} > 2^{2m} (\times 1) - \frac{3}{2}$ ....(4.65)

This 2mth bisection point falls in Lavaṇa sea which is clear from (4.65). This bisection point falls ($\frac{1}{2} + \frac{3}{2^{2m}}$) lac yōjanas inside from the outer boundary of Lavaṇa sea, which may be approximately said to be "50000" yojanas inside.

After this, on finding (2m+1)th bisection of rāju, we get $1 - \frac{3}{2^{2m+1}}$ lac yojanas, which is greater than $\frac{1}{2}$ lac yojanas or greater than half diameter of Jambū island.

In this way, this bisection point, (2m+1)th as it is, falls on the Lavaṇa sea. It is clear from this analysis that in the Lavaṇa sea, the 2mth and (2m+1)th bisection point falls, or in the Lavaṇa sea, two bisection points fall. This second bisection point lies $\{1 + \frac{1}{2} + \frac{3}{2^{2m+1}}\}$ lac yojanas inside from the outer boundary of Lavaṇa sea. This may be said to be $1\frac{1}{2}$ lac yojanas inside, because in comparison of $1\frac{1}{2}$ lac yojanas, $\frac{3}{2^{2m+1}}$ lac yojana is trivial, as 2m is an innumerate quantity. Thus, after getting 2m + 1 bisections of rāju, there remain $1 - \frac{3}{2^{2m+1}}$ lac yojana.

Out of the above two bisection points, one is said to be counted as that of Lavaṇa sea and the other as of Jambū island. That on the meru is counted as the first. Thus, five bisection point of five islands and one at meru sum up to six, whose reckoning is not taken into consideration for finding out the number of Moons of islands and seas.

On bisecting continually, the rāju, when 2 lac yojana is bisected, then 17 bisections (ardhacchada) or ($\log_2$) are obtained, and one yojana remains. This is just a rough statement as 2^{17} is 131072. One yojana contains 768000 pramāṇāṅgula, whose number of ($\log_2$) is 19, and

1 sūcyangula is obtained as remainder. This statement is also approximate as 2 = 5242288. It has been indicated in v.4.557. commentary, to carry on finding out $\log_2$ (F), till one point is obtained, denoted by the symbol.

The symbol for $\log_2$ P is given as छे or che, and the square of ($\log_2$ P), or $(\log_2 P)^2$ is the same as $\log_2$ (F). Thus, the bisection points count as one at meru, 17 of one lac yojanas, and 19 of aṅgula, totalling to numerate $\log_2$, whose symbol is २ or S. Thus, the $\log_2$ F + S is denoted as

छे छे २ or $(\log_2 P)^2 + S$.

Now

$$F = [P]^{\log 2 P} \quad \text{...........(4.66)}$$

As per definition

$$[(F)^3]^{P/A} = L = 7 \text{ rāju} \quad \text{...........(4.67)}$$

or $$[\{(p)^{\log P}\}^3]^{P/A} = L = 7 \text{ rāju} \quad \text{...........(4.68)}$$

Taking log arithm both sides,

$$3 \frac{P}{A} \cdot [\log_2 (P)]^2 = \log_2 L \quad \text{...........(4.69)}$$

This has been symbolized as ३ छे छे छे, where a is also written as ७ .
a

As L is same as 7 rāju, there fore

$\log_2 L = \log_2 \text{rāju} + \log_2 7,$

or $\log_2 \text{rāju} = \log_2 L - 3$ approximately, if 2^3 is taken as 7.

or $\log_2$ rāju = ३ छे छे छे रिण ३
a

When the set to be reduced is subtracted through rule of three from the $\log_2$ (R), the number of islands, seas is obtained. This set is 17 + 19 + 1 + छे छे or 17 + 19 + 1 + $\log_2 P \log_2 P$, which is obtained on finding $\log_2$ of yojana etc. of Jambū island. When this is subtracted from the above mentioned $\log_2$ (rāju), the number of islands and seas is obtained as

$$\frac{3\log_2 P \log_2 P \operatorname{Log}_2}{A} - 3 - 17 - 19 - 1 - 1 - \log_2 P \log_2 P \qquad \text{...........(4.70)}$$

There are 5 $\log_2$ and 1 $\log_2$ of five islands, seas and meru respectively, to talling to 6 $\log_2$. Thus, the measure of the gaccha or number of terms for finding out the number of Moons, beyond five island and seas, is

$$= \log_2 (\text{rāju}) - [\log_2 (\text{Jambū island}) + 6], \text{ where Jambū island is 100000 yojanas.}$$

$$= \frac{3\log_2 P \log_2 P \operatorname{Log}_2}{A} - 3 - 17 - 19 - \log P \log P - 6$$

$$= \frac{3\log_2 P \log_2 P \operatorname{Log}_2}{A} (\log_2 P - \frac{P}{A}) - 3 - 17 - 19 - 6 \qquad \text{.........(4.71)}$$

CALCULATION FOR FINDING TOTAL NUMBER OF ASTRAL BODIES

The number of Moons in the first five islands seas, according [D] is 1396 ....(i)

In order to find out the Moons of the remaining islands and seas, the measure of number of term as per (4.71) is

३ छे छे (छे $\frac{a}{३}$) − ३ − १७ − १९ − ६

$$\text{or} \quad \frac{3\log_2 P \log_2 P}{A} (\log_2 P - \frac{A}{3}) - 3 - 17 - 19 - 6 \qquad \text{..........(4.72)}$$

For finding the sum, the geometrical progression is similar to [E], where first term is 64 × 176 and common difference is 4.

$$\text{The sum} = a\frac{(r^n - 1)}{r - 1} = \frac{\text{mukha}(\{\text{pracaya}\}-1)}{\text{pracaya}-1}$$

$$= (64 \times 176)\ \frac{[4]^{\frac{3}{A}\log_2 P \log_2 P(\log_2 p - \frac{A}{3}) - 3 - 17 - 19 - 6} - 1}{4-1} \qquad \text{...........(4.73)}$$

$$= 64 \times 176\ \frac{2^{\frac{3}{A}\log_2 p \log_2 P \log_2 P} \cdot 2^{\frac{3}{A}\log_2 \log_2 \log_2} - 1}{(2^3)^2 . (2^{17})^2 . (2^{19})^2 . (2^6)^2 (2 \log_2 P \ \log_2 P) \times 3}$$

$$= 64 \times 176\ \frac{(L)(L)-1}{(7)^2(100000)^2(768000)^2(64)^2(\text{aṅgula})^2(3)}$$

$$\frac{(L^2-1)(64)(176)}{(F)^2(768000)^2(100000)^2(64)^2(7)^2(3)} \qquad \text{.........(4.74)}$$

In the commentary the above has been shown as

$$\frac{L^2 \times 11}{(F)^2 \times (65536) \times (5292)(10)^{16}} \qquad \text{............(ii)}$$

Further, for negative of summation, the geometric progression in [E], has the same number of terms, the first term is 64, common ratio is 2, hence the measure of number of Moons here is

$$= \frac{[2]^{\frac{3}{A}\log_2 P \log_2 P(\log_2 p - \frac{A}{3}) - 3 \ 17 - 19 - 6} - 1}{2-1}$$

$$\frac{(L-1)}{(F)(768000)(100000)(64)(7)(1)} \qquad \text{............(iii)}$$

From the above it is evident that (iii) - (i) measures about (श or S) F × L ....(iv)

Thus the total number of Moons

= (ii) – (iv) , which will be as follows

$$\frac{(L^2 \times 11) - S\,F\,(L)\,(F^2)\,(65536) \times 5292\,(10)^{16}}{(F)^2\,(65536)\,(5292)\,(10)^{11}}$$

$$\text{or} \quad \frac{(\text{a bit less than } L^2)\,(F)\,(S)\,(11)}{(F)^2 \times (65536) \times (5292)\,(10)^{16}}$$

$$\text{or} \quad \frac{(\text{a bit less than } L^2)\,(F)\,(S)\,(11)}{(256\,F)^2\,(5292)\,(10)^{16}} \quad \text{..............(V)}$$

Now the whole Moon's family along with the Moons, is, total number of all astral bodis is to be calculated, about which it is known that (V) is to be established at five places and to be multiplied as follows:

The first set is multiplied by 1 getting number of all Moons.

The second set is multiplied by 1 getting number of all suns

The third set is multiplied by 88 getting number of all planets

The fourth set is multiplied by 28 getting number of all constellations

The fifth set is multiplied by $66975\ (10)^{14}$ .... Stars.

In the commentary it is written that in (v), the above product is performed to get the sum-set of all products-sets, and the approximate sum is

$$\frac{L^2\,[73625] \times (10)^{10} + 1298}{(F)^2 \times (65536) \times (5292)\,(10)^{16}} \quad \text{...........(4.75)}$$

which approximate to $\frac{L^2}{(256\,F^2)}$

In ancient symbols it is written as

$$\overset{=}{\text{४ । ६४ =}} \quad \text{...........(4.76)}$$

FORTHER ELABORATION OF VERSES

(v.4.352)

The diameter of the middle universe is a rāju. On bisecting it the first bisection point fall on centre of meru. In this way, the distance from the meru centre to last boundary of the last sea is $\frac{1}{2}$ rāju.

meru cantre — inner altar of Svayaṁbhūramaṇa sea — half rāju — altar of Svayaṁbhūramaṇa sea

M_0 J_{2m-2} J_{2m-1} J_{2m} **Figure 4.25**

The half of half of the rāju, falls 75000 yojanas ahead of the inner boundary of the Svayaṁbhūramaṇa sea. In the figure 4.25, the first bisection point is denoted by Mo, second bisection point is M_1, the third is M_2, and so on. Similarly, J_1 represents the boundary point of Jambū island, the J_2 represents the boundary point of Lavaṇa sea, J_3 that of the Dhātakī island, and so on. If the number order of Svyaṁbhūramaṇa sea is 2m, then its boundary point may be denoted by J2m, as shown in the figure.

In the figure Jo and Mo are the same point. Jo is the centre of Jambū island. Jo J2m measures $\frac{1}{2}$ rāju.

According to the formula

"dvir dvir viskaṁbhaḥ pūrva pūrva parikṣepiṇo valayākṛtayaḥ,

The measure of a rāju is

$= 1 + 2 [2 + 2^2 + 2^3 + ...2^{2m-1}]$ lac yojana

$= (2^{2m+1} - 3)$ lac yojana ....(4.77)

The reason is that the width of the ring Svayaṁbhūramaṇa sea is J_{2m-1} J_{2m} or 2^{2m-1} lac yojana. The distance from the Jambū centre up to the outer boundary point of

Svayaṁbhū will be $\frac{1}{2}$ rāju, given by

$$= \frac{1}{2} + [2 + 2^2 + 2^3 + \ldots\ldots + 2^{2m-1}] \text{ lac yojana}$$

$$= 2^{2m} - \frac{3}{2} \text{ lac yojana} \qquad \ldots\ldots\ldots\ldots(4.78)$$

Half of Half rāju, point falls on M_1, where Mo M_1 = $M_1 J_{2m}$

Jo	J_{2m-2}	J_{2m-1}	J_{2m}
Mo	M_2	M_1	
	75000 + 37500 yojanas	75000 yojanas	

Figure 4.26

It is evident that $\frac{1}{4}$ rāju is equal to $2^{2m-1} - \frac{3}{4}$ lac yojana when the distance from J_{2m-1} to J_{2m} is equal to 2^{2m-1} lac yojana.

Hence distance of J_{2m-1} M is $\frac{3}{4}$ lac yojana or 75000 yojanas. Thus, $(J_{2m-1} \; J_{2m})$ -

$$(M_1 J_{2m}) = 2^{2m-1} - (2^{2m-1} - \frac{3}{4}) \text{ lac yojana}$$

$$= \frac{3}{4} \text{ lac yojana} = 75000 \text{ yojanas.}$$

Here, J_{2m-1} is the point on the outer boundary of Svayaṁbhūramaṇa island. Again on halving the $\frac{1}{4}$ rāju, the bisection point falls on M_2. Thus, we have

$\frac{1}{8}$ rāju = $M_0 M_2 = M_2 M_1 = 2^{2m-2} - \frac{3}{8}$ lac yojanas. ....(4.79)

Here J_{2m-2} is the point lying one the Svayaṁbhūramaṇa island boundary which is internal. Hence the destance between J_{2m-2} and the bisection point M_2 is given by ,

$$J_{2m-2} M_2 = J_{2m-2} M_1 - M_2 M_1 = (2^{2m-2} + \frac{3}{4}) - (2^{2m-2} - \frac{3}{8}) \text{ lac yojanas}$$

$$= \frac{3}{4} + \frac{3}{8} \text{ lac yojana} = 112500 \text{ yojana.} \quad ....(4.80)$$

Through this method the logarithms of rāju are to be found out beyond the external and inside the internal boundaries of islands and Seas.

(v.4.354)

The description of this has been given in earlier verse, i.e., the third bisection point of rāju is beyond the internal boundary of Svayaṁbhūramaṇa island by 112500 yojanas. For further bisection points, the following verse is described

(v.4.355)

On taking out the bisection fourth point of rāju, we get the $\frac{1}{16}$ rāju = $M_0 M_3 = M_3 M_2 =$

$2^{2m-3} - \frac{3}{16}$ lac yojana . ...(4.81)

Here, J_{2m-3} will be the point on the internal boundary of Ahīndravara sea, and J_{2m-3} will be at a distance from M_3 bisection point as given by

$$J_{2m-3} M_3 = J_{2m-3} M_2 - M_3 M_3 = (2^{2m-3} + \frac{3}{4} + \frac{3}{8}) - (2^{2m-3} - \frac{3}{4}) \text{ lac yojana}$$

$$= 131250 \text{ yojanas} \quad ....(4.82)$$

(v.4.356)

It is evident from the above method that the fifth bisection point of rāju, with be at a distance of 75000 + $\frac{75000}{2}$ + $\frac{75000}{4}$ + $\frac{75000}{8}$ or 140625 yojana distant from J_{2m-4} the point at the boundary internal altar of J_{2m-4}. The sixth bisection point will be seen at a distance of 75000 + $\frac{75000}{2}$ + $\frac{75000}{4}$ + $\frac{75000}{8}$ + $\frac{75000}{16}$ yojanas beyond J_{2m-4}. This will go on, getting $\log_2$ (75000), and till 1 yojana remains, i.e. till 17 bisections points are obtained. Here the first bisection point, falling on Jambū centre has been left. This one yojana so left, has 768000 aṅgula. This number gives $\log_2$ (768000) = 19, till one aṅgula remains. Here, 17 + 19 = 36 is numerate. ९ or S. Now the $\log_2$ of aṅgula pradeṣa (point) is calculated, till one space-point is left. Thus, on adding the numerate bisection points and those of sūcyaṅgula, the excess of one pradeṣa is expressed as, " saṁkhejja rūva saṁjuda". The same may be छे छे ९ or S + $\log_2$ F or S + $\log_2$ P $\log_2$ P.

(v.4.357)

After the above process, at the end, the bisection point falls 150000 yojanas beyond the internal boundary, and to obtain it, the following formula is used

$$\text{Sum or the guṇakāra saṁkalana} = \frac{\text{antadhana} \times \text{guṇakāra - ādi}}{\text{guṇakāra -1}}$$

or $a\frac{a(r^n-1)}{r-1}$, when the series is a, ar, ar^2, ...l, ar^{n-1}. Here, first-term is 1 pradeśa, last amount is 75000 yojanas, common ratio (guṇakāra) is 2. Hence the sum is

$$\frac{75000 \times 2 - 1}{2 - 1} = 150000 - 1 \text{ where 150000 is yojana, 1 is pradeṣa.}$$

The symbolism for the logarithmic process is

75000 $\frac{75000}{2}$ $\frac{75000}{2-2}$ .....सू, $\frac{\text{सू}}{२}$ $\frac{\text{सू}}{२२}$ ......4/2/1.

or 75000 $\frac{75000}{2}$ $\frac{75000}{2-2}$, F, $\frac{F}{2}$, $\frac{F}{2^2}$, ...4/2/1, ...(4.83)

In ancient symbolism, 2 represents the sūcyaṅgula as a numerical symbol (aṅka saṁdṛṣṭi). The equation (4.83) is in artha saṁdṛṣṭi or norm symbolism, where as the following is in aṅka saṁdṛṣṭi

64 | 32 | 16 | 8 | 4 | 2 | 1 ....(4.84)

(v.4.358)

In the Lavaṇa sea two bisection points of rāju fall. The reason is that as the rṇju is subjected to continuous dichotomies, when $\log_2$ (2 lacs) is determined then after 17 processes of bisection 1 yojana remains. 1 yojana = 768000 aṅgula, whose 19 processes of bisection yield 1 aṇgula. Again the first bisection point of rāju fall in meru centre. Thus, there are numerate bisection points as 17 + 19 + 1. The 1 aṅgula so left is sūcyaṅgula, hence the $\log_2$ (sūcyaṅgula) is $\log_2 F$ or $\log_2 P \log_2 P$.

Now the $\log_2$ (100000 yojanas) has the value $\log_2$ F + S or $\log_2 P$ $\log_2 P$ + S, written as २
छे छे

From the above $\log_2$, "apanayana trairāśika" mathod, on subtraction, the number of islands and seas is obtained, which is as follows:

$$\log_2 (\text{rāju}) = \log_2 \left(\frac{L}{7}\right) = \log_2 L - \log_2 7 = \log_2 L - 3 \text{ (approximately)}$$

$$= \frac{\log_2 P}{A} . 3.(\log_2 F) - 3$$

$$= \frac{\log_2 P}{A} .3. (\log_2 P)^2 - 3, \text{ which has} \qquad \text{............(4.85)}$$

been put in ancient form is

or छे/a . ३. छे छे - ३   ३ [छे/a छे छे - १]

छे/७   छे   छे   ३.   ....(4.86)

Explanation of two bisection points falling in Lavaṇa sea is given as follows, from the figure

inner shore of Lavaṇa sea, outer shore of Lavaṇa sea.

outer shore of Jambū island

J_0 J_1 J_2 outer shore of

M_0 M''   M'

50000 + 150000 yojana

Figure 4.27

Paṇḍita Toḍaramala expresses in his commentary that 2 bisection points of Lavaṇa sea may be counted as one, and as we have already mentioned his opinion that due to 1 lac yojana as sum of 50000 of Jambū and 50000 more, gives the explanation that it may be counted asone.

Thus, set of bisection points and one at the meru make six, but as 5 and meru point bisection set is not useful in giving the number of astral bodies, hence it is not include, and subtracted later on.

(v.4.359)

Now we know

$$L = [(F)^3]^{\log_2 P \div A}$$

$$\therefore \quad \log_2 L = \{ \log_2 P \div A\} [3 (\log_2 P)^2]$$

$$\therefore \quad \log_2 \text{rāju} = \log_2 (\frac{L}{7}) = \log_2 L - \log_2 7 = \{\log_2 P \div A\} \{3. (\log_2 P)^2 \} -3 \text{ app...}(4.87)$$

The number of terms is gaccha given by

$= \log_2 (\text{rāju}) - [\log_2 (100000 \text{ yojanas}) + 6]$

$= \frac{\log_2 P}{A} \log_2 P \log_2 P \ 3 - 3 - [(\log_2 P \log_2 P + १) + 6]$ (4.88) A

or छे छे छे ३ - ३ - [(छे छे + १) + ६] (4.88) B

This has been written as

(छे/a रिण १/३) (छे छे × ३) रिण छे छे १ ....(4.88) C

The १ above छे on right side expresses that it is in excess.

(v.4.360)

The geometrical progression is the negative set here and the arithmetical progression is the positive set. For arithmetical progression, the terms are

gaccha = pada = stations sthāna measure = number of terms – n

ādi = prabhava = mukha = first station term in gaccha = first term = a

pracaya = sthāna sthāna prativrddhi = common difference = d

ādidhana = all station terms without common differences = na

uttara dhana = all common difference sum $(\frac{n-1}{2} \cdot d)n$

saṅkala yoga = ādidhana + uttara dhana = ubhayadhana

$$na + (\frac{n-1}{2} \cdot d)\, n. = \frac{n}{2}[2a + (n-1)d] \quad ....(4.89)$$

The geometrical progression has already been discussed.

Now for finding out the astral bodies, first term is $(4)^3 \times 176$, which is the sum of ādi dhana and uttar dhana. The common difference is the four times increasing sum with respect to subsequent island or sea. This is in relation to positive set.

The negative set has its first term as $(8)^2$ or 64, and the common ratio is the double increase. The subtraction may be effected term by term, or stationwise.

In a moon's family, there is one sun, 88 planets, 28 constellations, and $66975(10)^{14}$ stars. In Jambū island there are 2 moons, then 4 moons in Lavaṇa sea, 12 moons in Dhātakikhaṇḍa, 42 moons in Kālodadhi sea, 72 moons in Puṣkarādha upto Mānuṣottara mountain, and 144 beyond it.

Beyond Mānuṣottara, the first row, is 50000 yojanas beyond, when number of moons is 144. Beyond that the rings of row are at a distance of 1 lac yojanas each, subsequently, being 7 in number, in which the number of moons increase by 4, thus as 144, 148, 152, 156 ......etc. In the inner row of the subsequence sea, there are 288 moons. Here also the rows are at a distance of one lac yojanas each, with common difference of 4. Beyond the sea is the island, where in first row moons are 288×2, and there are 64 rows, each at a distance of 1 lac yojanas again, in subsequence, with the common difference of 4 Moons.

In the third sea (Puṣkaravara), 32 rings or rows of moons exist, the first containing 144×2 or 288 moons, taken as first term, 32 being the number of terms. Thus, ādıdhana na is 144×2 32, and uttara dhana is $(\frac{n-1}{2}d)n$ or $\frac{32-1}{2} \times 4 \times 32 = 31 \times 64$. In this we add minus 64 getting 32×64. This is to be subtracted later on, taken up here for convenience in calculation as else where also. Thus the total Sum

$= (144 \times 2 \times 32) + (32 \times 64)$

$= 176 \times 64 =$ ubhayadhana ....(4.90)

In Vāruṇivara island, there is four times sum, where

first term (mukha) $= 144 \times 2 \times 2$

number of rows (valaya saṁkhyā) $= 64$

ādi dhana or initial sum $= 144 \times 64 \times 4$

uttaradhana or post sum $= \frac{64-1}{2} \times 4 \times 64$

$= 63 \times 2 \times 64$

Here, adding 2×64 negative amount,

$64 \times 64 \times 2 = 32 \times 2 \times 64 \times 2 = 32 \times 64 \times 4$

ādi dhana + ubhayadhana = ubhayadhana,

$= (144 \times 64 \times 4) + (32 \times 64 \times 4)$

$= 176 \times 64 \times 4$. ....(4.91)

The total sum is four times in every subsequent island and sea. Note that the negative set includes 64, 2×64, $2^2 \times 64$ and so on. This is continued upto the number of terms given by

$\frac{(\log_2 P \log_2 P \log_2 P)3}{A} - 3 - (\log_2 P \log_2 P + S)$.

(v.4.361)

Now the method for sumning up the above is described

Sum total of all number of terms (sarva gaccha)

$= \frac{\text{gaccha} \times \text{gaccha} - 1}{\text{gaccha} - 1} \times \text{mukha}$

$= \frac{\text{number of terms} \times \text{number of terms} - 1}{\text{number of terms} - 1} \times \text{first term}$

Here, the number of terms is $[\frac{\log_2 P}{A} . \log_2 P \log_2 P . 3 - 3 - \{(\log_2 P)^2 + S\}]$

At these distribution-reckoning rods, to each is given 4, getting after mutual product

$$= [4]^{\{\frac{\log_2 P}{A} \log_2 P \log_2 P \,.\, 3 - 3 - (\log_2 P \log_2 P + S)\}}$$

or $$= [\,[2]^{\{\frac{\log_2 P}{A} \log_2 P \log_2 P \,.\, 3 - 3 - (\log_2 P \log_2 P + S)\}}\,]^2$$

$$= [2^{\frac{\log_2 P}{A} \log_2 P \log_2 P \,.\, 3}]^2 \, [2^{-3}]^2 - [2^{(-\log_2 P \log_2 P)}]^2$$

$$[2^{-17}]^2 \qquad [2^{-19}]^2 \qquad [2^{-6}]^2 \qquad \text{.........(4.93)}$$

In the above $[2^{\frac{\log_2 P}{A} \log_2 P \log_2 P}]^2 = L^2 =$ Jagapratara ....(4.94)

Now $[2^{-3 - (\log_2 P \log_2 P + S)}]$, or $\log_2$ (100000 yojanas) being

$$17, \text{ hence } [2^{-17}]^2 = (100000)^{-2} = \frac{1}{1 \text{ lac } . 1 \text{ lac}} \qquad \text{.........(4.95)}$$

Again, $\log_2 F = 19$, hence

$$[2^{-19}]^2 = (768000)^{-2} = \frac{1}{(768000)^2} \qquad \text{.........(4.96)}$$

Further,

$$(2^{-\log_2 F})^2 = (F)^{-2} = \frac{1}{(F)^2} = \frac{1}{\text{pratarāṅgula}} \qquad \text{.........(4.97)}$$

and $$(2^{-6})^2 = (64)^{-2} = \frac{1}{(64)^2}, \qquad \text{.........(4.98)}$$

which were subtracted as not needed.

Again, 3 were subtracted from $\log_2 L$ for $\log_2 \frac{L}{7}$,

$$\therefore \quad (2^{-3})^2 \qquad (7)^{-2} = \frac{1}{(7)^2} \qquad \text{...........(4.99)}$$

In this way, the numerator is (4.94), and the denominators are from (4.95) to (4.99). Then there was mutual multiplication of number of terms multiplier. Out of this 1 is subtracted, and divide it by 4 - 1 or 3, the first term being 64 × 176, hence as per formula, the positive summed up set is

$$\left[\frac{L^2 \times 64 \times 176}{(F)^2 (768000)^2 (lac)^2 (64)^2 (7)^2} \div (4-1)\right] - 1 \qquad \text{.........(4.100)}$$

Now, we find out the summed up amount of the negative set : Here the multiplier is 2. Whatever is the measure of the number of terms, is distributed into reckoning-rods and to each of them 2 is given and mutually multiplied, the L or universe-line (Jagaśreṇī) is produced, as numerator. Below, in the minus or negative set, 2 is to be raised to 17 etc., getting 100000, 768000, 64 and 7 respectively, which are divisors. Again subtracting 1 from the and on multiplying by the first term, 64, and dividing by common ratio as reduced by unity, it, 2-1, getting the sum of negative set as follows :

$$\frac{64 \times L}{F \times 768000 \times 100000 \times 7 \times 64 \times 1} \qquad \text{...........(4.101)}$$

On subtracting unity from it, we get

$$\frac{64\,L - (F \times 768000 \times 7 \times 64)}{F \times 768000 \times 100000 \times 7 \times 64} \qquad \text{.........(4.102)}$$

Now the positive set could be put in the form below from (4.100), as

$$\frac{L^2 (176) \times 64}{(F)^2 (768000)^2 (lac)^2 (64)^2 (7)^2 (3)} \qquad \frac{L^2 (11)}{(F)^2 (768000)^2 \ (4)\ (7)^2 (3)}$$

$$\frac{L^2 (17)}{F^2 (65536) (4) (1323) (10)^{16}} \qquad \frac{L^2 (11)}{F^2 (2)^{2^4} (5292) (10)^{16}} \qquad \text{.........(4.103)}$$

From the Jambū island upto Puṣkarārdha, doddovagā, etc. measure of Moons etc. has been related | 2| 4 | 12 | 42 | 72. have already been described whose sum is 132 Moons. For finding out the number of Moon in the same, beyond Mānuṣottara, the formula is

$$\text{saṁkalana} = [\frac{\text{pada} - 1}{2} \times \text{uttara} + \text{prabhava}] \times \text{pada}. \qquad \text{............(4.104)}$$

Here, gaccha = number of terms = valaya = 8

uttara = vṛddhi = commondifference = 4

prabhava = mukha = first term = 144,

$$\text{Hence the sum of the Moons} = [\frac{8 - 1}{2} \times 4 + 144]\, 8 = 1264 \qquad \text{.........(4.105)}$$

Adding 132 in 1264, total is 1396. ....(4.106)

From the above mentioned negative sum-set (4.102), this amount (4.106) is subtracted getting

$$\frac{64\,L + 1396\,(F)\,(768000)\,(10)^5 (7)\,(64)\,(1)}{(F)\,(768000)\,(10)^5\,(7)\,(64)\,(1)} \qquad \text{............(4.107)}$$

Here in place of 1396 F, we can take numerate F or S F, or २ २ . Further on subtracting the negative set (4.107) from positive set (4.103) we get

$$\frac{L^2 (11)}{F^2\, 2^{2^4} (5292)\,(10)^{16}} - \frac{(64)\,L + (1396\,F)\,(768000)\,(10)^5 (7)\,(64)}{F\,(768000)\,(10)^5\,(7)\,(64)}$$

$$\frac{[(L)^2 - L\;F\;S\,]\;11}{(F)^2 (2)^{2^4} (5292)\,(10)^{16}} \qquad \text{.........(4.108)}$$

From the above measure, the amount of astral bodies is calculated by separately multiplying the above measure of the number of Moons in (4.108), by 1,1, 88, 28 and 66975 $(10)^{14}$, which give respectively the numbers of Moons, Suns, planets, constellations, and stars. On adding all these five sets, we get the total number of astral bodies as

$$\frac{[L^2 - L F S]\, 11\, [1+1+88+28+66975(10)^{14}]}{F^2\,(2)^{2^4}\,(5292)\,(10)^{16}}$$

$$\frac{[L^2 - L F S]\, [7367250000000000001298]}{F^2\,(2)^{2^4}\,(5292)\,(10)^{16}}$$

$$= \frac{L^2}{F^2 2^{2^4}} = \frac{\text{Jagapratara}}{\text{prataraṅgula} \times \text{paṇṇaṭhi}} \quad \text{approximately,} \qquad \text{..........(4.109)}$$

or $\overset{=}{4}$ | 65 = |

In TPT, however, the same has been given as

$$\frac{L^2}{(256\,F)^2} \div \frac{1}{1655361} \quad \text{as} \quad \text{on p. 767, vol. 2 .}$$

The above calculations have been detailed in TLS commentary of Mādhava candra (c.11th century A.D.) and that of Paṇḍita Ṭoḍaramala (c.18th century A.D.)

(v.4.371)

In Jambū island the number of starts related with the two Moons is $133950(10)^{14}$. On dividing this by 190, the result $705(10)^{14}$ gives the first reckoning-rod. These go on doubling till the Videha, and beyond Videha, they go on halving. For example, 1 | 2 | 4 | 8 | 16 | 32 | 64 | 32 | 16 | 8 | 4 | 2 | 1 ....(4.111)

(v.4.372)

In the Bharata region, there are $705(10)^{14}$ stars. Ahead of this upto Videha region, the number of stars have been twice as much as in preceding region, respectively, as under

TABLE - 4.8

Name of regions and mountain	Number of Stars	Name of region and mountains	Number of Stars
Bharata region	$705(10)^{14}$	Nīla mountain	$22560(10)^{14}$
Himavan mountain	$1410(10)^{14}$	Ramyaka region	$11280(10)^{14}$
Haimavata region	$2820(10)^{14}$	Rukmī mountain	$5640(10)^{14}$
Mahāhimavān	$5640(10)^{14}$	Hairaṇyavata region	$2820(10)^{14}$
Hari region	$11280(10)^{14}$	Sikharī mountain	$1410(10)^{14}$
Niṣadha mountain	$22560(10)^{14}$	Airāvata region	$705(10)^{14}$
Videha region	$45120(10)^{14}$		

(v.4.373)

This verse informs the interval between the situated moons and suns, from Lavaṇa etc. sea to Puṣkarārdha-

In the Lavaṇa sea the number of suns is 4. Its half is $(4 \div 2) = 2$. By this 2 is multiplied the diameter of the sun, getting $\frac{48}{61} \times 2 = \frac{96}{61}$ yojanas. The diameter of the Lavaṇa sea is 2 lac yojanas, from which on subtracting $\frac{96}{61}$ yojanas, we get remainder $\frac{12199904}{61}$ yojanas. This gives two intervals: one interval is from sun ot sun, and second intervel from inner altar of first sun, and from outer altar of second sun, and in this way, on adding them, getting a single interval. When two intervals contain $\frac{12199904}{61}$ yojanas, one interval contains $\frac{12199904}{61}$ or 99999 yojanas and $\frac{26}{122}$ yojanas. Thus the interval between one sun to another is $99999\frac{13}{61}$ yojanas. The interval between the altar from its nearer sun is half of the above interval. This is halved as follows. First one is subtracted from the odd number, 99999-1 and divided by 2 getting $99998 \div 2 = 49999$ yojanas. Now in $\frac{13}{61}$ both half are added and obtained number is divided by 2 in numerator and denominator, thus, half of 1 is $\frac{1}{2}$ and half of $\frac{13}{61}$ is $\frac{13}{122}$, and sum of both $= \frac{1}{2} + \frac{13}{122} = \frac{74}{122}$ $= \frac{37}{61}$ yojanas. When this is placed with the half measure, the interval from altar to nearer sun is obtained as $49999\frac{37}{61}$ yojanas.

Lavaṇa sea has a ring width of 2 lac yojanas. Here, there are 4 suns, two being in one circumference. From the inner boundary of Lavaṇa sea, going $49999\frac{37}{61}$ yojanas ahead, there is the celestial plane of sun. Its diameter is $\frac{48}{61}$ yojanas. The boundary is $99999\frac{13}{61}$ yojanas. Hence the external altar is $49999\frac{37}{61}$ ahead of this. Thus the total of all these gives the diameter or width of ring of Lavaṇa sea as

$$(49999\frac{37}{61} + \frac{48}{61} + 99999\frac{13}{61} + \frac{48}{61} + 49999\frac{37}{61}) = 200000 \text{ yojanas.}$$

The interval between Moons in Lavaṇa sea -

$\{200000 - (\frac{56}{61} \times \frac{4}{2})\} \div \frac{4}{2} = 99999\frac{5}{61}$ yojanas is the interval from a moon to another moon. Thus, $99999\frac{5}{61} \div 2 = 49999\frac{33}{61}$ is the interval from circumference to moon and from moon to boundary. All totalling to $49999\frac{33}{61} + \frac{56}{61} + 99999\frac{5}{61} + \frac{56}{61} + 49999\frac{33}{61} =$ 200000 yojana, the width of ring.

Interval between Suns in Dhātakīkhaṇḍa

The ring width of Dhātakī khaṇḍa is 400000 yojanas. The number of suns and moons is 12 and 12. Both have diameters $\frac{48}{61}$ and $\frac{56}{61}$ yojanas.

Hence interval from sun to sun = $[400000 - (\frac{48}{61} \times \frac{12}{2})] \div \frac{12}{2} = 66665\frac{165}{183}$ yojanas.

$66665\frac{165}{183} \div 2 = 33332\frac{172}{183}$ yojana is distance from boundary to sun.

In Dhātakīkhaṇḍa, in 4 lac width, at 6 places, in each one of the circumference, there are two and two suns, hence among these six circumferences there will be 5 intervals from suns to suns, and relative to outer inner, there will be two intervals of circumference. Hence

$66665\frac{165}{183} \times 5 = 333325\frac{805}{183}$ yojanas, the region of 5 intervals.

$33332\frac{172}{183} \times 2 = 66665\frac{161}{183}$ yojanas,

region of two intervals $\frac{48}{61} \times \frac{12}{2} = \frac{288}{61}$ yojanas, the region of 6 suns.

Sum total of above = 400000 yojanas as the ring-width.

The intervals between the moons in Dhātakīkhaṇḍa:

$\{400000 - (\frac{56}{61} \times \frac{12}{2})\} \div \frac{12}{2} = 66665 \frac{137}{183}$ yojanas, interval beteween moon to moon.

$66665 \frac{137}{183} \div 2 = 33332 \frac{160}{183}$ yojanas, interval between boundary and moon

$66665 \frac{137}{183} \times 5 = 333328 \frac{136}{183}$ yojanas region of 5 intervals

$33332 \frac{160}{183} \times 2 = 66665 \frac{137}{183}$ yojanas region of 2 intervals

$\frac{56}{61} \times \frac{12}{2} = \frac{336}{61}$ yojanas, region of 6 moons.

Sum total of above is 400000 yojanas, the ring-width.

Interval from Sun to Sun in Kālodaka Sea

The ring width of kālodaka sea is 800000 yojanas. The number of suns and moons are 42 and 42. Hence

$\{800000 - (\frac{48}{61} \times \frac{42}{2})\} \div \frac{42}{2} = 38094 \frac{578}{1281}$ yojanas interval from sun to sun

$38094 \frac{578}{1281} \div 2 = 19047 \frac{289}{1281}$ yojanas, interval between boundary and sun

$38094 \frac{578}{1281} \times 20 = 761889 \frac{31}{1281}$ yojanas, region of 20 intervals

$19047 \frac{289}{1281} \times 2 = 38094 \frac{578}{1281}$ yojanas, region of 2 interval

$\frac{48}{61} \times \frac{42}{2} = \frac{1008}{61}$ yojanas, region of 21 suns.

Sum total = 800000 yojanas, ring width.

Interval between moon to moon :

$\{800000 - (\frac{56}{61} \times \frac{42}{2})\} \div \frac{42}{2} = 38094 \frac{410}{1281}$ yojanas, interval from moon to moon

$38094\frac{410}{1281} \div 2 = 19047 \frac{205}{1281}$ yojanas, interval between moon and boundary

$38094\frac{410}{1281} \times 20 = 761880\frac{8200}{1281}$ yojanas, region of 20 intervals of moon

$19047\frac{205}{1281} \times 2 = 38094\frac{410}{1281}$ yojana, region of 2 intervals of boundary

$\frac{56}{61} \times \frac{42}{2} = \frac{1176}{61}$ yojana, region of 21 moons

Sum total is 800000 yojanas ring width.

Interval from Sun to Sun in Puṣkarārdha island

In half Puṣkara island the ring-width is 800000 yojanas.

Here the each of number of suns and moon is 72 and 72. Hence,

$[800000 - (\frac{48}{61} \times \frac{72}{2})\} \div \frac{72}{2} = 22221 \frac{239}{549}$ yojanas, interval from sun to sun.

$22221 \frac{239}{549} \div 2 = 11110 \frac{394}{549}$ yojanas, interval of boundary to sun

$$22221\frac{239}{549} \times 35 = 777735\frac{8365}{549}$$ yojanas, region of 35 intervals of sun

$$11110\frac{394}{549} \times 2 = 22221\frac{239}{549}$$ yojanas region of two boundares of sun.

$$\frac{48}{61} \times 36 = \frac{1728}{61}$$ yojanas, region of 36 suns

Sum is 800000 yojanas as ring width

Interval between Moons is Puṣkarārdha island

$$\{800000 - (\frac{56}{61} \times \frac{72}{2})\} \div \frac{72}{2} = 22221\frac{167}{549}$$ yojanas, interval from moon to moon

$$22221\frac{167}{549} \div 2 = 11110\frac{358}{549}$$ yojanas, interval from moon to boundary

$$22221\frac{167}{549} \times 35 = 777735\frac{5845}{549}$$ yojanas, region of 35 intervals of moons

$$11110\frac{358}{549} \times 2 = 22221\frac{167}{549}$$ yojana, interval between moon to boundary region

$$\frac{56}{61} \times \frac{72}{2} = \frac{2016}{61}$$ yojanas as ring width.

(v.4.374)

The orbital region of motion of moon and sun is called movement region (cāra Kṣetra.) These is one for each of two suns and two moons, a movement region. The Jambū island has only one movement region. In Lavaṇa sea, there are two movement regions of four suns. There are 6 movement regions of 12 suns of Dhātakīkhaṇḍa island; 21 movement regions of 42 suns of Kālodaka sea, and 36 movement regions of 72 suns of Puṣkarārdha island.

(v.4.375)

The radial extension of movement region in the Jambū island is 180 yojanas alone. The remaining radial extension of $330\frac{48}{61}$ yojanas is in Lavaṇa sea. Here we find that the movement is in the island as well as in sea. But upto Puṣkarārdha, in the remain ing islands, seas, the movement region of moons and suns is within one's own island or sea.

(v.4.376)

The measure of paths of moon and sun is now related- There are 15 orbits of the moon and 184 orbits of the sun in movement region of $510\frac{48}{61}$ yojanas. Out of these, two Suns move in one orbit after another. Of the Lavaṇa sea, there are two movement regions of 4 suns, hence two suns on one side and two suns on another side, just opposite to each other move (as real and counter ?).

(v.4.377)

Alongwith the intervals of the paths, the motion for everyday is described. The "path vyāsapiṇda" means the measure of orbits as multiplied by the measure of image. Thus the movement region is $510\frac{48}{61}$ yojanas, in which there are 184 orbits of sun, each orbit is 48 yojanas wide, called diameter of orbit.

The orbit-diameter-set is $184\frac{48}{61} = \frac{8832}{61}$ yojanas. ....(4.112)

The movement region is $\frac{31158}{61}$ yojanas.

On subtraction of (4.112) from (4.113) we get ....(4.113)

$$\frac{31158}{61} - \frac{8832}{61} = \frac{22326}{61}.$$ ....(4.114)

When this divided by 184 - 1 or 183, the interval between the subsequent orbit is obtained :

$$\frac{22326}{61} \div 183 = 2 \text{ yojanas.} \qquad \text{.........(4.115)}$$

Thus, $2\frac{48}{61}$ or $\frac{170}{61}$ yojanas is the duirnal movement region of sun. ....(4.116)

Regarding the moon, the movement region is given by $\left(\frac{31158}{61} - \frac{56}{61} \times 15\right) \div (15 - 1) =$

$35\frac{214}{427}$, the difference or interval from one orbit to another. On adding the image diameter

$$\frac{15159}{427} + \frac{56}{61} = 36\frac{172}{427}, \qquad \text{.........(4.117)}$$

gives the duirnal movement region of moon.

(v.4.378)

Method is now related to find out the measure of circumferences of the orbits and their mutual interval for the moon and the sun from the Sumeru mountain.

Mutual distance between two Suns

The diameter of Jambū island is 100000 yojanas. Within the Jambū island, the movement region of the sun is 180 yojanas for one lateral side. For the other lateral part, measure is again 180 yojanas, hence 180 × 2 = 360 yojanas is to be subtracted from diameter of Jambū island for getting the distance between two suns : 100000 yojanas -360 yojanas = 99640 yojanas. This is also the measure of linear diameter of the internal or inner orbit. ....(4.118)

Interval between meru and the sun on inner orbit

This is obtained by halving the difference between the mutual distance of two suns and the diameter of the meru as

99640 - 10000 = 44820 yojanas. ....(4.119)

On adding $2\frac{48}{61}$ in this, we get $44820 + 2\frac{48}{61} = 44822\frac{48}{61}$ as the distance between meru and sun on second orbits. ....(4.20)

This can be calculated as that when sun on the last orbit.

$44820 + (2\frac{48}{61} \times 183) = 45330$ yojanas. ...(4.121)

Interval between sun from subsequent sun

On adding twice the diurnal motion ($2\frac{48}{61} \times 2 = \frac{340}{61}$ or $5\frac{35}{61}$ yojanas) in diameter (99640 yojanas) of inner orbit, the interval between sun and sun on second orbit is obtained as

$99640 + 5\frac{35}{61}$ or $99645\frac{35}{61}$ yojanas. ....(4.122)

Similarly the distance between sun ans sun on middle orbit is

$[99640 + (5\frac{35}{61} \times \frac{183}{2})] = 100150$ yojana.s

The sun and sun on outer orbit has a distance of

$[99640 + 5\frac{35}{61} \times 183)] = 100660$ yojanas. ....(4.123)

Circumference of inner (first) etc. orbits of the sun

According to verse 4.96, "vikkhambhava ggadahaguṇa---" the measure of circumference of diameter 99640 yojanas of inner orbit is 315089 yojanas. On adding to this, circumference of diameter of twice the diurnal motion, the circumference of second orbit is obtained. E.g. the diameter of twice the diurnal motion is $5\frac{35}{61}$ or $\frac{340}{61}$ yojanas.

Its square is $(\frac{340}{61})^2 = \frac{115600}{61\times61} \times 10 = 1156000$. The $\sqrt{\frac{1156000}{3721}} = \frac{1075}{21}$ or $17\frac{38}{61}$ yojanas. Hence the circumferences of the second orbit and the third orbit are after respective addition $315081 + 17\frac{38}{61} = 315106\frac{38}{61}$ yojanas and $315106\frac{38}{61} + 17\frac{38}{61} = 315124\frac{15}{61}$ yojanas respectively. Similarly the circumferences of the successive orbits are found out on sucessive addition of $17\frac{38}{61}$ to preceding value. Thus, the final circumference is $[315089 + (17\frac{35}{61} \times 183)]$ $= 318314$ yojanas.

From the verse 4.378, "suragiri candaraviṇaṁ" it is evident that similar to the description of the sun as above, the description of the moon should have been given. However it may be seen that the movement region of the moon is $510\frac{48}{61} = \frac{31158}{61}$ yojanas, and the diameter of the moon is $\frac{56}{61}$. Its orbits are 15, and every day it moves in them, one by one.

The diameter of Jambū island is 100000 yojanas. In the Jambū island, on both sides of the moon, the movement region is $180 \times 2 = 360$ yojanas, hence $100000 - 360 = 99640$ yojanas is the interval between both the moons situated on the innermost orbit of the Jambū island. Further, $\frac{99640-10000}{2} = 44820$ yojanas is the measure of the interval between the sumeru and the moon situated on the innermost (first) orbit.

The interval between the meru and everyday orbit of the moon

The width of the single orbit of the moon is

$\frac{56}{61}$ yojana, hence the width of the 15 orbits is $\frac{56}{61} \times 15 = \frac{840}{61}$ yojana.

The movement region $= (510\frac{56}{61} - \frac{840}{60}) \div (15 - 1) = 35\frac{214}{427}$ yojanas.

When the width of the moon is added, we have $35\frac{214}{427} + \frac{56}{61} = 36\frac{179}{427}$ yojanas as the diurnal (daily) motion of the moon.

The interval from the sumeru upto the moon on the innermost-orbit is 44820 yojanas on adding the daily motion, the result $44820 + 36\frac{179}{427} = 44856\frac{179}{427}$ yojanas gives the interval between meru centre and the moon on the second orbit. Further $44856\frac{179}{427} + 36\frac{179}{427} = 44892\frac{358}{427}$ yojanas is the interval between the meru centre and the moon on the third orbit. Similarly, similar calculations may be made for the remaining orbits.

Interval between meru and the moon the outer most orbit

$$44820 + \{36\frac{179}{427} \times (15-1)\} = 45329\frac{56}{61} \text{ yojanas.}$$

Twice the diurnal motion and interval between moon to moon-

$36\frac{179}{427} \times 2 = 72\frac{358}{427}$ yojana is the twice daily motion of the moon. On adding this to the interval between moons on the innermost orbit (99640 yojanas).

we get $(99640 + 72\frac{358}{427}) = 99712\frac{358}{427}$ yojanas, and $(99712\frac{158}{427} + 72\frac{358}{427}$ $99785\frac{289}{427}$ yojanas, as the respective intervals between the pair of moons on the second and the third orbit. Similarly, the interval between the two moons on 15th orbit is $= 99640 + \{72\frac{358}{427} \times (15-1)\} = 100659\frac{45}{61}$ yojanas.

The measure of circumference of orbits and the twice diurnal motion of the moon

Twice the diurnal motion of the moon is

$$72\frac{358}{427} \quad \frac{31102}{427} \text{ yojana.}$$

Its circumference is

$$\sqrt{\left(\frac{31102}{3721}\right)^2 \times 10}$$

$$230\frac{143}{427} \text{ yojanas.}$$

The circumference of the first orbit of moon is 315089 yojanas.

Now,

$$315089 + 230\frac{143}{427}$$

$315319\frac{143}{427}$ is the circumference of the second orbit.

and the amount of $315089 + (230\frac{143}{427} \times 14)$

$318313\frac{294}{427}$ yojana is the circumference of the 15th orbit of moon.

(v.4.379)

When the Sun moves in the innermost orbit of 180 yojanas near the alter of Jambū island, the day is of 18 muhūrtas (14 hours 24 minutes) and night is of 12 muhūrtas (9 hours 36 minutes). When that sun moves in the outermost orbit in Lavana sea, the day is of 12 muhūrtas and night is of 18 muhūrtas.

(v.4.380)

The position of the sun and the decrease and increase of day and night is stated. When the sun is stationed on the Cancer zodiac (Karkaṭa rāsi), it is the innermost orbital motion, and when it is situated on the capricorn zodiac (Makara rāśi), the sun is moving on the outer most orbit. Here, 18 muhūrtas is the base (bhūmi) and 12 muhūrtas is the top (mukha). The difference between base and top is 18 - 12 = 6. There are 184 orbits of the sun, but intervals are 184 -1 = 183.

When there are 183 orbits, the difference is of 6 muhūrtas, hence for 1 orbit the difference is $\frac{6}{183} = \frac{2}{61}$ muhūrta or $1\frac{35}{61}$ minutes.

When the sun moves in the innermost orbit, the day is of 18 muhūrtas, on the next day of second orbit the day is of $18 - \frac{2}{61} = 17\frac{59}{61}$ muhūrta.

On the third orbit, the day is of $17\frac{59}{61} - \frac{2}{61} = 17\frac{57}{61}$ muhūrta.

Similarly, upto the last orbit, and the night length increases as

$12\frac{2}{61}$, $12\frac{4}{61}$ and so on.

The converse phenomenon occurs when the sun proceeds from the outermost towards the innermost.

(v.4.381)

The sun, in the Śrāvaṇa month, remains in the innermost orbit and in the Māgha month, it is on the outermost orbit. In the remaining months, it remains in the middle orbits. In those Sun situated months, the brightness and darkness is to be related in all the orbits. For example, when in 6 month there are 183 days, then in one month how many days are there? This rule of three gives the following distribution of the sequence of days elapsed upto a particular month.

First the following figure gives the distribution of the lengths of days and nights in various months when the sun is on various solstices.

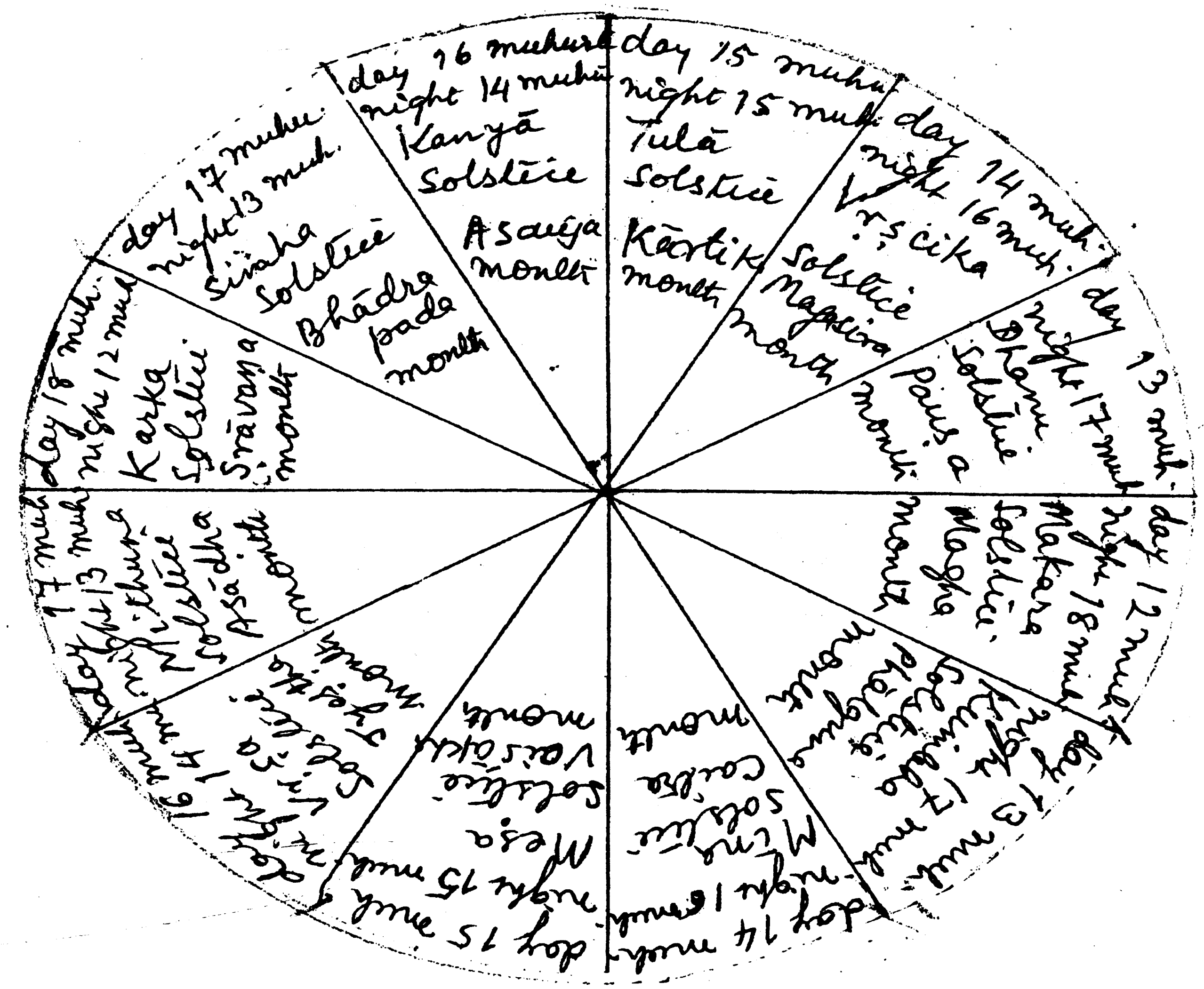


figure 4.28

Similarly, the days elapsed are given by the following table.

1. Śrāvaṇa month .... = $30\frac{1}{2}$ days

2. upto Bhādrapada there are .... 61 days

3. upto Āsauja there are .... $\frac{183}{2}$ days

4. upto Kārtika there are .... 122 days

5. upto Mārgaśirṣa there are .... $\frac{305}{2}$ days

6. upto Pauṣa there are .... 183 days

7. upto Māgha there are .... $30\frac{1}{2}$ days

8. upto Phālguna there are .... 61 days

9. upto Caitra there are .... $\frac{183}{2}$ days

10. upto Vaiśākha there are .... 122 days

11. upto Jyeṣṭhathere are .... $\frac{305}{2}$ days

12. upto Āsāḍha there are .... 183 days.

(v.4.382)

The diameter of the sumeru mountain is 10000 yojanas. ....(4.123)A

Innermost orbit diameter = Jambū's diameter - 180 × 2

= 100000 − 360 = 99640 yojanas. ....(4.124)

Middle orbital diameter = Jambū's diameter + [half orbital region - Jambu's orbital region] × 2

$$= 100000 + [\frac{510}{2} - 180] \times 2 = 100150 \text{ yojanas, for both sides.} \quad ....(4.125)$$

Diameter of outermost orbit = Jambū's diameter + [Lavaṇa orbital region] × 2 for both sides

= 100000 + [330] × 2

= 100660 yojanas. ....(4.126)

Diameter of the one-sixth part of the water = Jambū's diameter + [$\frac{\text{width of Lavaṇa}}{6}$] × 2 for both sides = $100000 + [\frac{200000}{6}] \times 2 = 166666\frac{2}{3}$ yojanas. ....(4.127)

As per formula of v.4.96. "vikkaṁbhavaggadahaguṇa ----" the circumferences corresponding to the above five are

(i) Meru's circumference is 31622 yojanas ...... (4.128)

(ii) Innermost orbit's circumference is 315089 yojanas .... (4.129)

(iii) Middle circumference is 316702 yojanas .... (4.130)

(iv) Outer circumference is 318314 yojanas .... (4 131)

(v) Water sixth part circumference is 527046 yojanas..... (4.132)

Now the bright and dark regions for a particular month is obtained on multiplying the result (obtained on dividing the any one of the five corresponding circumference by 60,) by the muhūrta (18 | 17 | 16 | 15 | 14 | 13 | 12) of the day and night respectively.

An example there of

The circumference of meru is to be taken as an example for the bright and dark regions, when the sun is on the Śrāvaṇa month, in which the day is of 18 muhūrta (or 14 hours 24 minutes) and the night is of 12 muhūrta (or 9 hours 36 minutes). The circumference of meru is 31622 yojanas. Hence for $\frac{31622\times18}{60} = 9486\frac{3}{5}$ yojanas is the thrust of bright region over meru, and $\frac{31622\times12}{60} = 6324\frac{2}{5}$ yojana as the thrust of dark region. Similarly these regions, tāpa and tama are determined.

The chosen circumference is divided by 60, the quotient is multiplied by one muhūrta, the product should be known as the decrease and increase in form of common difference of decrease and increase of brightness and darkness of the corresponding month. For example for merugiri the circumference 31622 yojanas is chosen, hence $\frac{31622\times1\text{muhūrta}}{60} = 527\frac{1}{30}$ yojanas is decreasing common difference.

How does there becomes increase of one muhūrta in a month, is related:

When in a day there is a decrease of $\frac{2}{61}$ muhūrta,

Then in $\frac{61}{2}$ days " " $\frac{2}{61}\times\frac{61}{2} = 1$ muhūrta.

Two suns complete one revolution in 30 muhūrtas.

How there been only one sun, it will have required 60 muhūrta for the full path. When in 60 muhūrta the sun moves 31622 yojanas, then in one muhūrta $\frac{31622}{60} = 527\frac{1}{30}$ yojanas is the decrease in the bright region thrust. Thus, as compared with the bright region of Śrāvaṇa month, the bright region of the next Bhādrapada has been reduced by $527\frac{1}{30}$ yojanas, and at the same time the corresponding increase in the dark area is $527\frac{1}{30}$ yojanas.

(v.4.383)

In whatever orbit, the measure of the brightness of the sun has been stated, its half part spreads forward and the rest backwards.

(v.4.384)

Out of the five orbits, the chosen is that of the meru. In 60 muhārta the sun propagates the region of 31622 yojanas Hence in $\frac{2}{61}$ " " $\frac{31162 \times 2}{60 \times 61}$ $17\frac{512}{1830}$ yojanas.

There are 184 orbits of the sun, out of which there are 183 intervals, and on multiplying 183 by 10, we get 1830. On dividing 31622 by 1830, we get $\frac{3162}{1830}$ $17\frac{256}{915}$ yojanas, hence the explanation for decrease and increase of the brightness and darkness regions. Thus when there is the northern solstice of the sun, every day the bright region increases by $17\frac{512}{1830}$ yojanas, and the same corrsponding amount of darkness-region decreases. Just opposite is the case for the southern solstice. In the inner orbit, the common difference of decrease increase everyday in brightness and darkness is $\frac{315089}{1830} = 172\frac{329}{1830}$ yojanas.

In the middle orbit, the decrease-increase commondifference of bright and dark region per day is $\frac{316702}{1830} = 173\frac{56}{915}$ yojanas.

In the external orbit, the decrease increase common difference of bright and dark region per day is $\frac{318314}{1830} = 172\frac{862}{915}$ yojanas.

In the $\frac{1}{6}$ th water part orbit, the corresponding common difference is $\frac{527046}{1830}$

$288\frac{3}{915}$ yojanas.

(vv.4.385-388)

The orbit at meru is 31622 yojanas. The orbit inner is 315089 yojanas, the middle-orbit has circumference of 316702 yojanas. The outer orbit is 318314 yojanas and that of one sixth water part, is 527046 yojanas. These are the data for five circumferences.

(v.4.387)

This tells how the sun moves dissimilar arcs in equal times.

The sun and the moon move with faster velocities while propagating from the first orbit to the second etc. or coming out, the opposite is the case, when they start from the outermost orbit, moving from it toward the innermost one, with slower velocities. The reason is that the circumferençes of the inner and outer orbits are dissimilar, the formet being smaller than the latter. As the time of movement is constant, the movement or velocity along the smaller inner orbit is smaller or slower, and in order to sweep greater parts of circumference, its velocity goes on increasing, the opposote being the case when the sun and the moon, move in the outer orbits with faster movements. The Kepler's Law, however, states, that the live joining the sun and the Earth sweeps out equal areas in equal times. This was the Keplar's second law valid for planetary motions also. From this law Newton deduced that the force with which a planet describes its orbit must act along the straight line joining it to the sun. As we have already seen, in TPT as well, (Jain, L.C., I.J.H.S.,vol. 13.1, 1978, 42-49) the motions in TPT and TLS for the planets are spiroelliptic (unified). The forces derived due to such a motion are Newtoniar, Einsteinian and some more of new types. The first Kepler's law is, "Each planet moves in an elliptical orbit with the sun at one of the foci" and Newton derived from this law that the force directed to the planet must vary inversely as the square of its distance from the sun. We can also compare the periods of revolution, through the distance ratios of the motion of the sun and the moon and verefy the Kepler's third law. From Kepler's third law, Newton deduced that the force on any of the planets vary directly as its mass and inversely as the square of its distance from the sun. This was one of the greatest achievements of science, when the concept of mass was introduced, which was related with energy equation of E instein through relativitie invariance of velocity of light.

(v.4.388)

The type of motion of the sun and the moon is elaborated. In the first orbit, the motion is like that of an elephant, i.e., the extremely slow. In the middle path it is like the motion of a horse denoting normally middle velocity. In the final orbit, the motion is like that of a lion. This is the fastest motion. The measure of the velocity in each orbit is calculated as follows: per muhūrta

$\because$ In the innermost orbit, the sun in 60 muhūrta moves 315089 yojanas

$\therefore$ It move in one muhūrta $\frac{315089}{60}$ yojana or $5251\frac{29}{60}$ yojanas.

$\because$ In the middle orbit the sun moves in 60 muhūrtas 316702 yojanas

$\therefore$ It moves in one muhūrta $\frac{316702}{60} = 5278\frac{11}{30}$ yojanas.

$\because$ In 60 muhūrta the sun moves in outer orbit 318314 yojanas.

$\therefore$ In one muhūrta it moves $318314 \div 60 = 5305\frac{7}{30}$ yojanas.

Regarding the Moon :

The sun requires 60 muhūrta to have one complete revolution, but the moon requires $66\frac{23}{221}$ complete orbit of the same measure.

Thus in $66\frac{23}{221}$ muhūrta, the moon travels 315089 yojanas

$\therefore$ in 1 muhūrta in inner orbit, in innermost orbit, $\frac{315089 \times 221}{13725}$

$= 5073\frac{7744}{13725}$ yojanas.

Since in $66\frac{23}{61}$ muhūrta the moon in outer orbit moves 318314 yojanas.

$\therefore$ in 1 muhūrta the moon moves $\frac{318314 \times 221}{13725}$

$= 5125\frac{6769}{13725}$ yojanas

(vv.4.389-391)

These verses give the touch of optical sense when the sun is on the innermost orbit.

The circumference is divided by 60 and multiplied by 9 for getting the maximal region of eye-touch. $47263\frac{7}{20}$ yojanas.

The emperor (cakravartī) is able to see the region given by subtracting theeye-touch region from half of Niṣadha arc. $123768\frac{18}{19}$, when the sun is over the Niṣadha. This is $(123768\frac{18}{19} \div 2) - (47263\frac{7}{20}) = 14621\frac{47}{380}$ yojanas. When this is subtracted from the lateral side of Niṣadha mountain, the remainder is 5575 yojanas, which shows that after a lapse of this distance travelled by the sun over the Niṣadha, it will set.

In 60 muhūrta the innermost orbit is 315089 yojanas, hence in 1 muhūrta the sun travels

$\frac{315089 \times 9}{60} = 472363\frac{7}{20}$ yojanas.

This is the maximal eye-touch region, or span.

The arc of Niṣadha is $123768\frac{18}{19}$ yojanas.

$$\text{Hence } \left(123768\frac{18}{19} \div 2\right) - 47263\frac{7}{20} = 14621\frac{47}{380} \text{ yojanas.}$$

In the first orbit, when the sun comes at the fringe of the Niṣadha from northern shore at a height of $14621\frac{47}{380}$ yojanas, the emperor at Ayodhyā sees it. Then from the later arm of the Niṣadha, 20196 yojanaṣ, this is subtracted, we get, an approximate distance, $20196 - 14621\frac{47}{380}$ or 5575 yojanas. The sun then sets, while reaching the southern shore by slightly less than 5575 yojanas.

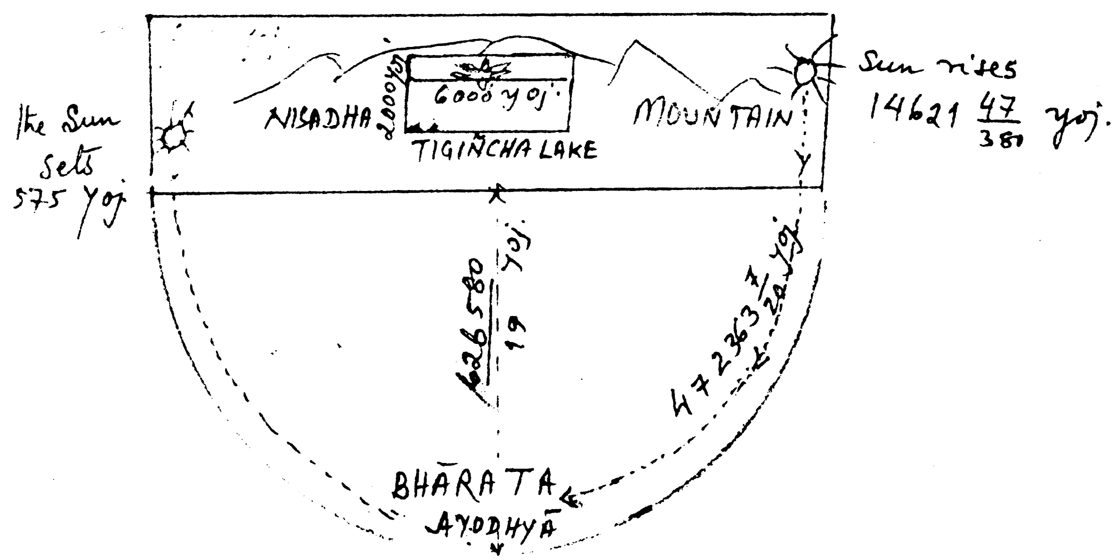


Figure 4.29

(v.4.392)

The verse gives the method of finding out the height of the segment of a circle, or the bāṇa.

The dhanuṣa is arc

The string or dorī or jīva is chord and the bāṇa is the height of the segment.

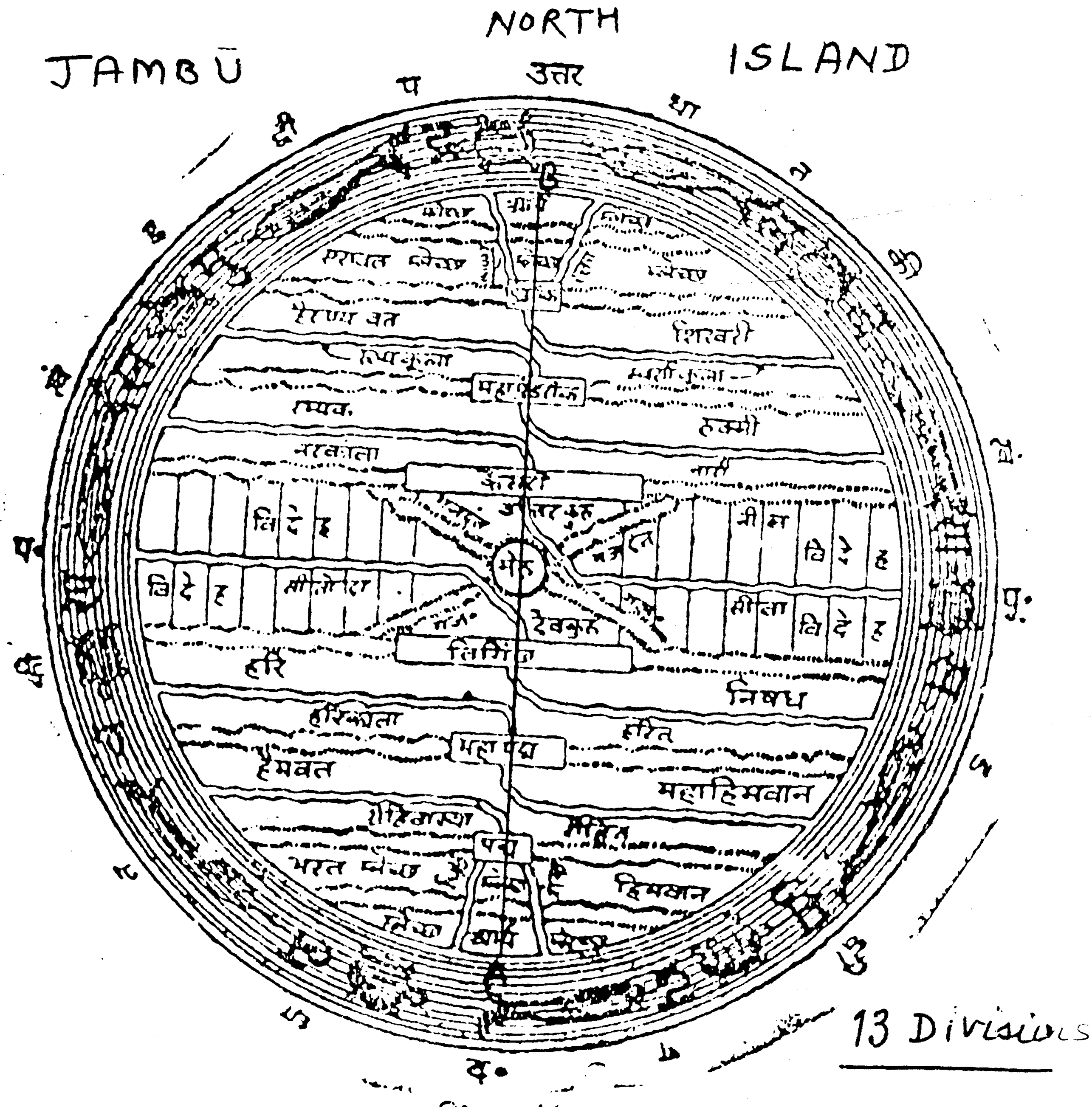

NORTH
JAMBŪ
ISLAND
उत्तर
शिखरी
रुक्मी
निषध
हरि
हैमवत
महाहिमवान
हिमवान
देवकुरु
SOUTH
13 Divisions

Figure 4.30

The distribution of regions of Jambū island, through division of the vertical diameter into 13 proportionate parts as follows :

Name of region	Reckoning rods
Bharata kṣetra	1
Himavān	2
Haimavata	4
Mahāhimavāna	8
Harikṣetra	16
Niṣadha	32
Videha region	64
Nīla Mountainain	32
Ramyaka	16
Rukmī Mountain	8
Hairaṇyavata	4
Śikharī	2
Airāvata	1

In this way, the total number of reckoning rods is 190. Out of this, the measure of reckoning rods from Bharata region to Harivarṣa region is 1 + 2 + 4 + 8 + 16 = 31. In order to find out this measure the formula for summing up the geometrical progression has been applied as, "antadhaṇaṁ guṇaguṇiyaṁ, ādi-vihīṇaṁ rū ūṇuttara bhajiyaṁ " or $S = \frac{a(r^n - 1)}{r - 1} = 2$

$\frac{2(2^5 - 1)}{2 - 1}$ = 31. Similarly the reckoning-rods for Niṣadha mountain will be 63. The vertical diameter of Jambū island is 1 lac yojanas, and its reckoning-rods arc 190.

Thus the region for 190 counting rods is 100000 yojana, that for 31 and 63 counting-rods will be the arrows $\frac{310000}{19}$ and $\frac{630000}{19}$ yojanas respectively for Harivarṣa and Niṣadha.

This is the interval from the altar.

Now for getting the eye-span region, the orbital region in Jambū island is 180 yojanas, and dividing it by 19 and multiplying by 19 gives $180 \times \frac{19}{19} = \frac{3420}{19}$ yojana.

Subtracting this amount from the above two region arrows from altar, we get

$\frac{310000}{19} - \frac{3420}{19} = \frac{306580}{19}$ as arrow of Harivarṣa and $\frac{630000}{19} - \frac{3420}{19}$ $\frac{626580}{19}$ as the arrow of Niṣadhācala. When, out of 100000 yojanas the orbital regions of 180×2 of both opposite directions are remoned, the measure of the innermost orbital width is obtained as $\{100000 - (180 \times 2)\} = 99640$ yojanas. On making it of equal denominator, this becomes

$$99640 \times \frac{19}{19} = \frac{1893160}{19} \text{ yojanas}$$

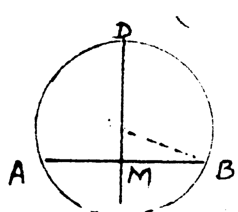
For finding out the arc of Harivarṣa, the formula,

"isuhīṇaṁ vikkhaṁbhaṁ, caugunidisuṇa hade du jiva kadī /

bāṇakadiṁ chahiguṇide, tattha jude ghaṇukādī hodi"

is applied, v.6.760), as the usual formula

$$(\text{chord})^2 = \left(\frac{1893160}{19} - \frac{306580}{19}\right)\left(4 \times \frac{306580}{19}\right)$$

Figure 4.31 

$$AM^2 = CM - MD \text{ or } \left(\frac{AB}{2}\right)^2 = (CD - CM)(CM)$$

$$\text{or} \quad (AB)^2 = (CD - CM)(4CM) \qquad ....(4.133)$$

Thus if square root, $\frac{1584172}{19}$ yojana is the chord of Harivarṣa.

Similarly the chord for Niṣadha is

$$\sqrt{\left(\frac{1266580}{19} \times \frac{2506320}{19}\right)}, \text{ where } \frac{1893160}{19} - \frac{626580}{19} = \frac{1266580}{19}$$

$$= \frac{1781697}{19} \text{ yojana} \qquad \text{and} \quad \frac{1266580}{19} \times 4 = \frac{2506320}{19}$$

$$= 93773\frac{10}{19} \text{ yojanas.}$$

For finding out the square of arc, the square of the arrow is multiplied by 6 and added to the square of chord.

Thus, $(\text{arc})^2 = (\text{arrow})^2 \times 6 + (\text{chord})^2$ ....(4.134)

Thus for Niṣadhācala,

$$\text{arc} = \sqrt{\left\{\left(\frac{626580}{19}\right)^2 \times 6\right\} + \frac{3174454785600}{361}}$$

$$= 123768\frac{18}{19} \text{ yojanas}$$ ....(4.135)

(v.4.393)

Disposal of the above arcs of Hari and Niṣadha

The arc from the southern shore to northern shore is called the lateral side (pāśava bhujā).

Lateral side of Niṣadha = {(Arc of Niṣadha - Arc of Harivarṣa) }$\times \frac{1}{2}$ ....(4.136)

The process is however followed as below

$= \{(123768\frac{18}{19} - 83377\frac{9}{19}) - 1\} \times \frac{1}{2} = 40390\frac{9}{19} \times \frac{1}{2}$ or $40390 \div 2 = 20195$, 1 was subtracted, hence its $\frac{1}{2}$ is $\frac{1}{2}$, and half of $\frac{9}{19}$ is $\frac{9}{38}$, hence, we get $(\frac{1}{2} + \frac{9}{19\times 2}) = \frac{14}{19}$ which is regarded as unity and on subtracting it from the region and the arc of mount, on adding it to remaining half part 20195, we get (20195 + 1) = 20196 as the Niṣadha Mounts lateral side in yojana. ....(4.137)

This has been related in the next verse as follows:

(v.4.394)

Here, Mādhava means Nārāyaṇa are 9 and visible moon is 1, hance 19, throuph which navaka kalā, fraction is $\frac{9}{19}$ yojana is the remaining numeral of Hari's arrow. (Arc of Hari region is $83377\frac{9}{19}$ yojanas). Out of the $\frac{9}{19}$, (naya pada), where naya is 9, hence the place of 9 is multiplied by pramāṇa which is 2, we get $\frac{9}{19} \times 2 = \frac{18}{19}$ yojana as the remainder numeral of Niṣadhācala mountain's arc. (The total measure of Niṣadha's arc is $123768\frac{18}{19}$) and the lateral side of Niṣadha is slightly less than the square of 14 i.e. 196 inclusive of twenty thousand, i.e., slightly less than 20196 yojanas.

(v.4.395)

This verse describes the measure of rise in orbital region without division in solstices

The complete orbital region of the Sun is 510 yojana. The measure of movement region per day of the Sun is $2\frac{48}{61}$ or $\frac{170}{61}$ yojana, hence if there is one rise of Sun in $\frac{170}{61}$ yojana, then how many rises would there be in 510 yojana. This gives $\frac{510\times61}{170}$ = 183 rise stations.

...............(4.138)

Upto the end of orbital region, in the remaining region, there is one rise station of the occupied region by $\frac{48}{61}$ yojana of Sun's image. This is added to 183, getting approximately 184 rise stations. In one orbital region the orbits of the sun are 184 alone, hence in one orbit there is only one rise station, hence on Niṣadha mountain there are 63 rise stations. On the Nīla also there are 63 rise stations. On th Hari and Ramyak regions there are two for each, and in the Lavaṇa sea there are 119 rise stations.

In the whole orbital region of 510 yojanas the rise stations of the sun are 184. Relative to Bharata region, on Niṣadha there are 63, on Hari are 2, and in Lavaṇa sea there are 119 rise stations, thus totalling to 63 + 2 + 119 = 184 rise stations.

From the innermost orbit upto 63rd orbit, the sun rises over the Niṣadha, which is visible by residents of Bharata region. When on 64th and 65th orbit, it rises in Hari, and from 66th upto the last rise-station, it rises over Lavaṇa. Similarly in the Airāvata region, 63 rise stations are on the Nīla mountain, 2 in Ramyak region and 119 in Lavaṇa sea.

(v.4.396)

In the southern solstice, dividing the altar and orbital region relative to island seas, the rule of three is related for describing the rise.

When the sun is in the innermost orbit, the south solstice begins and when it is in the outermost, the northern solstice begins. Here the number of rise-stations of southern-solstice sun is described. Whatever are the rise stations in the width of the orbital region and orbits of the sun are related.

In Jambū island, the orbital region extends upto 180 yojanas. The width of Jambū altar is 4 yojanas, therefore the orbital region of Jambū remains 180 - 4 = 176 yojanas.

Over 4 yojanas altar there is the orbital region also.

The orbital region in Lavaṇa is $330\frac{48}{61}$ yojanas. Everyday movement of the sun is $\frac{170}{61}$ yojana.

Thus the $\frac{170}{61}$ daily movement gives one rise-station

$\therefore$ for 176 yojanas of movemt, " " $\frac{176\times61}{170} = 63$ rise station. ....(4.139)

The remainder is $\frac{26}{170}$. Out of these the first rise station of first orbit is related to northern solstice, hence the rise-stations are $63\frac{26}{170} - 1 = 62\frac{26}{170}$. ....(4.140)

From the first orbit upto the last of the island, 63 rise stations are finished. There remains rise-portion $\frac{26}{170}$, this occupies the region thus. The one rise-station occupies $\frac{170}{61}$ yojanas region, hence $\frac{26}{170}$ portion of rise occupies $\frac{170\times26}{61\times170} = \frac{26}{61}$ yojana. ....(4.141)

Further, in the 4 yojanas of altar, there are $\frac{61}{170}\times4 = \frac{244}{170}$ or 1 rise-station, remainder rise portion is $\frac{74}{170}$. This occupies $\frac{170\times74}{61\times170} = \frac{74}{61}$ yojana ....(4.142)

Hence taking $\frac{22}{61}$ yojana from $\frac{74}{61}$, adding it to (4.1441) or $\frac{26}{61}$ yojana, we get $\frac{26}{61} + \frac{22}{61} = \frac{48}{61}$ yojana region. ....(4.143)

This is the region occupied by the sun. Hence in 64th orbit the width of the sun is $\frac{26}{61}$ yojana. then on adding to it $\frac{22}{61}$ from altar's orbital region, shows that it is $\frac{48}{61}$, indicating the 64th orbit being between the island and its altar.

Ahead of this there is an interval of 2 yojana. Ahead of this interval, $\frac{48}{61}$ yojana is occupied by sun, as its orbit's width is $\frac{48}{61}$ yojana. Ahead of this from the remaining $\frac{74}{61}$, we should take $\frac{52}{61}$ part and give it to 2 yojana interval. Thus, the sun in between the island and altar. The $\frac{22}{61}$ yojana region carried over to its width. from it the altar's 4 yojana region ends.

In the $\frac{170}{61}$ yojana at Lavaṇa there is 1 rises hence in 330 yojanas of orbital region with image $\frac{61\times 130}{170\times 1} = 118\frac{70}{170}$ rise station. ....(4.144)

Here, the $\frac{70}{170}$ yojana rise-portion remains. When 1 rise station occupies $\frac{170}{61}$ yojana. then $\frac{170}{61}$ rise portion occupies $\frac{170\times 70}{61\times 170} = \frac{70}{61}$ yojana. To this we add $\frac{52}{61}$ from $\frac{74}{61}$ yojana, getting $\frac{70}{61} + \frac{52}{61} = \frac{122}{61}$ or 2 yojana interval. ....(4.145)

Ahead of this interval, upto the last interval, there are 118 daily-motion reckoning rods alongwith sun's image. Here rise-stations are 118. Ahead of this in the outer most orbit, in width of the sun there is one rise stations. In this way, in Lavaṇa sea there are 118 + 1 = 119 rise stations. Hence in southen solstice, the total sun rise-stations are 62 + 2 + 1i9 =183. :.....(4.146)

The rises in 184 orbits are however 184.

Description about the order at the northern solstice:

In Lavaṇa sea, the orbital region alongwith sun's image is $330\frac{48}{61}$ yojana, or $\frac{20178}{61}$ yojanas.

For $\frac{170}{61}$ yojana region there is one daily-motion reckning rod. Hence for $\frac{20178}{61}$ yojana there are $\frac{61\times20178}{170\times61}=\frac{20178}{170}=118\frac{118}{170}$ reckning rods. ....(4.147)

On subtracting 1 from this gives the number of rise stations as 118 -1 = 117 rise stations. The rise in the outermost orbit is related with southern-solstice, hence one is subtracted. Remaining $\frac{118}{170}$ yojanas is to be operated as before. This rise portion contains region =

$\frac{170\times118}{61\times170}=\frac{118}{61}$ yojana. ....(4.148)

Out of this $\frac{48}{61}$ yojana is taken out and given to the next orbital width, getting one rise-station. In the northern solstice, in Lavaṇa's 117 rise-stations, this one is added, totalling to 118. Remaining $\frac{118}{61}-\frac{48}{61}$ is $\frac{70}{61}$ yojana which is added to the next interval, finishing the sea's orbital region. The 4 yojanas of altar also gives, throgh the rule of three one rise-station and there remains $\frac{74}{61}$ yojana out of which $\frac{52}{61}$ yojana is taken out and added to $\frac{70}{61}$ resulting is $\frac{70}{61}+\frac{52}{61}=\frac{122}{61}$ or 2 yojana, completing the remaining interval. Ahead of this interval, there is one rise in one daily-motion region. And remaining $\frac{22}{61}$ yojana should be given to orbit-width. In this way. the altar region of 4 yojanas is also disposed.

Excluding the 4 yojanas altar region, there remains the orbital region of 176 yojanas relative to orbital region of island. From this $\frac{48}{61}$ yojana is subtracted getting $\frac{176}{1} - \frac{48}{61} =$

$\frac{10688}{61}$.

For $\frac{170}{61}$ yojana region there is one diurnal motion reckning rod therefor for $\frac{10688}{61}$ yojana region, $\frac{61 \times 10688}{170 \times 61} = 62\frac{148}{170}$ reckning rods. Thus, due to 62 reckning rods, the rise stations are also 62.

The earlier region type of $\frac{148}{170}$ rise portion is $\frac{148}{61}$ yojanas.

Out of the $\frac{26}{61}$ yojanas is taken out and given to width of orbit in between the island and altar, completing the path width.

Now $\frac{148}{61} - \frac{26}{61}$ gives $\frac{122}{61}$ or 2 yojanas, which is to be given to the joint orbits-width interval ahead. Thus, there are 62 rise station for 62 reckningrods, and one rise each for innermost orbital-width. Thus, total being 64 rise-stations.

There also continuing the process 183 rise station are obtained. Ahead of which is the 184th orbit-width.

Regarding the moon, without solstice division, in the 180 yojanas of orbital region there are 5 rise-station in the island and there are 10 rise stations relative to 330 $\frac{48}{61}$ yojana of Lavaṇa sea. Thus, total is 15.

Description of rise-station Moon in southern solstice-

As per verse 377, " patha vyāsa piṇḍahiṇe", the measure of daily motion of the moon is $\frac{15551}{427}$ region. For $\frac{15551}{427}$ yojana region, there is one rise-station.

Then, for 180 yojana of orbital region .... $\frac{427\times180}{15551} = 4\frac{14656}{15551}$ rise-stations.....(4.149)

Here 4 are integral rise stations where as $\frac{14656}{15551}$ is the fractional rise, covering $\frac{14656}{15551} \div \frac{427}{15551}$ yojana $= \frac{14656}{427}$ yojanas. ....(4.150)

The orbit-width of the moon is $\frac{56}{61}$ yojana or $\frac{392}{427}$ yojana. Out of $\frac{14656}{427}$ yojana, $\frac{392}{427}$ is taken and added to next orbit width gives one rise-station, hence there are 5 rise-station in Jambū island. Out of these 5, only 4 are admissible as the rise in the innermost orbit is related with northern solstice. Now remaing region $\frac{14264}{427}$ is $33\frac{173}{427}$ which is to be given to the next interval, after 4 rise-stations.

The orbital region related with sea is $330\frac{48}{61}$ yojanas, or $\frac{20178}{61}$ yojana. For $\frac{15551}{427}$ yojana there is station of one rise Hence for $\frac{20178}{61}$ yojana region there are $\frac{427\times20178}{15551\times61}$

$= 9\frac{1287}{15551}$ rise stations. ....(4.151)

Here, after 9 rise station the fraction-rise $\frac{1287}{15551}$ remains, whose region is $\frac{1287}{427}$ yojana.

The measure of moon's diameter is $\frac{56}{61}$ yojana or $\frac{392}{427}$ yojana. Hence out of $\frac{1287}{427}$ yojana, this $\frac{392}{427}$ yojana is subtracted and added to external path, making one rise-station. Thus, 9 + 1 = 10 rise stations are obtained and $\frac{395}{427}$ yojana region is left. This is = $2\frac{41}{427}$, when added to remainder $33\frac{173}{427}$ given $33\frac{173}{427} + 2\frac{41}{427} = 35\frac{214}{427}$ yojana, the fifth interval being filled up. In this way, there are in all 14 rise-stations in the island-sea at southern solstice of the moon.

Rise Stations the moon in northern solstice

The orbital region related with Lavaṇa sea is $330\frac{48}{61}$ yojanas. In according with the above method, 9 rise stations are obtained and $\frac{1287}{15551}$ fractional rise remains. This when converted to region becomes $\frac{1287}{15551}$ yojana. The moon's diameter is $\frac{56}{61}$ yojana or $\frac{392}{427}$ yojana. Out of $\frac{1287}{427}$ yojana, $\frac{392}{427}$ yojana is subtracted, and added to external path diameter after the 9th interval, giving rise to one rise-station. Thus these are 10 rise stations in sea. The outermost orbit is related to rise in southern solstice, hence it is not admissible. Thus, only 9 rise-stations remain. The remaining $2\frac{41}{427}$ region in sea's orbital region is given to the 10th interval. Thus, ends the calculation of sea's orbital region.

The island's orbital region has, as already shown, 4 rise-stations, with remainder $\frac{14656}{15551}$ fractional rise-station, and this becomes $\frac{14656}{427}$ yojana when converted. Out of this

$\frac{14264}{427}$ yojana is taken out and added to the tenth interval.

Now remains $\frac{392}{427}$ yojana or $\frac{56}{61}$ yojana, which when given to inner most orbit-diameter, gives one rise-station. Thus in island there are 5 rise-stations of moon related to northern solstice. The total of rise-stations is thus 141 although there are 15 rise-stations in 15 orbital diameters, and the first orbital region of sea is not admissible as it belongs to southern solstice.

(v.4.397)

The division of bright region of sun in south, north, up and down directions is described.

When the statement is made relative to sun in innermost orbit, the radius of Jambū island is 50000 yojanas. Out of this 180 yojanas of orbital region is subtracted for island, getting 50000 - 180 = 49820 yojanas. Hence,in the northern direction, from centre of meru mountain upto innermost orbit. the birght area of sun is 49820 yojanas as spread.

The width of Lavaṇa sea ring is 200000 yojanas. Its sixth part is $33333\frac{1}{3}$ yojanas. On adding 180 yojanas, we get $33513\frac{1}{3}$ yojanas which gives the region in south direction for spread of brightness from the innermost orbit upto this.similarly, the same calculation be made for other orbits. The Citrā earth is 800 yojanas below the sun, and the base of Citrā earth is 1000 yojanas, totalling to 1800 yojanas, hence the brightness of sun extends to a depth of 1800 yojanas.

100 yojanas above the sun's diameter, is the astral universe and the brightness of the sun extends to a height of 100 yojanas.

(v.4.398)

Now the conjunction of the moon, planets with the constellation is described relative to celestial parts (gagana khaṇḍa)

There are in all 109800 celestial parts of circumference of celestial sphere. Out of these there are 630 calestial parts of Abhijit reletive to moon. Similarly, there are 6 constellations with 1005 celestial parts of extention, the 15 with 2010 celestial parts of extension, and then the maximal type 6 with 3015 celestial parts of extension. The names of these have been given in verses 4.399 and 4.400.

(v.4.401)

The period of revolution etc. are derived. There 6 minimal constellations having 1005 celestial parts each. Middle 15 have each 2010, and the maximal 6, each with a stretch of 3015 celestial parts.

The celestial parts of the minimal arc 1005 × 6 = 6030 celestial part.

The celestial parts of the middle arc 2010 × 15 = 30150 celestial part

The celestial parts of the maximal arc 2010 × 6 = 18090 celestial part

The celestial parts of the Abhijit arc 630 celestial part

Hence grand total = 6030 + 30150 + 18090 + 630 = 54900 celestial parts.

This is related to one moon, hence two moon cover 109800 celestial part. One is to be regarded as the real and the other as the counter. By the rule of three sets. The moon traverses 1768 celestial part in one muhūrta.

Hence " " 109800 " $\frac{109800}{1768} = 62\frac{23}{221}$ muhūrta. ....(4.152)

Similarly, the sun traverses 1830 celestial part in one muhūrta.

Hence " " 109800 " in $\frac{109800}{1830} = 60$ muhūrta. ....(4.153)

Similarly, the constellation traverses 1835 celestial part in one muhūrta

Hence " " 109800 in $\frac{109800}{1835} = 59\frac{307}{367}$ muhūrta. ....(4.154)

Actually we have to take half of these celestial part and consequent half of the periods.

(v.4.404)

Relative to constellations, the moon travels 1835 - 1768 or 67 celestial part less per muhūrta and the sun travels 1835 - 1830 or 5 celestial part less per muhūrta. For Abhijt, which has 360 celestial part, we have

$\because$ for leaving 67 celestial part the moon required 1 muhūrta

$\therefore$ for leaving 630 celestial part the moon required $\frac{630}{68} = 9\frac{27}{67}$ muhūrta. ....(4.155)

This period is the āsanna muhūrta, for the moon to be with Abhijit. Similarly, with the minimal constallations, the moon remains for $\frac{1005}{67} = 15$ muhūrta. ....(4.156)

With the middle constellations the moon remains for $\frac{2010}{67} = 30$ muhūrta. ....(4.157)

And with the maxmimal constellation the moon remains for $\frac{3015}{67} = 45$ muhūrta. ....(4.158)

Thus remains 5 celestial part behind the constellation. Hence with Abijit.

The sun remains for $\frac{630}{5} = 126$ muhūrta or $4\frac{1}{5}$ days, or 4 days 6 muhūrta ......(4.159)

The sun remains with mainimal constellation for $\frac{1005}{5}$

$= 201$ muhūrta or $6\frac{7}{10}$ days, ie. 6 days 21 muhūrta ....(4.160)

It remains with middle constellation for $\frac{2010}{5}$

= 402 muhūrta or 13 days 12 muhūrtas. ....(4.161)

Similarly it remains with maximal constellation for $\frac{3015}{5}$

= 603 muhūrta or 20 days 3 muhūrtas. ....(4.162)

(v.4.405)

The celestial part of the sun is 1830. When $\frac{1}{12}$ is subtracted from 1830,

we get $1830-\frac{1}{12} = 1829\frac{11}{12}$ celestial part. There are $\frac{61}{12}$ more than 1835 celestial part of constellation.

Now for learing $\frac{61}{12}$ parts, Rāhu takes 1 muhūrta

Hence for learing 630 celestial part-------- $\frac{12 \times 630}{61} = \frac{7560}{61}$ muhūrta

or $4\frac{8}{61}$ days ....(4..163)

Similarly the Rāhu takes

$\frac{12 \times 1005}{61 \times 30} = \frac{402}{61} = 6\frac{36}{61}$ days for crossing minimal constellation. ....(4.164)

$\frac{12 \times 2010}{61 \times 30} = \frac{804}{61}$ or $13\frac{11}{61}$ days for crossing middle contstellation. ....(4.165)

$$\frac{12 \times 3015}{61 \times 30} = \frac{1206}{61}$$

or $19\ 47\frac{47}{61}$ days for crossing maximal constellations. ....(4.166)

The alternative formula is given in the next verse 4.406.

(v.4.407)

The measure of inclusive and exclusive days of constellation with Moon, in a solstice -

In the northerm solstice of sun, there is Abhijit nakṣatra bhukti, whose period is $\frac{21}{5}$ days. Ahead of this, respectively the sun crosses the śravaṇa, Dhaniṣṭhā, Śatabhiṣā, Pūrvabhādrapada, Uttarabhādrapada, Revatī, Aśvinī, Bharaṇī, Kṛttikā, Rohiṇī, Mṛgaśīrṣa, Ārdrā, Punarvasu, and Puṣya. Out of these Śatabhiṣā, Bharaṇī and.Ārdrā are three minimal constellations. Out of these every one has been the sun for $\frac{67}{10}$ days, and for 3 constellations, is $\frac{67}{10} \times 3 = \frac{201}{10}$ days. Śravaṇa, Dhaniṣtha, Pūrvabhādrapada, Revatī, Aśvinī, Krttikā, and Mṛgaśīrṣa, are 7 middle ones each of whose has the period $\frac{67}{5}$ days with the sun, hence 7 constellations take $\frac{67}{5} \times 7 = \frac{469}{5}$ days. Similarly uttarabhādrapada, Rohiṇī, Punarvasu are three maximal ones, taking each $\frac{201}{10}$ days, hence the 3 take $\frac{201}{10} \times 3 = \frac{603}{10}$ days. After this the period for Puṣya to remain with the sun is $\frac{67}{5}$ days. But in the northern solstice, the bhukti period of Puṣya constellation is only $\frac{23}{5}$ days, hence $\frac{21}{5} + \frac{201}{10} + \frac{469}{5} + \frac{603}{10} + \frac{23}{5} = \frac{1830}{10} = 183$ day. Apart from this, how many days are there? There are 3 pastdays (gatadivasa) in a solstice. That is explained in next verse -

(v.4.408)

On crossing one orbit by the sun, $\frac{1}{61}$ day is got, hence on crossing 183 orbits, ------

$\frac{1}{61} \times 183 = 3$ days more are obtained. ....(4.161)

How 183 days are taken for a solstice ? The celestial part for sun in 1 muhūrta is 1830, and for the constellation is 1835, the move.

When sun takes for leaving constellations 5 celestial part behind, one muhūrta,

Then sun takes for leaving Abhijit constellation 630 celestial part behind, 630 muhūrta

Thus bhuktikāla is or $\frac{21}{5}$ days.

Similarly, the bhuktikāla of the sun through Śatabhiṣā etc. 3 constellation is $\frac{1005}{5 \times 30} =$ $\frac{67}{10}$ days.

It crosses the Śravaṇa etc. 7 middle constellation, bhuktikāla for each is $\frac{2010}{5 \times 30} = \frac{67}{5}$ days.

It covers Uttarābhādrapuda etc. 3 maximal constallations bhuktikāla for each is $\frac{3015}{5 \times 30} =$ $\frac{201}{10}$ days.

(v.4.409)

The speciality of Puṣya is stated in this verse.

The Puṣya constellation is middle one, having stretch of 2010 celestial part for leaving 5 celestial part, the sun takes 1 muhūrta

$\therefore$ for leaving 2010 celestial part, the sun takes $\frac{2010}{5 \times 30} = \frac{67}{5}$ days (bhuktikāla).

Out of these 5 parts, $\frac{23}{5}$ is subtracted and given to completion of northern solstice, remainder is $\frac{67}{5} - \frac{23}{5} = \frac{44}{5}$. Out of $\frac{44}{5}$ again $\frac{23}{5}$ is taken and given to first bracket of southern solstice, in the initial form of southern solstice. This day of Śravaṇa kṛṣṇa is the initial of southern solstice in the (first) innermost orbit. The remainder $\frac{21}{5}$ should be given to second bracket. In this way, in the beginning of the southern solstice, first at the end of the corssing (bhoga) of Puṣya constellation, respectively, it crosses Āśleṣā, Maghā, Pūrvāphālgunī, Uttarāphālgunī, Hasta, Citrā, Svāti, Viśākhā, Anurādhā, Jyeṣṭhā, Mūla, Pūrvāṣāḍhā, and Uttarāṣāḍhā. Out of these Aśleṣā, Svāti, and Jyeṣṭhā are the 3 minimal constellations, of 1005 celestial part each, hence the bhuktikāla of each is $\frac{67}{10}$ days, and of the three is $\frac{67}{10} \times 3 = \frac{201}{10}$ days. Maghā, Pūrvāphālguni, Hasta, Citrā, Anurādhā,Mūla and Purvāṣāḍhā are 7 middle ones, each of 2010 celestial part, with each bhukti kāla as $\frac{67}{5}$ days, hence the total is $\frac{67}{5} \times 7 = \frac{469}{5}$ days. Similarly uttarāphālguni, Viśākhā, and Uttarāṣāḍhā are 3 maximal ones, each having a stretch is 3015 celestial part, and bhuktikāla $\frac{201}{10}$ days, hence the bhuktikāla for it $\frac{201}{10} \times 3 = \frac{603}{10}$ days.

When all these bhuktiperiods are added, we get $\frac{44}{5} + \frac{201}{10} + \frac{469}{5} + \frac{603}{10} = \frac{1830}{10}$ days or 183 days in southern solstice.

The crossing period (bhuktikāla) of constellation by moon in northern solstice -

In the northern solstice first of all the moon crosses over (bhoga) the Abhijit constallation in $\frac{21}{61}$ days. After this it crosses over constellations from Śravaṇa to Punarvasu. Out of these Śatabhiṣā, Bharaṇī and Ārdrā are 3 minimal, with crossing period each of $\frac{1005}{67 \times 30} = \frac{1}{2}$ day. Here the 3 take $\frac{3}{2}$ or $1\frac{1}{2}$ days. The 7 middle constellations are the Śravaṇa, Dhaniṣṭhā, Pūrvabhādrapada, Revatī, Aśvinī, Kṛttikā, and Mṛgaśirṣa, the crossing period of each being $\frac{2010}{67 \times 30} = 1$ day, hence 7 days for 7 constellations. Similarly, the 3 maximal are the Uttarābhādraprada, Rohiṇī and Punarvasu each with crossing period of $\frac{3015}{67 \times 30} = 1\frac{1}{2}$ days, hence totalling to $\frac{3}{2} = 4\frac{1}{2}$ days. After this there is the Puṣya constellation crossed by the moon its $\frac{23}{67}$ th part in a day. The reason is that when the sun crosses to in $\frac{67}{5}$ days, the moon crosses it in 1 day, then if the sun crosses it $\frac{23}{5}$ days, the moon will cross it in $\frac{5}{67} \times \frac{23}{5} = \frac{23}{67}$ day. The sum total of all these comes out to be $(\frac{23}{67} + \frac{21}{67} + 1\frac{1}{2} + 7 + 4\frac{1}{2}) = 13\frac{44}{67}$ days. This is the crossing period of constellations by the moon in northern solstice.

The crossing peroad of constellation by moon in southern solstice -

In southern solstice, the moon crosses first of all the Puṣya constellation. The $\frac{23}{67}$ th part has already been crossed over in the northern solstice, hence the remainder $\frac{44}{67}$ th part is the crossperiod hare. This $\frac{44}{67}$th part should be taken and be given to first bracket of southern solstice in initial form of the southern-solstice. Thus after complete crossing over of Puṣya constellation, the moon then crosses respectively from Āśleṣā to Uttarāṣāḍhā. Out of these 3 minimal constellations have their crossing period as $\frac{1005 \times 3}{67 \times 30} = 1\frac{1}{2}$ days, that of 7 middle constellations is $\frac{2010 \times 7}{67 \times 30} = 7$ days, and that of 3 maximal constellations $\frac{3015 \times 3}{67 \times 30} = 4\frac{1}{2}$ days.

Thus the sum total is $\frac{44}{67} + 1\frac{1}{2} + 7 + 4\frac{1}{2} = 13\frac{44}{67}$ days, is the total crossing period of Constellations by moon in southern solstice

The crossing pe riod of Constellations by Rāhu in northern solstice -

In the northern solstice, the Rāhu, first of all crosses the Abhijit whose crossing period by it is $\frac{252}{61}$ days. Ahead of this, from Śravaṇa upto Punarvasu constellations, the crossing is in sequential order. Out of these the crossing period (bhuktikāla) of minimal constellations is $\frac{1206}{61}$ days, which is $\frac{402 \times 3}{61}$ days. The crossing period for middle constellations is $\frac{804 \times 7}{61} = \frac{5628}{61}$ days. The crossing period for 3 maximal constellations is $\frac{1206 \times 3}{61} = \frac{3618}{61}$ days. The crossing period for Puṣya is as follows: when the sun crosses Puṣya in $\frac{67}{5}$ days, the Rāhu crosses it in $\frac{804}{61}$ days. Hence, when the sun crosses it for $\frac{23}{5}$ days, the Rāhu takes $\frac{804 \times 5 \times 23}{61 \times 67 \times 5}$

$= \frac{276}{61}$ days, when there is completion of northern solstice. Thus the complete crossing period of Rāhu through northern solstice is the sum

$$\frac{252}{61} + \frac{1206}{61} + \frac{5628}{61} + \frac{3618}{61} + \frac{276}{61} = \frac{10980}{61} = 180 \text{ days.}$$

Crossing period of Rāhu in Southern solstice -

In the southern solstice, first of all the remainder $\frac{528}{61}$ part of Puṣya crossing period, is the period to be crossed. Ahead of this there is crossing in sequence from Āśleṣā to Uttarāṣāḍhā. Out of these, the crossing period of 3 minimal constellations is $\frac{402 \times 3}{61} = \frac{1206}{61}$ days. The crossing period of 7 middle constellation is $\frac{804 \times 7}{61} = \frac{5628}{61}$ days, and the crossing period of 3 maximal constellations is $\frac{1206 \times 3}{61} = \frac{3618}{61}$ days. The sum total of these is

$$\frac{528}{61} + \frac{1206}{61} + \frac{5628}{61} + \frac{3618}{61} = \frac{10980}{61} \text{ days} = 180 \text{ days.}$$

In a solstice the moon crosses the constellations in $13\frac{44}{67}$ days, hence the crossing period of one year is $13\frac{44}{67} \times 2 = 27\frac{21}{67}$ days. The sun's crossing period of one solstice is 183 days, hence that of one year it is $183 \times 2 = 366$ days. Similarly the crossing period of Rāhu for one solstice is 180 days, hence its crossing period of one year is $180 \times 2 = 360$ days. The collected crossing periods of the Rāhu, Ravi (sun) and śaśi (moon) are thus found out and depicted below :

(1) The column of minimal, middle and maximal extension constellations

(2) The crossing period of Rāhu in both solstices (360 days)

(3) The crossing period of sun in both solstice (366 days)

(4) The crossing period of moon in both solstice (27 $\frac{21}{\text{[illegible]}}$ days)

(5) Names of constellations against crossing periods.

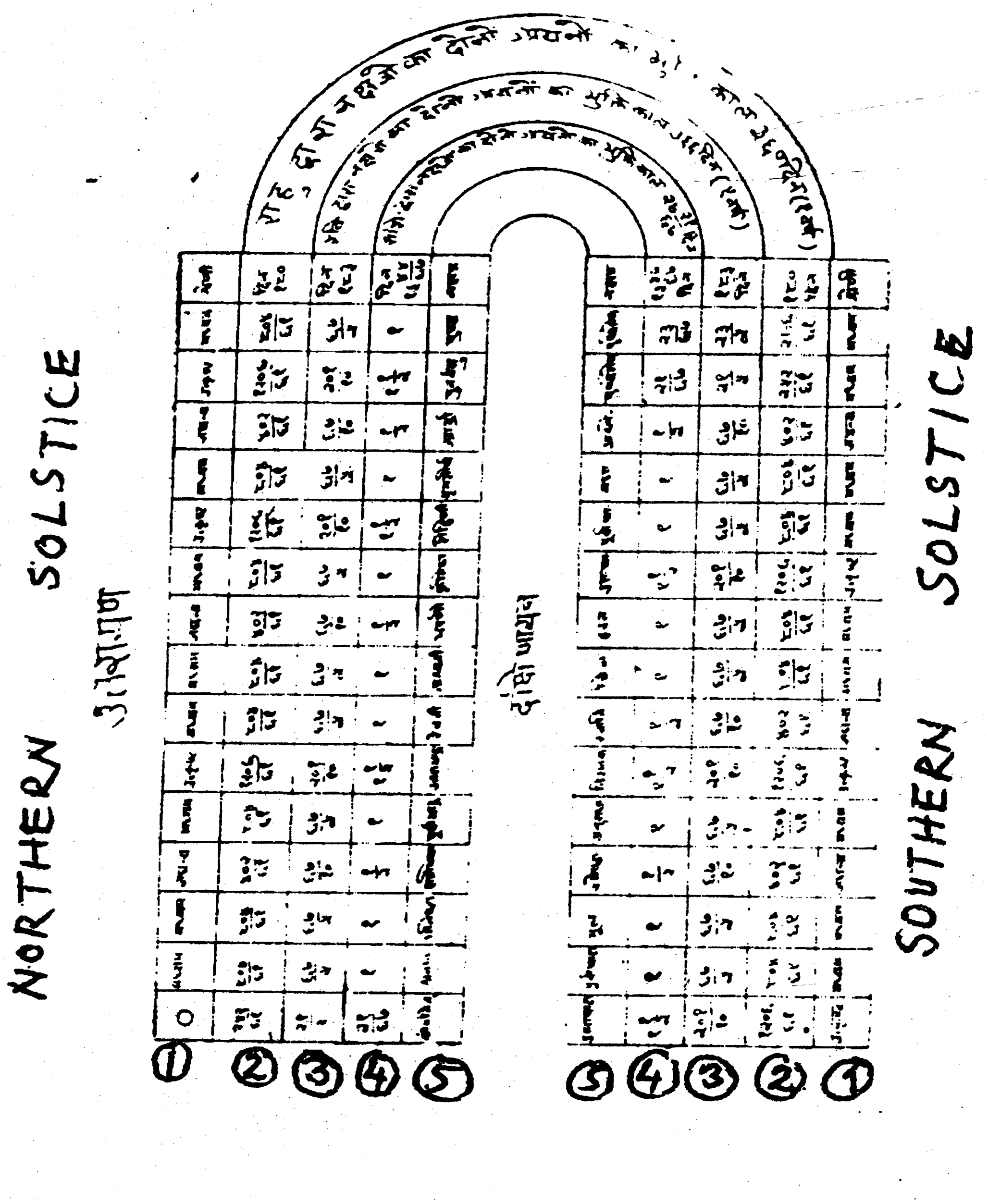


Figure 4.32

(v.4.410)

The formula for describing the intercallar y month (adhikamāsa) -

There are 184 orbits of the sun. The orbits are at an interval of 2 yojanas each. The sun has to cross the interval of 2 yojanas for entering into the next orbit. For crossing all the intervals, time taken is 12 day, because, for crossing one interval the time taken is 1 muhūrta (48 minutes), hence in one day there is an increase of one muhūrta, in thirty days there is an increase of 30 muhūrta or one day. Hence in 12 months there is an increase in period, of 12 days. In 2 years there is an increase of 30 days, and in 5 years there is an increase of 2 months.

Alternate Explanation:

In a year there are 12 months and in one month there are 30 days. Every 61st day, a tithi is reduced, hence in one year there should be 354 days, but the sun has for its year of 366 days. Hence in one year there is an increase of 12 days, in two years that of 24 days, in $2\frac{1}{2}$ years that of 30 days (as in $2\frac{1}{2}$ years there is a year of 13 months), and in five years there is an increase of 2 months.

(vv.4.411- 4.418)

The meaning of the above verse is explained through the next 8 verses -

(v.4.411)

In the afternoon of the full moon day of Āṣāḍha month, at the complation of the northern solstice, the five-year yuga comes to an end. Then on conjunction of the moon with the Abhijit constellation, on the Śravaṇa dark pratipadā (first), the five year yuga begins alongwith beginning of southern solstice.

(v.412)

There are 184 orbits of the sun's motion. Out of these where the sun is on the first orbit, then there begins the southern solstice. When it is on the last orbit, there is beginning of the northern solstice. This is called the first frequency (āvṛtti) of the southern solstice-northern solstice. The southern frequency increases as 1, 3, 5, 7, initiating with unity.

(v.413)

How is the frequence of the northern solstice-

There is an ending of earlier solstice and beginning of new solstice, and this is called the frequency (āvṛtti). These frequencies are 10 times in a yuga of 5 years. Out of these 1, 3, 5, 7 and 9th frequency is that of the southern solstice and the 2, 4, 6, 8 and 10th frequency concerns with the northern solstice.

At the end of northem solstice, when there is beginning of frequency related with southern solstice, then it begins with Śravaṇa month. The first frequency began from Śravaṇa dark pratipadā. The second frequency has been stated to be in Mṛgaśīrṣa constellation on Śravaṇa dark 13th (Trayodaśī).

(v.4.414)

In Śravaṇa white 10th, when the moon conjuncts with Viśākhā constellation, there is the 3rd frequency, and on Śravaṇa dark 7th at the conjunction with Revatī constellation there is the 4th frequency, and on Śravaṇa white 4th, it conjuncts with Pūrvaphālgunī constellation, and this is the 5th frequency.

(v.4.415)

In every Śravaṇa month, there is one frequency for all the 5 years of a yuga Hence there are 5 frequencies.

(vv.4.416-4.417)

The frequencies are as follows-

TABLE - 4.8 A

	SOUTHERN	SOLSTICE -		SUN
frequency order	Year	Month	Tithi	Constellation
1st	1st	Śravaṇa dark	pratipadā	Abhijit
2nd	1st	Māgha dark	7th	Hasta
3rd	2nd	Śravaṇa dark	13th	Mṛgaśīrṣa
4th	2nd	Māgha white	4th	Śatabhisā
5th	3rd	Śravaṇa white	10th	Viśākhā
6th	3rd	Māgha dark	pratipadā	Puṣya
7th	4th	Śravaṇa dark	7th	Revatī
8th	4th	Māgha dark	13th	Mūla
9th	5th	Śravaṇa white	4th	Pūrvāphālgunī
10th	5th	Māgha white	10th	Kṛttikā

(v.4.418)

All these frequencies in the northern solstice, for Māgha months of five years, have been stated for the sun by preceptors.

The collection of the above date for 5 years is called a Yuga. The above data remains the same for 2nd, 3rd etc. Yugas. The beginning of southorn solstice is in five Śravaṇa months and that of northern solstice in 5 Māgha months. In the duration of southern solstice Bhādra Āsauja Kārtika etc. months appear, so also in the duration of northern solstice, Phālguna, Caitra etc. months appear. For every one of these months, 31 tithis should be established, because ordinarily in a month threre are 30 days, but according to verse 4.410, "igimāse diṇavaḍḍhi", in the day there is an increase of 1 muhūrta, hence in a month there is an increase of one day. Hence in every month 31 tithis have been established. In a month, due to increase of 1 day, in 12 months there is an increase of 12 days and in 5 years, there is an increase of 2 months, as in the following figure may be seen.

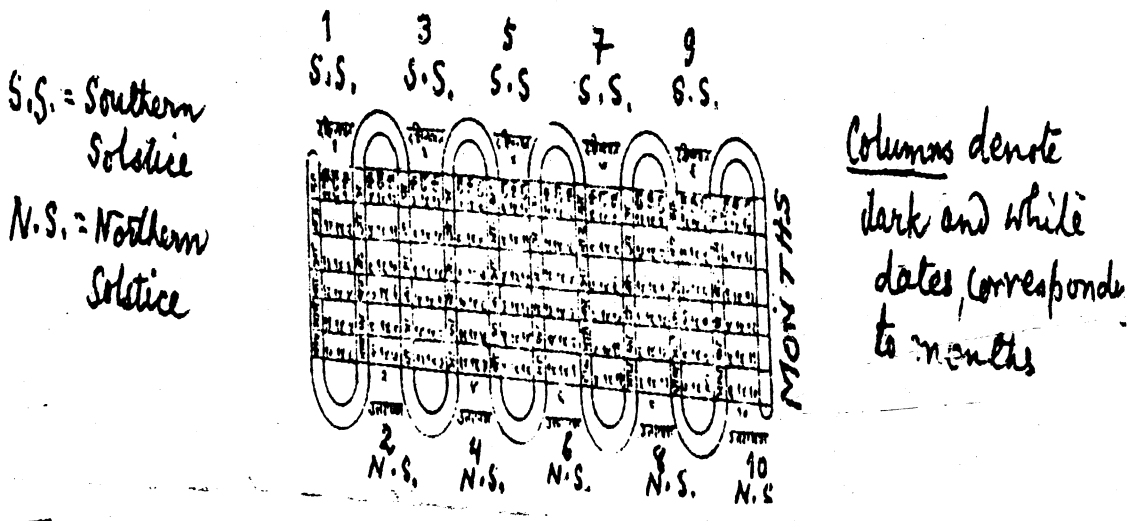


Figure 4.33

(v.4.419)

Law for finding out constellation in the beginning of southern and northern solctice -

Let the first frequency is chosen, Subtract one from this 1 getting zero. On multiplying it by 181, zero is obtained. In this product zero, on adding 21, sum is 21. On dividing this by cube of 3 or 27, it is not divisible, hence remainder is 21.

Thus 1-1= 0, $0 \times 181 = 0$, $0 + 21 = 21$, $21 \div 27$ give 21 remainder, 21st constellation is Uttarāṣāḍhā. But here in place of Uttarāṣāḍhā, we should take Abhijit constellation, because, athough there are 28 constellations, the place where counting of constellations is done, only 27 constellations are taken into account. Abhijit is not taken into account because its means is fine. Here in the first frequency, roughly the uttarāṣāḍhā is obtained, but for fine calculation, Abhijit is shown further, this should not be taken into account. Thus in the beginning southern solstice, in the first Śravaṇa month, the rule for finding out constellation has been shown.

Another example there of- Let 2nd ferquency is given. Subtracting 1, the remainder is 2-1 = 1. On multiplying by 181, we get 181. On adding 21 to this we get 181 + 21 = 202. On dividing this by 3^3 or 27, we get remainder 13, i.e. $202 \div 27 = 7\frac{13}{27}$. Thus in the 2nd frequency, counting from Aśvini, the 13th constellation is Hasta, hence in the beginning of Uttarāyaṇa, in the first Māgha month, Hasta constallation is obtained. Similarly, in the 3rd, 5th, 7th, and 9th frequencies, in the beginner Śravaṇa month of southern solstice, and in the 4th, 6th, 8th and 10th frequencies in the beginner Māgha month of northern solstice, constellations may be found out.

(v.4.420)

Rule for finding out the Parva and Tithi of southern solstice and northern solstice-

For example- Let first frequency is given for this purpose. Subtracting 1 from 1, zero is obtained. On multiplying 0 by 183, we get zero. On adding 0×3 in it, $0 + 0 = 0$. On adding 1 in this, $0 + 1 = 1$. On dividing this by 15, it remains undivided, therefore Parva does not exist here. Remainder is 1, hence that is pratipadā of dark fortnight (pakṣa). On completion of the fortnight, whatever full moon or new moon happens, that is called Parva. This first frequency happens to be on pratipadā of dark fortnight in first Śravaṇa month at the beginning of southern solstice.

Another example there of - Let second frequency is given for the case. On subtracting 1 from 2 gives $2\text{-}1 = 1$. This is multiplied by 183 we get $1 \times 183 = 183$. The multiplier was 1, on multiplying 1 by 3, we get 3 which is added to 183, getting $3 + 183 = 186$. One is added to it and the sum divided by 15 getting $\frac{186 + 1}{15} = 12\frac{7}{15}$. Thus in the second frequency, 12 parva and 7th tithi is obtained. This second frequency in northern solstice happens to be after its beginning, in first Māgha month, on 7th tithi of dark fornight, and upto this period 12 Parva have been elepsed from the beginning of Yuga.

Another example there of - Let the 3rd frequency be given for the case. Hence here, the operation are $3 - 1 = 2$, $2 \times 183 = 366$, $366 + (2 \times 3) = 372$, $\frac{372 + 1}{15} = 24\frac{13}{15}$.

Thus this third frequency happens to be on 13th tithi of dark fortnight in second Śravaṇa month, begining at the southern solstice. Upto this even, 24 parva have elapsed from the beginning of the Yuga. In this sequence, in other frequencies, the parva and tithi could be calculated.

(v.4.421)

The next 6 verses described the parva, tithi in the equinoxes along with constellation in the ten solstices of the Yuga.

A solstice (ayana) is of 6 months, and after the lapse of half of solstice, lengths of day and night are equal. This is an equinox. In the half-period of southern solstice there are 5 equinoxes, and again there are 5 equinoxes in half-period of northern solstice. Thus in a yuga, there are in all 10 equinoxes (viṣupa). In the beginning of yuga, at the lapse of 6 parva (3 months) of the start of first equinox related with southern solstice and thus at the beginning of yuga on the 3rd tithi, there is crossing period of the Rohiṇī constellation by the moon.

(vv.4.422-426)

From the first instant of hyperserpentine (utsarpiṇī) and hyposerpentine (Avasarpiṇī), upto the last instant, in the five-year yugas, there happens southern and northern solstices. At the lapse of half part of every solstice, there is an equinox. The following table gives the description of the how and when of equinoxes, in what months and constellations -

TABLE - 4.9

Year No.	Equinox Number	Elapsed parva count	Month	Fort night (paṣka)	Tithi	Constellation
1st	1st	At lapse of 6 parva	Kārtika	darkhalf	3rd	At conjunct with Rohaṇī
	2nd	At lapse of 18 parva	Vaiśākha	darkhalf	9th	At conjunct with Dhaniṣthā
2nd	3rd	At lapse of 31 parva	Kārtika	darkhalf	new moon (amāvaśyā)	At conjunct with Svāti
	4th	At lapse of 43 parva	Vaiśākha	Whitehalf	6th	At conjunct with Punarvasu
3rd	5th	At lapse of 55 parva	Kārtika	Whitehalf	12th	At conjunct with Uttarābhādrapada
	6th	At lapse of 68 parva	Vaiśākha	darkhalf	3rd	At conjunct with Anurādhā
4th	7th	At lapse of 80 parva	Kārtika	darkhalf	9th	At conjunct with Maghā
	8th	At lapse of 93 parva	Vaiśākha	darkhalf	new moon	At conjunct with Aśvini
5th	9th	At lapse of 105 parva	Kārtika	Whitehalf	6th	At conjunct with Uttarāsāḍhā
	10th	At lapse of 117 parva	Vaiśākha	Whitehalf	12th	At conjunct withUttarāphālguni

(v.4.427)

Rule for finding out parva and tithi in equinox- Whatever equinox is chosen, it is doubled and one is subtracted from it, in the remainder 6 is multiplied, getting the number of parva, and half of it is the number of tithi.

For example : Let first equinox is chosen (iṣṭa). It is doubled and 1 is subtracted getting $1 \times 2 = 2, 2 - 1 = 1$, in which 6 is multiplied getting $1 \times 6 = 6$, half of which is $\frac{6}{2}$ or 3. This is the number (3) of parva elapsed and the first equinox is on 3rd.

Another example there of- let the chosen equinox be 5th. Then $5 \times 2 = 10, 10 - 9 = 9$, $9 \times 6 = 54; 54 \div 2 = 27, 27 \div 15 = 1\frac{12}{15}$. This 1 is added to 54, getting 55 as the number of elapsed parva and the remainder 12 denotes the tithi.

(v.4.428)

Rule for finding out number of tithi in frequency (āvṛtti) and equinox (viṣupa)-

Let a frequency by chosen for the problem. One is subtracted out of it, remainder is multiplied by 6, and established at two places. At one place one is added and at the second place 3 is added, we get respectively the number of tithi and the tithi number of the equinox of the frequency. If the tithi number is odd. then it is the dark half, and if it is even then it is white half.

An example there of - Let 1st frequency is under study. Hence number at first place $1 - 1 = 0, 0 \times 6 = 0, 0 + 1 = 1$ tithi number at first place. Thus it is the pratipadṣ tithi of first frequency. This tithi number is odd, hence it is dark half. Or the first frequency appeared on pratipadā (first) tithi of the dark half. Further $1 - 1 = 0, 0 \times 6 = 0, 0 + 3 = 3$ tithi number at second place. This tithi number 3 is odd, hence it is dark half. Thus the first equinox happens on 3rd tithi of the dark half (kṛṣna pakṣa).

Another example there of- Let 10th frequency be under study. Hence $10 - 1 = 9, 9 \times 6 = 54, 54 + 1 = 55, 55 \div 15 = 3\frac{10}{15}$. Quotient is 3 and remainder is 10. This remainder 10 is the tenth tithi of the 10th frequency. The tithi is even number, hence the 10th frequency appears on

10th tithi of white half. Similarly, at second place 10 - 1 = 9, 9 × 6 = 54, 54 + 3 = 57, 57 ÷ 15 = $3\frac{12}{15}$. Here 12 is the remainder, an even number, hence it is 12th tithi of white half of 10th equinox. Si nilarly, other problems could be solved.

(v.4.429)

Rule for finding out the number of constellations and complete days in an equinox-

Whatever constellation is obtained for whatever frequency, 10 is added to it, that count gives the number of the constellation of the equinox, and whatever constellations are obtained for the 6th, 8th and 10th frequencies, on adding to them 10 as reduced by 1, is 9, gives the constellations respectively of the 6th, 8th and 10th equinoxes. In the parva number of frequency is multiplied by 15, and on adding the same frequency tithi number, all the total number of days from the beginning of yuga upto given frequency. Similarly, the parva number of equinox is multiplied by 15, and on adding to the product the tithi number, the total number of days of the equinox is obtained.

An example there of - Given the 20th constellation Abhijit of first frequency. On adding 10, we get 20 + 10 = 30, or the 2nd Rohaṇī constellation of first equinox is obtained. Similarly the constellation of the 2nd frequency is the 11th Hasta, and on adding 10, it is 21st constellation Dhaniṣṭha of second equinox.

Another example- The Pusya constellation is 6th of the 6th frequency, and adding 10 -1 = 9 in it, the 6 + 9 = 15th constellation is Anurādhā of the 6th equinox. Similarly the Kṛttikā constellation of the 10th frequency + (10 - 1) = 10th constellation Uttarāphālgunī of the 10th equinox.

Example-3 : The parva number of second frequency is 24 × 15 = 360. Adding 13 tithi to it, it becomes 373 days, ie. from the beginning of the yuga, on 373th day, there is the 2nd frequency.

Example-4 : The parva number of 7th equinox is 80 × 15 = 1200, then 1200 + 9 tithi = 1209 days. Thus from beginning of the yuga, after 1209 days, there is the 7th equinox.

(v.4.430-431)

The finding of constellation of frequency is by another method, in equinox, through two verses as follows- for the given frequency, and its constellation, the constellation is counted from Aśvini constellation, and whatever number is obtained, 8 is added to it, and on being counted from Kṛttikā constellation, the equinox's very number of constellation is obtained. For example- Arbitrary equinox be 3rd. Its constellation is Mṛgaśīrṣa, which on being counter from Aśvini, is 5th. On adding 8 to it we get 13. Counting 13th from Kṛttikā is Svāti constellation, hence the third equinox's constellation is Svāti.

The next verse details what to do if on adding 8 to the frequency's constellation the resulting number is greater than 28. From the count from Aśvinī of given frequency's constellation, if on adding 8, it gives more than 28, then subtract from it 28, and then counting be done from kṛttikā constellation, the constellation so found is that of the equinox. For example, the given frequency is 4th. Its contellation is Śatabhiṣā which on being counted from Aśvinī is the 25th. On adding 8, it is 33. On subtracting 28 from 33, we get 5. Punarvasu is the 5th constellation from kṛttikā constellation. Hence this is the constellation of 4th equinox.

Counting from Aśvinī, the constellations of second and fifth frequencies, whatever be obtained, 8 may be added to them, and adding one digit more, counting be done from Kṛttikā. Whatever constellations are obtained they belong to second and fifth equinoxes. For example, in the 2nd frequency there is Hasta which is 13th from Aśvini, adding 8, we get 13 + 8 = 21, adding 1 ~~more,~~ we get 21 + 1 = 22. Counting from kṛttikā, 22nd is Dhaniṣṭhā, which is the constellation of 2nd equinox.

Similar is the process for the 5th. Now regarding the 6th and 8th frequency's constellations, whatever be obtained as count from Aśvinī, 8 be added to them and one digit be subracted from each. What ever be the remainder, count from kṛttikā gives the constellations belonging to the sixth and tenth equinoxes. For example, in 6th frequency the constellation is

Puṣya, the 8th from Aśvinī, 8 + 8 = 16 and 16 - 1 = 15. Counting 15th from kṛttikā is Anurādhā, the constellation of 6th equinox. Similarly for the 10th frequency. The following table is a complete illustration of the process-

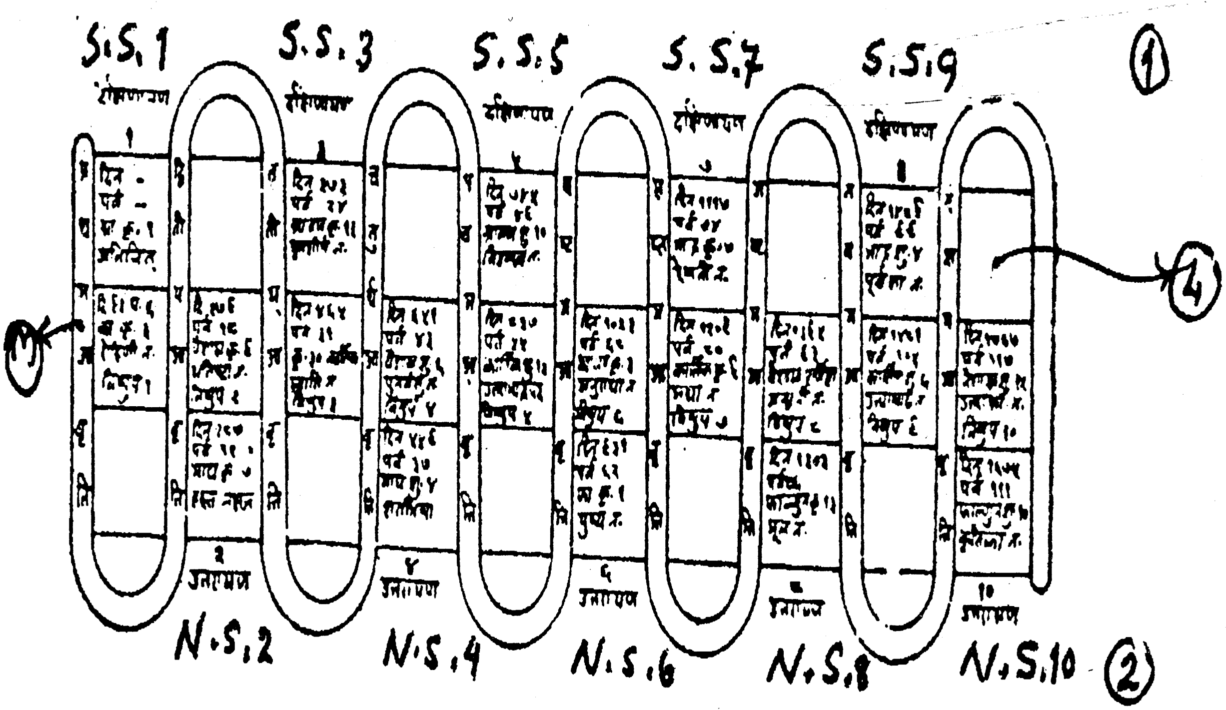


Figure 4.34

(1) S.S.= Southern solstice from 1 to 9,odd

(2) N.S.= Northern solstice from 2 to 10, even

(3) vertical columns are ten frequencies from 1st to 10th, filled in curved line.

(4) The rectangular blocks carry information about 10 equinoxed from 1 to 10, in days, parva, tithi, and constellation corresponding to month etc.

(v.4.434-435)

The following is the TABLE depicting the lord of the specific constellation - Comparison may be made with other systems.

TABLE - 4.10

No.	Constell.	Lord	No.	Constell.	Lord
1	kṛttikā	Agni	15	Anurādhā	Mitra
2	Rohaṇī	Prajāpati	16	Jyesṭhā	Indra
3	Mṛgaśirṣa	Soma	17	Mūla	Nairṭi
4	Ārdrā	Rudra	18	Purvāṣāḍhā	Jala
5	Punarvasu	Aditi	19	Uttarāṣāḍhā	Viśva
6	Puṣya	Devamantri	20	Abhijit	Brahmā
7	Aśleṣā	Sarpa	21	Śravaṇa	Viṣṇu
8	Maghā	Pitā	22	Dhaniṣṭhā	Vasu
9	Pūrvāphālgunī	Bhaga	23	Śatabhiṣā	Varuṇa
10	Uttarāphālgunī	Aryamā	24	Pūrvabhādrapada	Aja
11	Hasta	Dinakara	25	Uttara bhādrapad	Abhivrddhi
12	Citrā	Svaṣṭa	26	Revatī	Pūṣā
13	Svāti	Anila	27	Aśvanī	Aśva
14	Viśākhā	Indrāgni	28	Bharaṇī	Yama

(v.4.436)

At the setting of the kṛttikā constellation, the 8th constellation Maghā from Kṛttikā comes at the meridian (madhyahna) or midday transiting, and the Anurādhā, the 8th from Maghā is rising. Similarly, regarding Rohaṇī etc. the eighth constellation from it is at the meridian, transiting and 8th beyond it is rising.

For example, simultaneous states of the constellations-

Setting	Transiting	Rising
Rohaṇī	Pūrvāphālgunī	Jyeṣṭhā
Mṛgaśirā	Uttarā phālgunī	Mūla
Ārdra	Hasta	Pūrvāṣāḍhā
Punarvasu	Citrā	Uttarāṣāḍhā

(vv.4.437-339)

These verses give the names of the constellation in various sequential orbits of the moon-

Orbit Number where moon is orbiting   Names of constellations in the orbits.

1st orbit - Abhijit, Śravaṇa, Dhaniṣṭhā, Śatbhiṣā, Pūrvābhādrapada, Uttarābhādrapada, Revatī, Aśvinī, Bharaṇī, Svātī, Pūrvāphālgunī and Uttarāphālgunī

(12) constellation.

(2) 3rd orbit- Punarvasu and Maghā

(1) 6th orbit- Kṛttikā

(2) 7th orbit- Rohaṇī and Citrā

(1) 8th orbit- Viśākhā

(1) 10th orbit- Anurādhā

(1) 11th orbit- Jyeṣthā

(8) 15th orbit- Hasta, Mūla, Purvāṣāḍhā, Uttarāṣāḍhā, Mṛgaśīrṣa, Ārdrā, Puṣya and Aśleṣā

(28) Total planets in various orbits of the moon. This has been in the following diagrammatic figures paths of the constellations, coincident with those of the moon - The Lunar zodiac -all the 28 constellations are depicted-

15 orbits of the moon, round the meru, some of them coincide with-those of the constellations as described above.

(n) the nth orbit, The names of the constellations, have been noted in their own orbit. Their distance from the meru are all given in yojana.

Altar of Jambūdvīpa

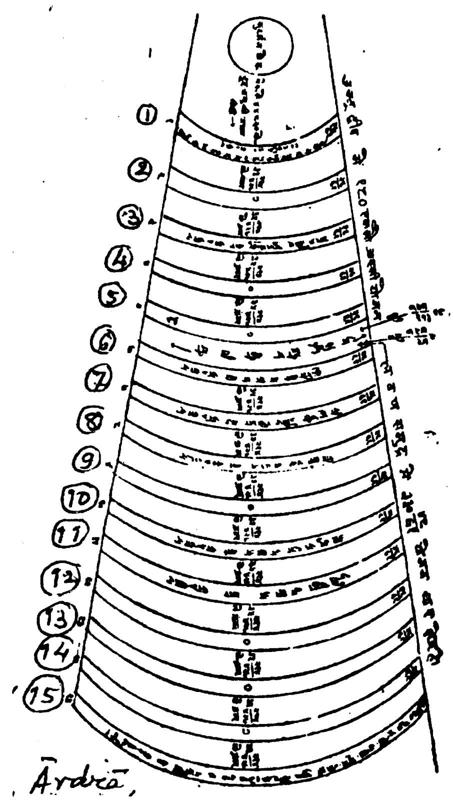


Figure 4.35

(vv.4.440-445)

The following verses give the number of stars as sun in any constellation of the lunar zodiac. The table also dipicts the shape of the cluster of stars associated with a constellation. These are comparable with those given in the Hindu system of astronomy. These have been also described in the TPT. The constellations also contain family of stars whose number has also been given in the following table-

TABLE - 4.11

Ser. No.	Constellation	No. of Stars	Shape of Stars collection, as if	Number of Family Stars
1	Kṛttikā	6	Bijanā (fan)	1111 × 6 = 6666
2	Rohaṇi	5	Spoke of a wheel	1111 × 5 = 5555
3	Mṛgaśirṣa	3	Head of a deer	1111 × 3 = 3333
4	Ārdrā	1	Lamp	1111 × 1 = 1111
5	Punarvasu	6	Archada	1111 × 6 = 6666
6	Puṣya	3	Umbrella	1111 × 3 = 3333
7	Aśleṣā	6	Snake residence or mole hillock Bàlmika (Anthill)	1111 × 6 = 6666
8	Maghā	4	Urine of cow	1111 × 4 = 4444
9	Pūrva phālguni	2	Arrow	1111 × 2 = 2222
10	Uttarā phālguni	2	Yuga (yoka)	1111 × 2 = 2222
11	Hasta	5	Hand	1111 × 5 = 5555
12	Citrā	1	Blue lotus	1111 × 1 = 1111
13	Svāti	1	Lamp	1111 × 1 = 1111
14	Viśākhā	4	Support, adhikaraṇa (receptacle)	1111 × 4 = 4444
15	Anurādhā	6	Grand Garland	1111 × 6 = 6666
16	Jyeṣṭhā	3	Lute sign	1111 × 3 = 3333

17	Mūla	9	Scorpion	1111 × 9 = 9999
18	Pūrvāṣāḍhā	4	complex well	1111 × 4 = 4444
19	Uttarāṣāḍhā	4	Lion pot	1111 × 4 = 4444
20	Abhijit	3	Elephant pot	1111 × 3 = 3333
21	Śravaṇa	5	Drum	1111 × 3 = 3333
22	Dhaniṣṭhā	5	Falling bird	1111 × 5 = 5555
23	Śatabhiṣā	111	Army	1111 × 111 = 123321
24	Pūrvābhādrapada	2	Fore-body of Elephant	1111 × 2 = 2222
25	Uttarābhādra pada	2	Rear-body of Elephant	1111 × 2 = 2222
26	Revatī	32	Boat	1111 × 32 = 35552
27	Aśvinī	5	Head of a Horse	1111 × 5 = 5555
28	Bharaṇī	3	Stone of fire-place, cūlhā patthara (stone of burner)	1111 × 3 = 3333

(v.4.446)

The maximal life or longevity of moon is 1 Palya and 1 lac years, that of the sun is 1 palya and 1000 years, that of Venus is 1 palya and 100 years, that of Jupiter is 1 palya, those of Mercury, Mars and Saturn etc. are half palya each; those of stars and constellations are one fourth of a palya, and their minimal longevity is $\frac{1}{8}$ palya.The sun etc. have minimal longevity is $\frac{1}{4}$ palya (vide Jambū dvīpa paṇṇatti, p.233).

CHAPTER - V

VAIMĀNIKA LOKA ADHIKĀRA

(Chapter on Celestial-Plane-Universe)

(vv.5.452-453)

The celestial-planes paradises are of two types the wish (kalpa) and the beyond wish (kalpātīta), first the wish-paradise is deseribed-

There are one Indra each of Saudharma, Aiśāna, Sānatkumāra, and Māhendra, hence there are 4 wish-paradise. There is one Indra for Brahma-Brahmottara, hence this is the fifth wish-paradise. Similarly Lāntava Kāpiṣṭha is sixth, Śukra-Mahāśukra is seventh, and śatārasahasrāra is eighth, because the pair has one and only one Indra. Ānata, Prānata, Āraṇa and Acyuta are 4 wish-paradises because each has its own Indra. Indra means the lord of deities.

(v.5.454)

The sixteen paradises have eight pairs. As shown above the former pairs, four have 4 Indra, hence they are 4 wise-paradise. The remaining upper and lower two pairs each or eight paradises have 8 Indra, hence there are 8 wish-paradises. Thus for 16 paradises, relative to 12 Indra, there are 12 wish-paradises (kalpa).

TABLE - 5.1

Ser. No.	Nameof paradise	Indra	No. of Indra	Disc	Indra Number	Indra	Name of paradise
1	Acyuta	Indra	1	6	1	Indra	Āraṇa
2	Prāṇata	Indra	1	.	1	Indra	Ānata
3	Sahasrāra	Indra	1	1	.	.	Śatāra
4	Mahāśukra	Indra	1	1	.	.	Śukra

5	Kāpiṣṭha	.	.	2	1	Indra	Lāntava
6	Brahmottara	Indra	1	7	1	Indra	Brahma
7.	Māhendra	Indra	1	7	1	Indra	Sānatkumāra
8	Aiśāna	Indra	1	13	1	Indra	Saudharma

(v.5.455)

The Graiveyaka are of three types-the lower, the middle and the upper. Out of these every one is of 3 types, in this way there are 9 Graiveyaka. Above these are nine Anudiśa, And still above them are five Anuttara celestial planes. All these are beyond-wish celestial planes (kalpātita vimāna), in which the Ahamindra reside, there being absence of wish or imagination of an Indra. The following figure illustrates them-

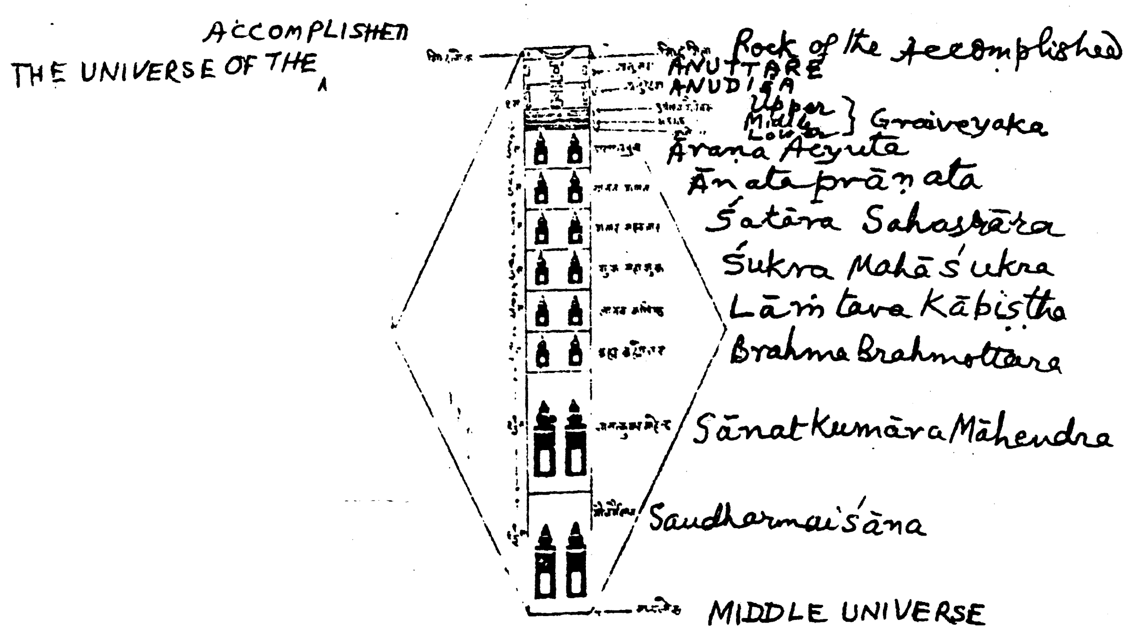


Figure 5.1

(vv.5.456-458)

These verses describe the locations of various types of celestial planes which are kalpa and kalpātita, corresponding to kalpa and kalpātita paradise. The number of celestial planes range from Śaudharma as 3200000 to Anuttara as 5.

(v.5.472)

This verse gives the extension of Indraka celestial planes. From the Ṛtu to Sarvārtha siddhi, the Indraka celestial planes decrease in extension in a common difference of an arithmetical sequence. Here the human region is 4500000 yojana in width, hence the Ṛtu Indraka celestial plane is of the same width. The Jambū island has a diametre of 100000 yojana which is also the diameter of Sarvārthasiddhi. On subtraction, the remainder is 4400000 yojanas. This is divided by (63 - 1) or total number of terms minus one, giving the difference decrease common to each, Thus, $\frac{4500000 - 100000}{63 - 1} = 70967\frac{23}{31}$ yojana as the common-decrease-difference. Hence on subtracting this from 4500000, the measure of the next Indraka celestial plane is obtained as $4429032\frac{8}{31}$ yojana of candra Indraka. This is continued upto 63rd celestial plane.

(v.5.473)

This verse describes the location of sequen tial (śreṇibaddha) celectral planes.

In the first kalp pair, there are 31 Indraka planes. Out of these, in the four directions each of the first Ṛtu Indraka plane, there are located 62 and 62 sequential planes. Ahead of this, in the second, third, fourth Indraka, they get reduced by unity, (61, 60, 59 etc.), till in the four directions each of the Anudiśa and Anuttara Indraka planes, there remains only one sequential plane.

Here the rule is given for finding sum total from dakṣiṇendra and uttarendra :-

The number of mono-directional sequential planes in saudharma kalpa is 62. As in the three direction, each, west, south are subject to this kalpa, hence for finding out the sequential planes of these three directions 62 is multiplrd by 3, getting $62 \times 3 = 186$. This 186 is the first term (mukha or prabhava), and this is the initial sum (ādidhana). The post-sum (uttara dhana) is 3. This is also called decreasing, difference (hāni-caya), because in the every disc, three sequential planes of three directions corrsponding to saudharma go on reducing. As discs are 31, hence number of terms (gaccha) is 31. Now taking help of reducing summation (hina saṅkalana), the sum is found out. By making use of formula in v. 1.164, "padamegeṇa vihiṇaṁ", whatever is obtained, that is multiplied by post-sum 3, the product is subtracted from initial sum (ādidhana), 186, and on multiplying the remainder by term 31, the measure of sequential planes of Saudharma is obtained. For example $\frac{31-1}{2} \times 3 = 45$; $(186 - 45) \times 31 = 4371$ is the number of the sequential planes of Saudharma. On adding 31 Indraka of Saudharma kalpa, amount 4371 + 31 = 4402 is obtained.

Only northern directional sequential planes of the above mentioned 31 Indraka planes are contained in this kalpa, hence the Aiśāna kalpa has initial sum = 62, post-sum = 1 and number of terms 31. According to the above rule, here in Aiśāna kalpa, $\frac{31-1}{2} \times 1 = 15$; $(62 - 15) \times 31 = 1457$ is the number of sequential planes. Here the amount of Indraka planes is not mixed because there is absence of Indraka planes for uttarendra. ie., all 31 Indraka planes are under control of Saudharma and not under Aiśāna.

The amount of monodirectional sequential planes of Saudharma kalpa is 62. Out of these, the own number of terms (gaccha), 31, is subtracted, getting 31 as remainder. This is also the amount of mono directional sequential planes of Sānatkumāra Māhendra in the first disc, similarly, on subtracting number of terms of own disc from the monodirectional sequential planes of first disc of earlier pair, give successively the monodirectional sequential planes of first disc of successive pairs.

for example, in Saudharmaiśāna, 62; in Sānatkumāra Māhendra, 62 - 31 = 31; in Brahmabrahmottara, (31 - 7) = 24; in Lāntava Kāpiṣṭha, 24 - 4 = 20; in Śukramahāśukra, 20 - 2 = 18; in Śatarasahasrara, 18 - 1 = 17; in Āanata etc. four kalpa, 17 - 1 = 16; in Adho - graiveyika, 16 - 6 = 10 ; in Madhya-graiveyika, 10 - 3 = 7; in Uparima graiveyika, 7 - 3 = 4; and in all Anudiśa, 4 - 3 = 1 are the sequential planes in a single direction. These amounts of sequential planes, are multiplied by 3 relative to Dakṣiṇendra and by 1 relative to uttarendra, and in case of no imagination of these, on multiplication by 4 give the initial sum (ādidhana). For example, of Sā, (31 × 3) = 93; of Mā, (31 × 1) = 31; in Brahma Brahmottara kalpa 96; in Lāntava Kāpiṣṭha, 80; in Śukra Mahāśukra, 72; in Śatāra-Sahasrara kalpa 68; in Ānata etc. four, 64; in Adhograiveyika, 40; in Madhyagraiveyika, 28; in Uparima graiveyika, 16; and in Nine Anudiśa planes 4 are the amounts of initial sums. The negative common-difference or post-sum is 3 in Sānatkumāra, is 1 in Māhendra, and 4 every where above. The number of terms is equal to its own disc. For example the number of terms in Sānatkumāra etc. are respectvily 7, 4, 2, 1, 1, 6, 3, 3, 3, and 1.

Thus,

$\frac{7-1}{2} \times 3 = 9$; $(93 - 9) \times 7 = 588$, the measure of sequential planes in Sānatkumār-kalpa

$\frac{7-1}{2} \times 1 = 3$; $(31 - 3) \times 7 = 196$ the measure of sequential planes in Mahendra kalpa

$\frac{4-1}{2} \times 4 = 6$; $(96 - 6) \times 4 = 360$ the measure of sequential planes in Brahmabrahmottara kalpa

$\frac{2-1}{3} \times 4 = 2$; $(80 - 2) \times 2 = 156$ the measure of sequential planes in Lāntava-Kāpiṣṭha.

And so on, upto the Anudiśa.

(v.5.475)

The scarttered planes are called prakīrṇaka, spread like flowers in the in intervals of sequentially ordered planes, without being in any row, as shown in figure. Whatever is the number of every paradise, out of it the own disc's number of Indraka and sequential planes are subtracted, getting the remainder as the amonut of scattered planes. For example:

In Saudharma kalpa : 3200000 - (4371 + 31) = 3195598 scattered planes.

In Aiśāna kalpa : 2800000 - (1457 + 0) = 2798543 scattered planes.

In Sāntkumāra kalpa : 1200000 - (588 + 7) = 1199405 scattered planes.

And so on upto Anudiśa, where there are 9 - (4 + 1) = 4 scattered planes. In Anuttara paradise, there is absence of prakīrṇaka (scattered) planes.

62 sequentially ordered planes in four directions of first Ṛtu Indraka of first heaven, remaining are the scattered planes. width is 4500000 yojanas

32 sequentially ordered planes in four directions of 31st Prabhā Indraka 32 of first heaven, remaining are the scattered planes width is $2370967 \frac{23}{31}$ yojanas.

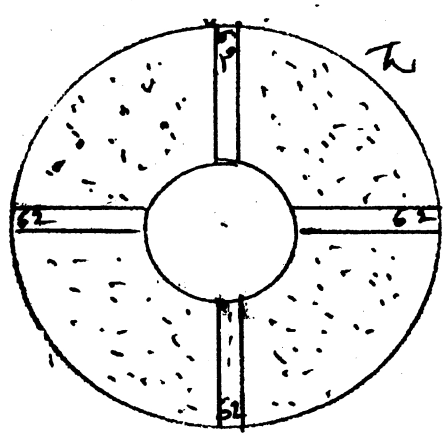


Figure 5.2

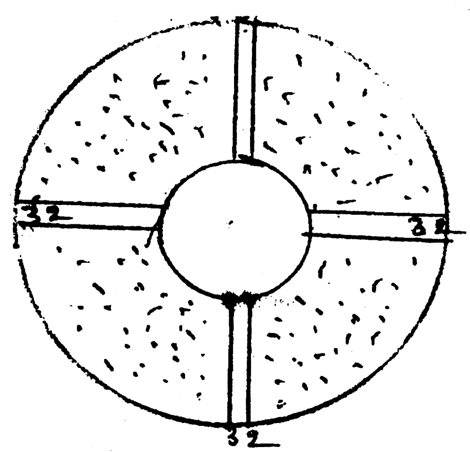


Figure 5.3

(v.5.493)

We describe the city in Saudharma paradise, other having similar type of description: The width of the city is 84000 yojanas. The Saudharmaiśāna having a height of 300 yojanas, thickness of 50 yojanas, depth of 50 yojanas, with Gopura doors having a height of 400 yojanas in every one of the directions. Similarly for remaing pairs etc.

(v.5.505)

Where there are cities of the universal-guards (lokapāla), in the subdirections, there are chief gaṇikā deities cities, which are square with a side of one lac yojanas.

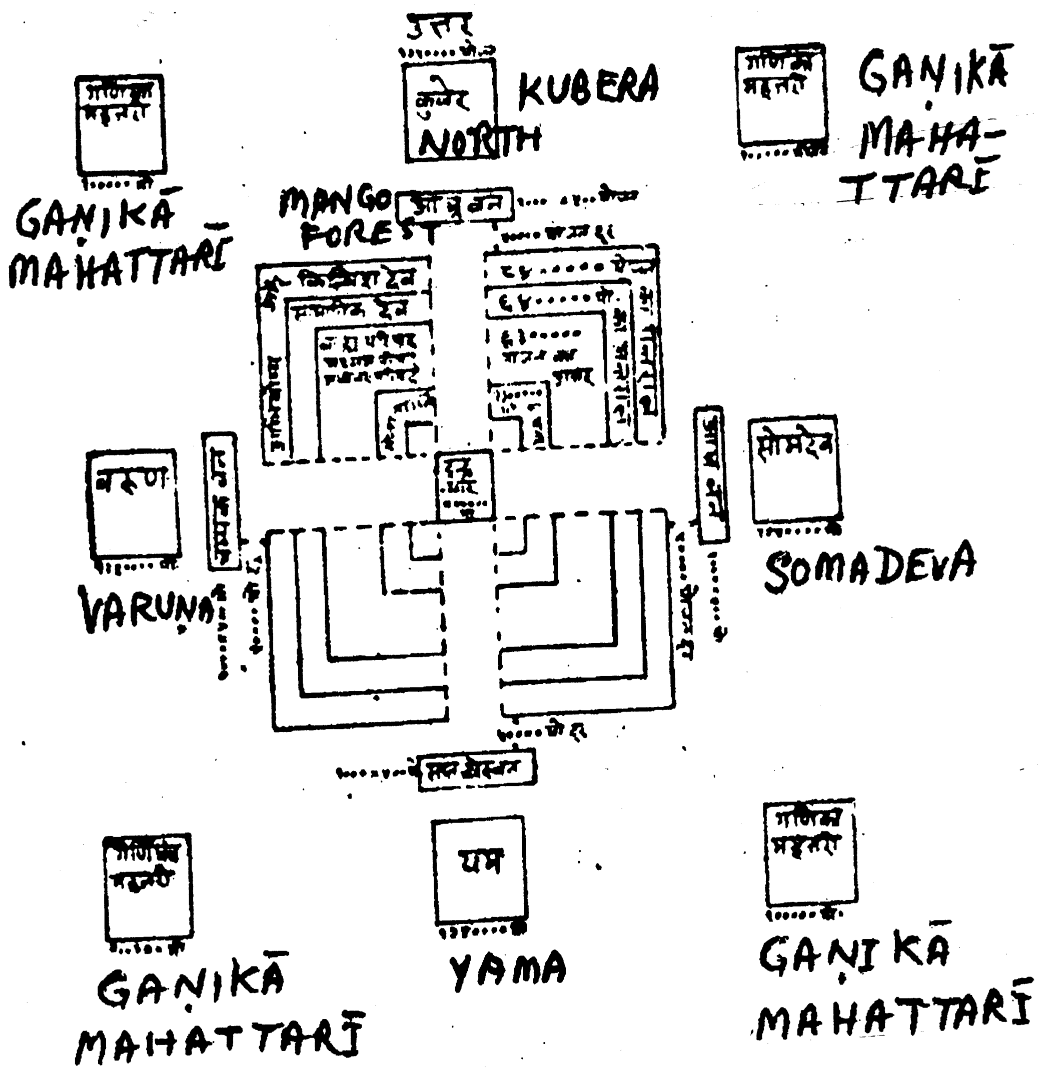


Figure 5.4

(v.5.518)

The figure depicts various types of deities alongwith their seats and postures in various directions alongwith their guands

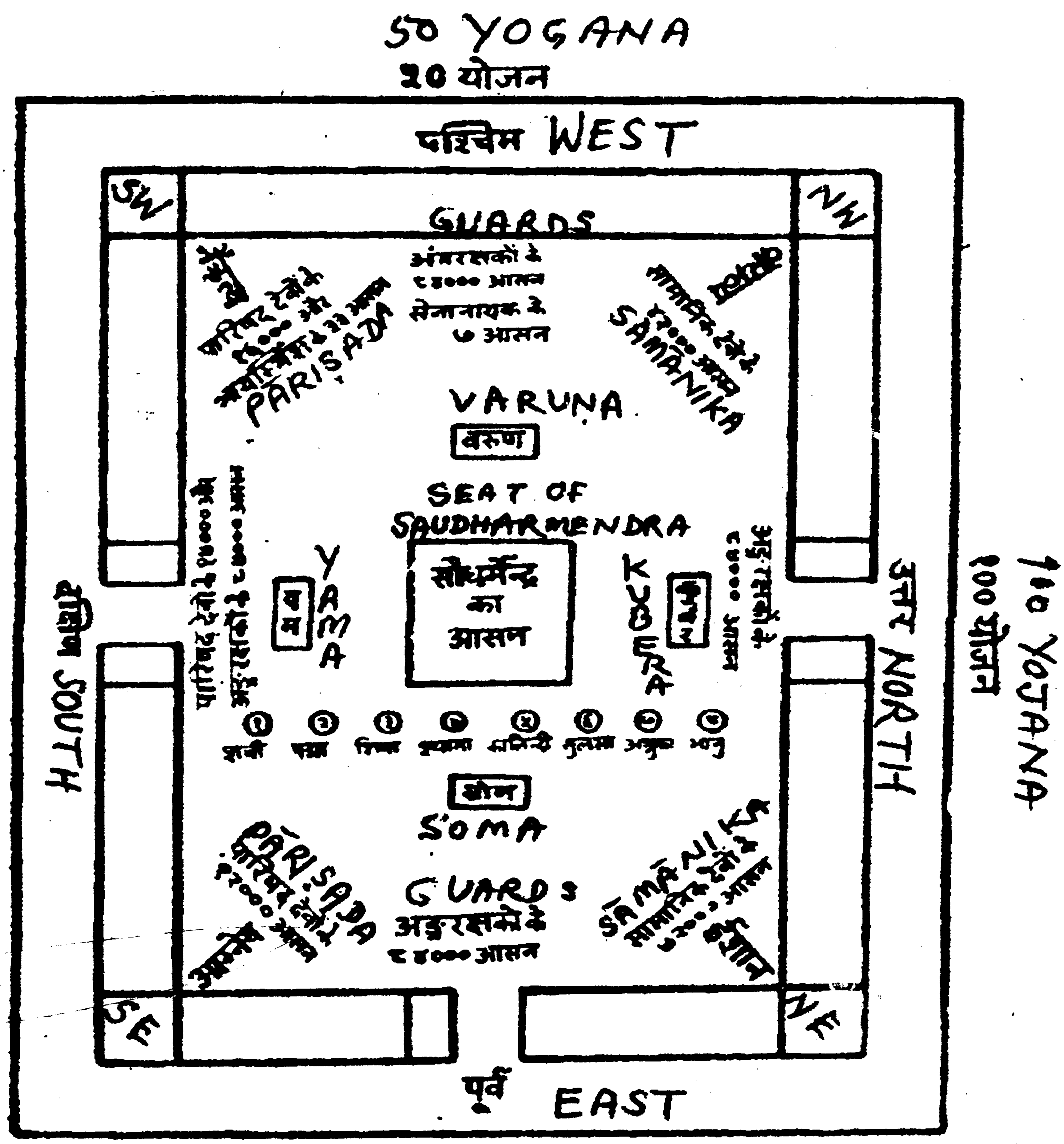


Figure 5.5

(v.5.522)

THE PRIDE-PILLAR (Māna-stambha) This has been described in vv 5.519-522, with different measurements and decorations. This just before the seat-stationed Maṇḍapa. This is one yojana long 36 yojanas high, a cylinder with diameter of 4 kośa. There are 12 lines with extension of one kośa. Other description is simple to understand.

Over that Pride-pillar lie boxes (karaṇḍa), on the jewelled rods of one kośa long and $\frac{1}{4}$ kośa wide there are the garments fit for the ford-founder, which he never accapts. In the Saudharma kalpa, the boxes garments are meantfor ford foundrs of Bharata region. Similarly, those in Aiśāna kalpa, they are meant for these in Airāvata region and so on. The lines are at a distance of 1 kośa each.

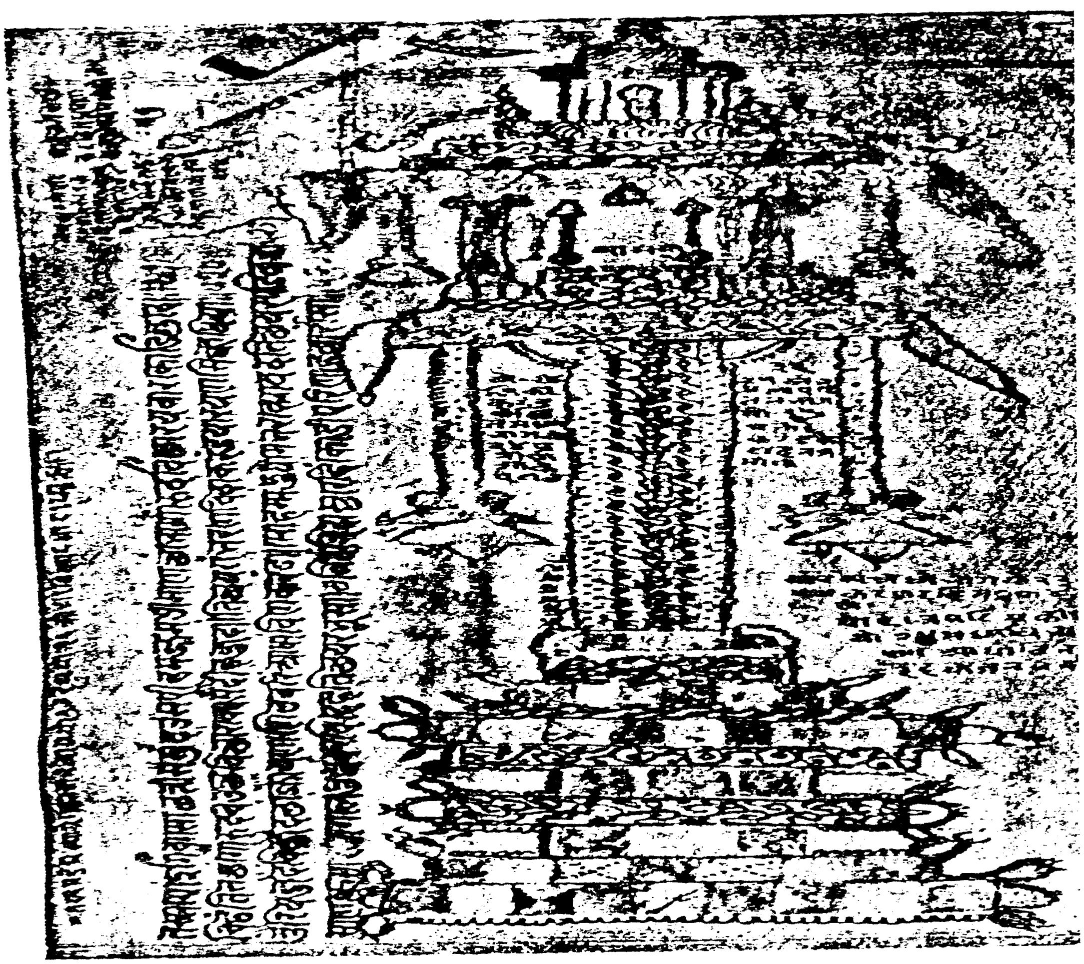


Figure 5.6

(vv.5-527-528)

The deities or divine beings of various paradise cannot know through their clairvoyance of the places higher to them, on the otherhand they are able to know the lower portions, limited as per their capacity.

The first two kalpa deities can know upto Gharmā earth, the next two kalpa deities have clairvoyance upto Vaṁśā earth, further Brahma etc. four paradises upto third Meghā earth, Śukra etc. 4 upto fourth Añjanā earth, further Ānata etc. paradises upto Ariṣṭā earth, further nine graiveyika paradises deities know upto sixth Mahgavī earth, and further Nava Anudiśa and five Anuttara, ie. of 14 planes deities, have power to reactivety upto seventh Māghavī earth of hells, ie. they have their clairvoyance from their flag upto the external (thin) air-envelop there is the full universe channel, one rāju square in length breadth and slightly less than 14 rāju of depth, which they could observe. The five Anuttara deities are able to see the whole of the universe-channel (Loka-naḍī).

Rule for knowing the clairvoyance

When one point (pradeśa) is subtracted from the clairvoyance domain, then their own clairvoyance-knowledge-screening karma ultimate particles set is divided once by the constant-divisor (dhruvahāra), the result is again divided by the constant-divisor, and one more point is subtracted from the domain. Thus the process is continued till the whole domain points have not been exhausted. Further elaboration of the fluent of the clairvoyance is as follows :-

Whatever is the domain of clairvoyance of the Vaimānika deities, whatever are their points (pradeśa), they are collected and established. Then the ultimate-particles of karma (converted into kārmāṇa variform (vargaṇā) of own clairvoyance-screehing, in state existence without Visrasopacaya (natural accumulation), are established on other side, and this fluent (dravya) of the clairvoyance-screening is divided once by the constant divisor which is infinitesemal part of the set of accomplished bios (siddha rāśi) and from the domain set of points one point (pradeśa) is taken out. The quotient is then divided the second time by the same constant set (dhruvahāra) divisor and from the domain set of points one more point (pradeśa) is taken out. Similarly the third time and so on. The process is continued as many times as is the number of the domain-points of clairvoyance, and then whatever is the ultimate quotient-set of points, those ultimate particles molecule is known by the Vaimānika deity through his clairvoyant eye. Such is the classification of the domain established clairvoyance-fluent.

Further, elaboration of the same description is as follows- On one side are established the number of points of the domain of clairvoyance, and the own fluent of clairvoyance-screening Karma without natural accumulation (visrasopacaya) is established on the other side. In Saudharma paradise, the clairvoyance domain is one and a half cubic rāju, whose symbol is $\frac{\equiv}{343}$

$\frac{3}{2}$ cubic rāju. Here 343 is 7^3, and $\frac{-}{7}$ or $\frac{L}{7}$ is a rāju, the cubic rāju is $\frac{L^3}{(7)^3} = \frac{L^3}{343}$.

Further, the symbol for instant-effective bond (samayaprabaddha) is Sa 7 or स ७ or B×7 for seven Karmas, and when this is divided by 7, the fluent $\frac{B \times 7}{7}$ of clairvoyance screening is obtained. In this the all-blocking (sarvaghāti) super-variforms (spardhaka) are very few, hence neglecting them, the B × 7 may be regarded as partial-blocking supervariforms. In the four knowledge (minded, scripture, clairvoyant and telepathy), knowledge-screening karma, there are partial-blocking supervariforms. Hence on dividing $\frac{B \times a}{7}$ by 4, the fluent $\frac{Sa \times a}{7 \times 4}$ or $\frac{B \times a}{7 \times 4}$ is the karmic flunet of the clairvoyance-screening in an instant-effective-bond (samaya-prabaddha. This much one instant effective bond of clairvoyance screening karma is multiplied by one and a half guṇahāni or geometric regression devoted by 8 × 4 = 12, and the result is $\frac{B \times a \times 12}{7 \times 4}$, the state (sattva) of clairvoyance-screening karma. The symbol for constant divisor is ६ , hence on dividing the state fluent of clairvoyance-screening karma once, $\frac{B \times a \times 12}{7 \times 4 \times ६}$ or $\frac{\text{सा२।१२}}{\text{८।४।६}}$ is obtained. On reducing the set of points $\frac{\equiv}{343} \times \frac{3}{2}$ or $\frac{L^3}{343} \cdot \frac{3}{2}$ by unity, the points of region of clairvoyance remains as $\frac{\equiv \text{ ३}}{\text{३४३ २}}$ or $(\frac{L^3}{343} \times \frac{3}{2})$ -1. It is also written as .

In this way, every time the state fluent of clairvoyance-screening karma is divided by a constant-divisor (dhruvabhāgahāra), the one point every time is reduced from the clairvoyance region point set, till the points in all are exhausted. Whatever ultimate fluent of clairvoyance-screening fluent if left, that is the measure of material molecular fluent subjected to clairvoyance.

The deity of Sardharma paradise can not know a finer molecule through his clairvoyance. He can know grosser molecule. Relative to time, the subjective period of clairvoyance of the deities of Saudharma pair is innumerate crore years, and the subjective period of the deities of the remaining pairs, for clairvoyance is innumerate part of palya for example, as per numerical symbolism, let the points of clairvoyance be 10 (pradeśa), and the number of ultimate particles of molecule of clairvoyance screening karma be 1000 000 000 00, and the constant-divisor be 5. Hence

Region	**Ultimate Particle-Flu ent of Clairvoyance-Screening**
10 points (pradeśa)	100000000000
10 - 1 = 9	$100000000000 \times \frac{1}{5} = 20000000000$
9 - 1 = 8	$20000000000 \times \frac{1}{5} = 4000000000$
8 - 1 = 7	$4000\,000\,000 \times \frac{1}{5} = 800000000$
7 - 1 = 6	$800000000 \times \frac{1}{5} = 160000000$
6 - 1 = 5	$160000000 \times \frac{1}{5} = 32000000$
5 - 1 = 4	$32000000 \times \frac{1}{5} = 6400000$
4 - 1 = 3	$6400000 \times \frac{1}{5} = 1280000$
3 - 1 = 2	$1280000 \times \frac{1}{5} = 256000$

$2 - 1 = 1 \qquad 256000 \times \frac{1}{5} = 51200$

$1 - 1 = 0 \qquad 51200 \times \frac{1}{5} = 10240$

Hence the Vaimānika deity know 10240 ultimate particle-fl. cent of matter through their claivoyance-eye (or vision) or clairvoyance.

(v.5.532)

Here is the arithmetical progression with common-differences two and one.

(v.5.533)

Two types of blocking or cut off longevity is 1. cancellation (apavartana) blocking and 2. plaintain (kadalī) blocking. Cancellation blocking is of bindable (badhyamāna) longevity, and plaintam blocking of longevity is of endurable (bhujyamāna) longevity. There is no plaintain cut off of the deities but their bindable longevity is cut off through cancellation. For example, in the human birth, in the state of vow etc., the bios bound maximal longevity of the higher paradise planes, afterwards abstained from vow, cuts off the bindable longevity, this is cancellation cut off and the bios is celled block-longevity (ghātāyuṣka). The serene visioned who are with block-longevity, their longevity is half sāgaropama as reduced by inter-muhūrta, greater than maximal longevity. For example, in the Saudharma pair, the maximal longevity of serene visioned is of two sāgara, but the longevity of block-longevity is two and half sāgaropama as reduced by inter-muhūrta. Similarly this should be known upto the Sahasrāra paradise. Over this there is absence of generations of block-longevity bios. In the first disc of Saudharma pair, the maximal age of Ṛtu Indraka is half sāgaropama. In this way, the decreasing commondifference of every disc should be known from longevity of first and last disc.

According to v.5.200, "ādiantavisese -----", on subtracting the maximal longevity of the initial disc from that of the last disc, the remainder when divided by number of terms less one, the decreasing commondifference is obtained.

For example, four Saudharmaiśāṇa, final longevity is $\frac{5}{2}$ sāgara, the initial longevity is $\frac{1}{2}$

sāgara, difference is $\frac{2}{1}$ and number of terms is 31, less one is 30, hence $\frac{2}{1} \div 30$ or $\frac{1}{15}$ is the decreasing common-difference or negative common-difference. Now the maximal longevity of first Ṛtu disc is $\frac{1}{2}$ sāgara and negative common difference is $\frac{1}{15}$ sāgara, giving $\frac{1}{2} + \frac{1}{15} = \frac{17}{30}$ sāgara as the longevity of second Vimala disc. Again on adding it $\frac{17}{30} + \frac{1}{15} = \frac{19}{30}$ is that of third Candra disc, and so on.

Similarly, the non-blocking-longevity (aghātāyuṣka) be also obtained. For example, the final maximal longevity of Saudharmaiśāna is 2 sāgara, that of initial is $\frac{1}{2}$ sāgara (Ṛtu-disc), difference = $\frac{3}{2}$, on dividing by 31 - 1 = 30, get $\frac{3}{2} \div 30 = \frac{1}{20}$ sāgara. Here, on adding $\frac{1}{20}$ sāgara in the maximal age (longevity) of $\frac{1}{2}$ sāgara, $(\frac{1}{2} + \frac{1}{20}) = \frac{11}{20}$, sāgara, the maximal longevity of Vimala disc is obtained. Again adding the negative common difference, $\frac{11}{20} + \frac{1}{20} = \frac{12}{20} = \frac{3}{5}$ sāgara, the maximal longevity of third candra disc is obtained. Similarly, the summation of both, block-longevity and non-block-longevity can be found, say for Ṛtu paṭala is $\frac{1}{2}$ sāgara + $\frac{2}{30} = \frac{17}{30}$ for ghātāyuṣka and $\frac{1}{2}$ sāgara + $\frac{1}{20} = \frac{11}{20}$ sāgara, can be obtained.

(v.5.534)

The following figure illustrates the location of Laukāntika deities as well as the eight types of their families (kula) and the families in their intervals. Thus, the total number of Laukāntika deities in eight families and in eight intervals between then is 352 352 + 55468 = 407820.

They reside at the end of the Brahmaloka, in eight directions in sphecical scattered celestial planes.

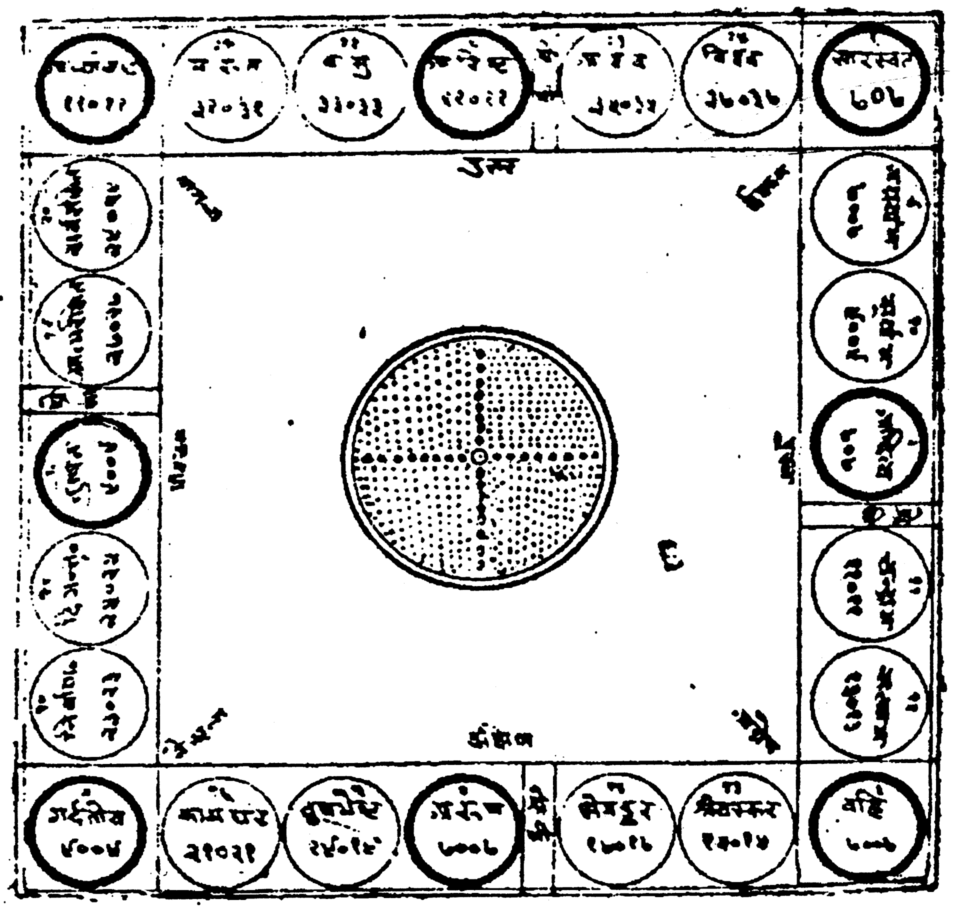


Figure 5.7

(v.5.544)

In the verse 532, whatever is their maximal longevity is detailed, "sohanma varaṁ pallaṁ", in those sāyara reckoning rods, a fornight and a thousand years when are multiplied, the results are their respirations interval and intervals between each food take. This is important for data are their respirations interval and intervals between each food take. This is important for data reckoning and statistical results.

TABLE-5.2

Paradise Maximal Longevity etc.

Ser. No.	Name	Maximal longevity	Respiration Interval	Food Intake Interval
1	Saudharmaiśāna	2 sāgara	after 2 fortnight	after 2000 years
2	Sānatkumāra-Māhendra	7 sāgara	after 7 fortnight	after 7000 years
3	Brahma-Brahmottara	10 sāgara	after 10 fortnight	after 10000 years
4	Lāntava-Kāpiṣṭha	14 sāgara	after 14 fortnight	after 14000 years
5	Śukra-Mahśāukra	16 sāgara	after 16 fortnight	after 16000 years
6	Śatāra-Sahasrāra	18 sāgara	after 18 fortnight	after 18000 years
7	Ānata-Prānata	20 sāgara	after 20 fortnight	after 20000 years
8	Āraṇa-Acyuta	22 sāgara	after 22 fortnight	after 22000 years
9	Sudarśana	23 sāgara	after 23 fortnight	after 23000 years
10	Amogha	24 sāgara	after 24 fortnight	after 24000 years
11	Suprabuddha	25 sāgara	after 25 fortnight	after 25000 years
12	Yaśodhara	26 sāgara	after 26 fortnight	after 26000 years
13	Subhadra	27 sāgara	after 27 fortnight	after 27000 years
14	Suviśāla	28 sāgara	after 28 fortnight	after 28000 years
15	Sumanasa	29 sāgara	after 29 fortnight	after 29000 years
16	Saumanasa	30 sāgara	after 30 fortnight	after 30000 years

17	Pritiṅkara	31 sāgara	after 31 fortnight	after 31000 years
18	Āditya	32 sāgara	after 32 fortnight	after 32000 years
19	Arci	32 sāgara	after 32 fortnight	after 32000 years
20	Archimāli	32 sāgara	after 32 fortnights	after 32000 years
21	Vairocana	32 sāgara	after 32 fortnights	after 32000 years
22	Prabhāsa	32 sāgara	after 32 fortnights	after 32000 years
23	Archiprabha	32 sāgara	after 32 fortnights	after 32000 years
24	Archi madhya	32 sāgara	after 32 fortnights	after 32000 years
25	Archirāvarth	32 sāgara	after 32 fortnights	after 32000 years
26	Archiviśiāta	32 sāgara	after 32 fortnights	after 32000 years
27	Vijaya	33 sāgara	after 33 fortnights	after 33000 years
28	Vaijayanta	33 sāgara	after 33 fortnights	after 33000 years
29	Jayanta	33 sāgara	after 33 fortnights	after 33000 years
30	Aparājita	33 sāgara	after 33 fortnights	after 33000 years
31	Sarvārthasiddhi	33 sāgara	after 33 fortnights	after 33000 years

(v.5.561)

In the human universe, it in the two and a half islands, there are 398 non-artificial jina temples. In the Nandīśvara island there are 52, an Kuṇḍalagiri there are 4 and on the Rucakagiri there are four Jina temples. In this way, in the subhuman universe, there are 60 non-artificial temples. The sum total of this is 398 + 60 = 458 Jina temples which are to be bowed. The diagram of Jina temples is in the following figure:

All are non-artificial Jina temples-

16 Jina Temples (non-artificial) in 4 forests of Sudarśana meru

34 " in 34 vijayārdha

16 " in 16 vakṣāra

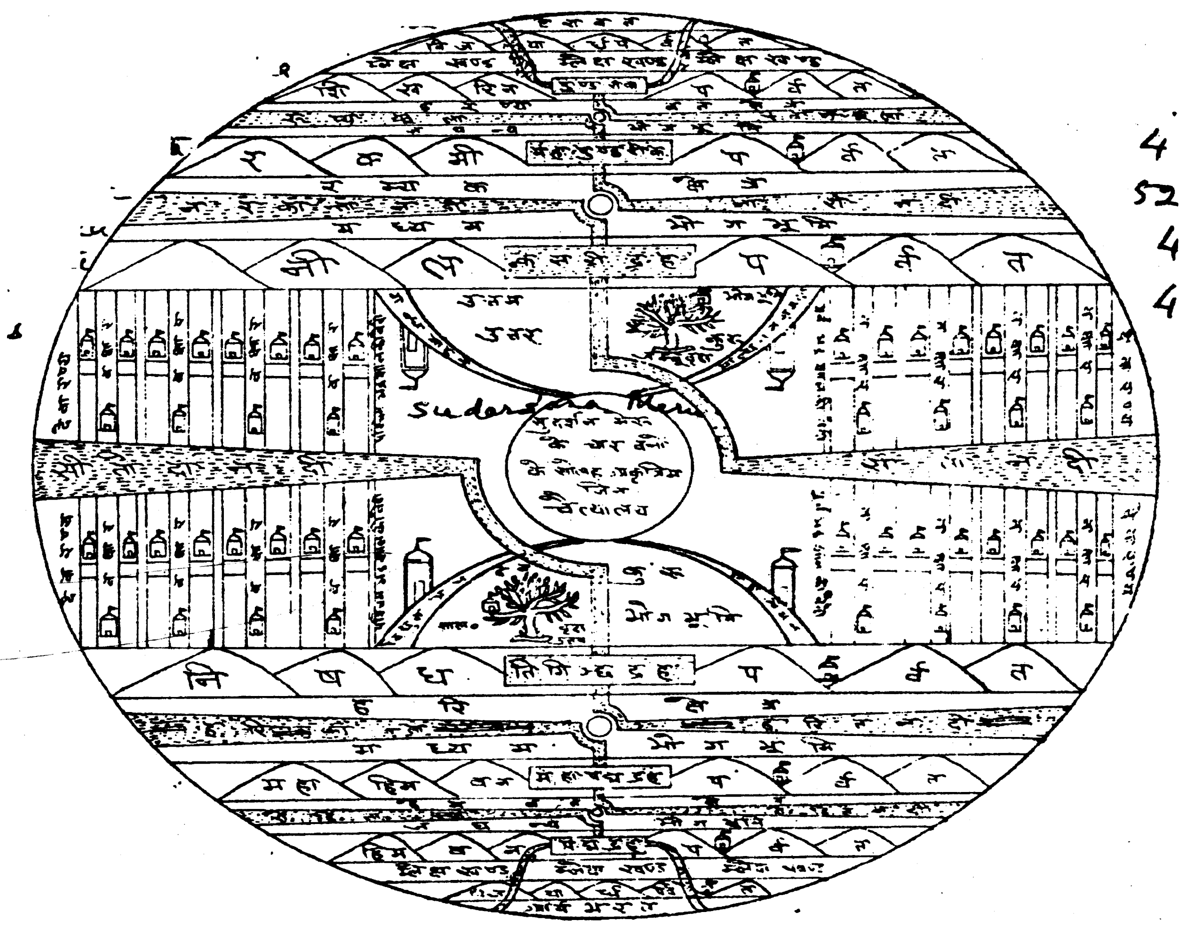
4 " in 4 Gajadanta

390 non-artificial Jina Temples of panca Meru

4 " of 4 Iśvākāra

4 " of Mānuśottara

52 " of Nandīśvara



(v.5.962-563)

There are 80 Jina temples on 5 sumeru mountains, there are 30 on 30 kula-mountains, there are 100 on 100 Vakṣāragiri, there are 4 on 4 Iṣvākāra, 4 on Mānuṣottara, 170 on 170 Vijayārdha, 5 on 5 Jambū trees, 5 on 5 śālamalī trees. In this way, in the human universe there are in all (80 + 30 + 100 + 4 + 4 + 170 + 5 + 5) = 398 Jina temples.

In the Jambū island, there is one meru mount. In Dhātakīkhaṇḍa end Puṣkarārdha islands, there are two bow shaped regions built up in east, west directions due to Iṣvākāra mountains. In these 4 regions, there are 4 sumerugiri. In those regions, whatever are the Bharata and Airāvata regions, built up by iṣvākara mountains, in their exact central portion, there are videha regions, and in the very centre of videha regions, these four Meru mountains are situated as shown in the following figure-

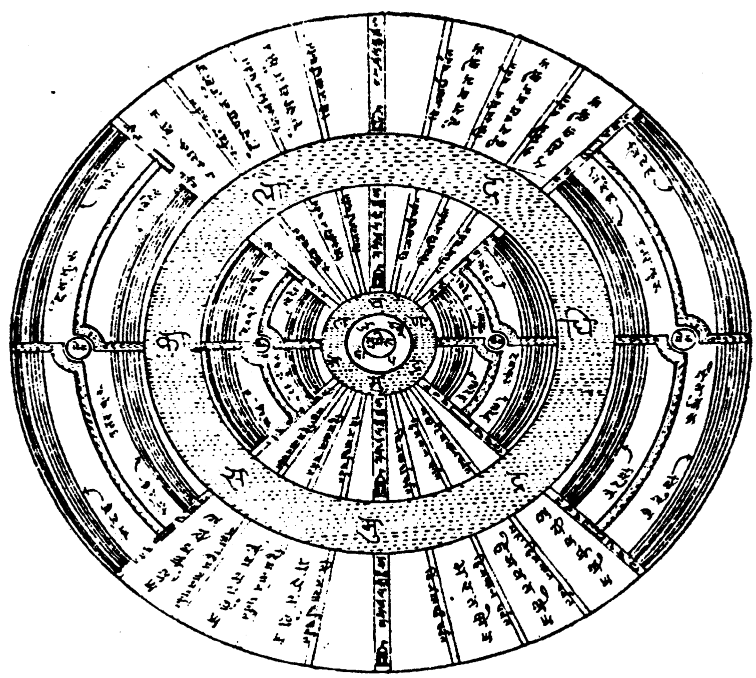


Figure 5.9

Just see the division of regions is through spokes of wheels, in radial directions. At the centre is sumeru, then Jambū island, then Lavaṇa sea ring, then Dhātakikhaṇḍa island, surrounding which is the kālodaka sea, and then semi-Puṣkara island. The scale of doubling widths of the rings have not been shown as it is not possible to show them in this much space.

(v.5.568)

When the height (udaya) of mountains is multiplied by 5, the diameter or width (vyāsa) of the lakes is obtained, on multiplying it by 10 gives the length of lakes, and on dividing it by 10, gives the depth of lakes. The lotus of the lakes have the length and width as the 10th part of depth of lakes. Other proportions are also worthy of attention:

TABLE -5.3

Ser. No.	Mountain Name	Height in yojana	Lake Name	Length in yojana	Breadth in yojana	Depth in yojana
1	Himavan	100	padma	1000	500	10
2	Mahāhimavān	200	Mahāpadma	2000	1000	20
3	Niṣadha	400	Tigiñch·	4000	2000	40
4	Nīla	400	Keśarī	4000	2000	40
5	Rukmī	200	Mahāpuṇḍarīka	2000	1000	20
6	Śikharin	100	Puṇḍarīka	1000	500	10

Height etc. of lotus, lotus, lotus pericarp (Karṇikā):

TABLE-5.4

Ser. Num.	Lotus of Lakes as maned	Height of Lotus	Width of Lotus	Lotus stem in water	Lotus stem above water	Height of pericarp	Width of pericarp	Thickness of lotus fibre
1	Padma lake	1 yojana	1 yojana	10 yojana	1/2 yojana	1 kośa	1 kośa	3 kośa
2	Mahāpadma	2 yojana	2 yojana	20 yojana	1 yojana	2 kośa	2 kośa	6 kośa
3	Tigiñchi	4 yojana	4 yojana	40 yojana	2 yojana	4 kośa	4 kośa	12 kośa
4	Keśari	4 yojana	4 yojana	40 yojana	2 yojana	4 kośa	4 kośa	12 kośa
5	Mahāpuṇḍarika	2 yojana	2 yojana	20 yojana	1 yojana	2 kośa	2 kośa	6 kośa
6	Puṇḍarīka	1 yojana	1 yojana	10 yojana	1/2 yojana	1 kośa	1 kośa	3 kośa

(v.5.575-576)

There are in all 4000 lotus (flowers) of sāmānika deities, in the north-east and north-west directions of basic lotus, on both directional angles of the north. From there, towards the basic lotus, there are 4000 gaurd's lotuses in separate four directions. Even in the interior of these, towards the basic lotus, in all the four directions there are 14 and 14, as well as in the sub-directions there are 13 and 13, thus total 108 lotuses of pratihāra Mahattara. All the family lotus are full of gems (maṇi), and on every lotus there are buildings full of gems each for the family deities. The specific form or structure, diameter etc. of these are each half of the chief lotus. The height of the stem is, equal to the depth of the lake. In this way the situation of Śri devi, and total number of her family lotus has the following measure and diagram:-

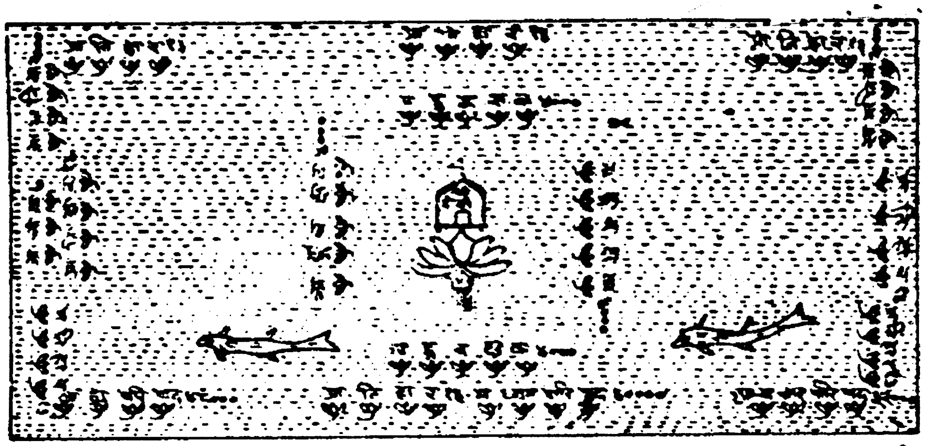


Figure 5.10

The amount of total number of lotuses of whole family of Śrī Devī is as follows: Guards 16000 + sāmānika 4000 + internal pariṣad 32000 + middle pariṣad 40000 + external pariṣad 48000 pratihāra 108 and 7 Anika = 140115 family-lotus. If in these the amount of seven classes (kakṣā) be added than the amount of total family lotus = 3556000 + 140115 =3696115 is obtained. From Himavāna upto Niṣadha mountain, the width of lotuses and height etc. are successively double than the preceding. The amounts of family lotuses are also similarly double of the preceding each.

The following table gives the width of the mansions of deities kumārīs and the amount of family lotuses, which are only great lotuses. The measure of small lotuses is extremely great. There are Jina temples with several types of jewelleries, in the mansions up on the lotus flowers:

[TPT.(V)4.1692]

TABLE - 5 . 5

Ser. No.	Name of deity kumārī	MANSIONS			SĀMANIKA DEITY in NE, NW,	Body Guards in 4 directions	THREE PARIṢAD. DEITY			Anika deity in west	Pratihāra in eight direction	TOTAL
		length	breadth	height			S.E. inter pariṣada	south mddle pariṣa	S.W. exterier Pariṣada			
1	Śrī	1ko	1/2 ko	$\frac{3}{4}$ ko	4000	16000	32000	40000	48000	7	108	140115
2	Hrī	2ko	1 ko	$1\frac{1}{2}$ ko	8000	32000	64000	80000	96000	14	216	280230
3	Dṛti	4ko	2 ko	3 ko	16000	64000	128000	160000	192000	28	432	560460
4	Kīrti	4 ko	2	3	16000	64000	128000	160000	192000	28	432	560460
5	Buddhi	2 ko	1	$1\frac{1}{2}$ko	8000	32000	64000	80000	36000	14	216	280230
6	Lakṣmi	1 ko	1	3/4	4000	16000	32000	40000	48000	7	108	140115
Name							Internal	Middle	External	west		

(v.5.586-590)

In Bharata region, leaving himavān mountain for 25 yojana;, the Gangā has 10 yojanas width like kāhalā, falls on Jina head in a round well. At the root of Himavān there is 10 yojanas deep and 60 yojanas wide circular well, at is centre, there is a circular island half yojana above water and 8 yojanas wide. At the centre of the island there is a 10 yojanas high diamond like mountain. The width of that mountain is 4 yojanas at base, 2 yojanas in the middle and 1 yojana at the top. On that mountain these is home of Śri devi or Gaṅgā kūṭa, whose diameter at the bottom is 3000 dhanuṣa, 2000 dhanuṣa in the middle, and 1000 dhanuṣa at the top. Its heights 2000 dhanuṣa, and internal width of this home is 500 and on adding its half part, it 750 dhanuṣa. The width of the door of this Śri home is 40 dhanuṣa and height is 80 dhanuṣa, whose both doors are diamond like. On the pericarp of lotus on fore part of the Gaṅgā peak,, there is a throne, on which the Jina is situated with jaṭās crown, and the Gaṅgā falls as if wishing to anoint him on the head. The following figures give the positions:

THE JAMBŪ ISLAND SURROUNDED BY THE LAVAṆA SEA

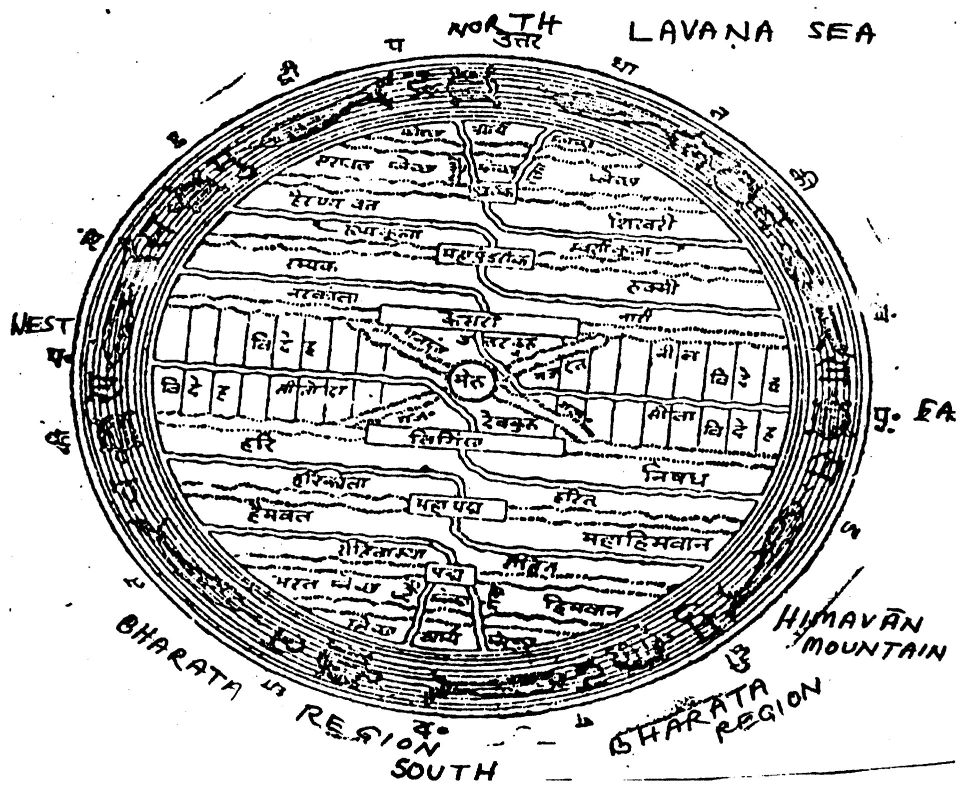


Figure 5.11

THE HOME OS SRIDEVI ON THE LOTUS AT PADMA LAKE

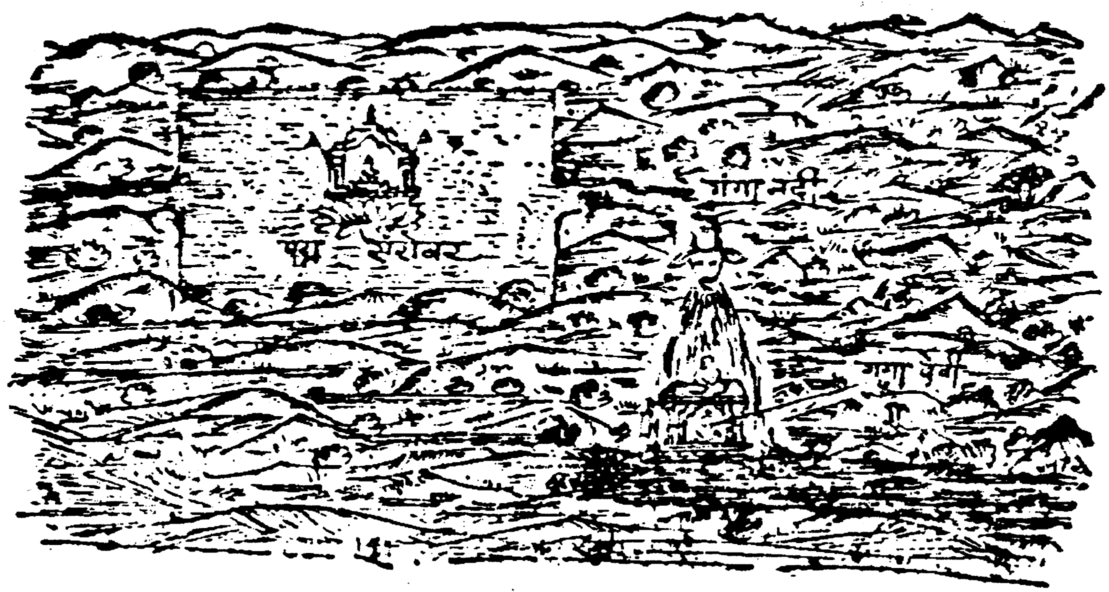


Figure 5.12

The description is already given above, and depicted through the above figures.

(vv.5.603-605)

The Bharata region, as shown above, is at the south of the Jambū island inside, and at the north inside it is the Airāvata region. The widths of the mountains is twice the Bharata region, then those of the regions is twice that of the family of mountains, then those of the mountains is twice that of the regions. In this way, this extends upto the Videha. Similar measures are for extension from the Airāvata region to the videha in opposite direction. The measure of these widths may be determined by the rule of three sets (trairāśika), where the multiplier-mass measure set (guṇakāra piṇḍa rāśi) is 190, the frist set (phala rāśi) is the width 100000 yojanas, being the width of the island and the requisition set (icchā rāśi) is their own multiplier-reckoning rods (guṇakāra śalākā).

The multiplier mass: The diameter of Jambū island is 100000 yojanas. There has been the following division of it:

1 Bharata, 2 Himavāna, 4 Haimavata, 8 Mahāhimavān, 16 Harivarṣa, 32 Niṣadha, 64 Videha, 32 Nila, 16 Ramyaka, 8 Rukmi, 4 Hairanyavat, 2 Śikhari and 1 Airāvata.

The total proportion is 190. This is the multiplier mass. On applying the rule of three sets to the measure (pramāṇa), fruit (phala), and requisition (icchā) sets (rāśi), the arbitrarily chosen region and the mountain are known for their width. For example ., when 190 is the total proportion, the width is 100000 yojanas, ∴ When 8 is multiplier rod, the width is $\frac{100000 \times 8}{190} = 4210\frac{10}{19}$ yojanas, as the width of the Mahāhimavāna mountain. Similar is to be known else where. The height of segment of Bharata region could be calculated simitarly. When 190 is the total multiplier-proportion then 100000 yojanas is width ∴ when 1 is the proportion, then $\frac{100000}{90} = 526\frac{6}{19}$ yojanas is the height of segment of Bharata region. Similarly for Himavân the width is $\frac{100000 \times 2}{190} = 1052\frac{12}{19}$ yojanas.

TABLE-5.6

Ser. No.	Name of Region	Width of Rigions in yojana	Ser. No.	Name of Mountain	Width of Mountain in yojana
1	Bharata	$526\frac{6}{19}$	1	Himavān	$1052\frac{12}{19}$
2	Haimavata	$2105\frac{5}{19}$	2	Mahāhimavān	$4210\frac{10}{19}$
3	Hari	$8421\frac{1}{19}$	3	Niṣadha	$16842\frac{2}{19}$
4	Videha	$33684\frac{4}{19}$	4	Nīla	$16842\frac{2}{19}$
5	Ramayaka	$8421\frac{1}{19}$	5	Rukmī	$4210\frac{10}{19}$

6	Hairanyavata	$2105\frac{5}{19}$	6	Śikharī	$1052\frac{12}{19}$
7	Airāvata	$526\frac{6}{19}$			

(vv.5.605 et seq.)

The north-south width of Videha region, as shown above is $33684\frac{4}{19}$ yojana. There are two chief rivers, the sītā and the Sītodā, in this Videha region. From the lake the origin of these rivers is 50 yojanas and the width at the mouth at ocean-entrance is 500 yojanas.

Now $(33684\frac{4}{19} - 500) \div 2 = 16592\frac{2}{19}$ yojanas.

This is the length of the 32 Videha cities, 16 Vakṣāragiri, 12 Vibhaṅga rivers, deity-forests etc.

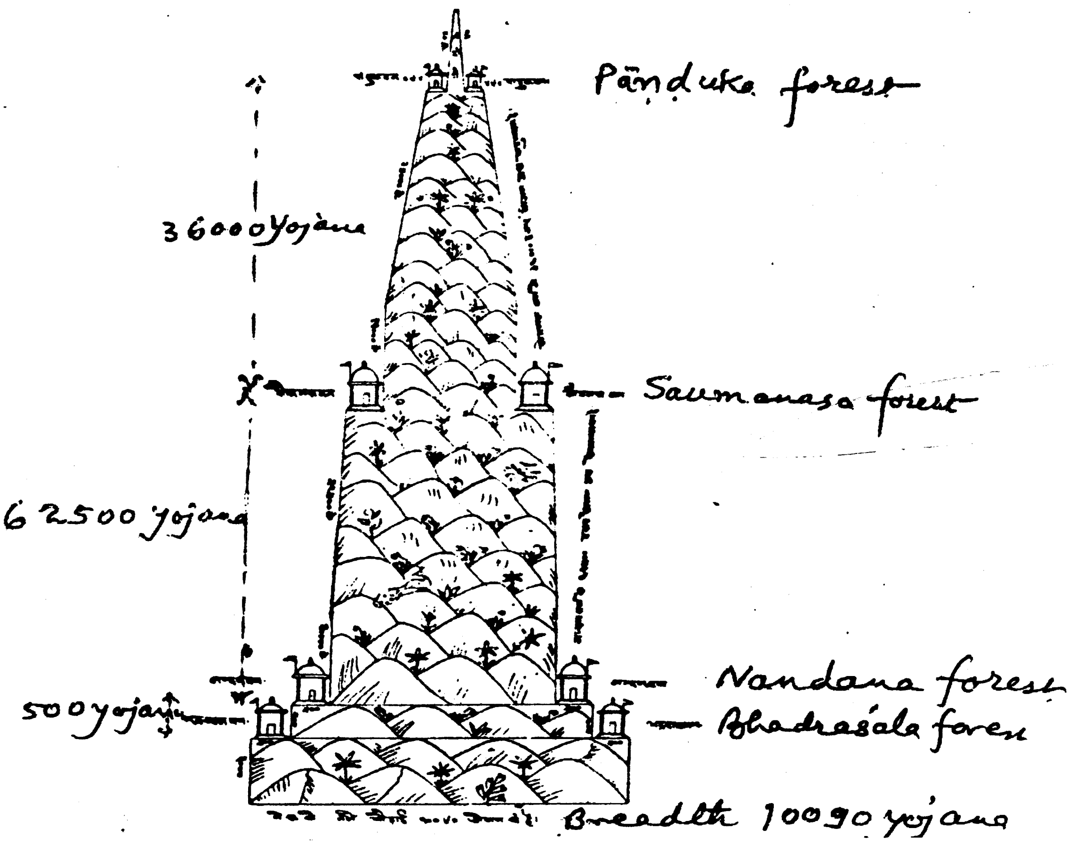
At the very centre of the Videha region, there is Sudarśana meru 99000 yojanas high, which has a diameter of 10000 yojanas at its base, and one thousand yojana at the top. It contains four forests at the top cuttings. At the base of the Sumeru mountain (under ground), there is Bhadraśāla forest. This forest surrounds the Mandara great mountain. There are frustrums (kaṭanī). 500 yojanas ahead, from this forest, there is a frustrum, with a forest named as Nandana.

Further, $500 \times 125 = 62500$ yojana above ahead, there is Saumanasa forest.

Then $500 \times 72 = 36000$ yojanas ahead above, there is at the top of Sumeru there is fourth forest named Pāṇḍuka.

All these three forests surround the Mandara which has thus a total height of 99000 yojanas.

The collected measure of the three intervals of four forests is $500 + 62500 + 36000 = 99000$ yojana, the height of Sumeru or Sudarśana meru. It has been illustrated as follows.



Sumeru parvata

Figure 5.13

Apart from the Videha meru in Jambū island, there are two meru in Dhātakīkhaḍa island and two meru in semi-Puṣkara island. These four meru mountains have Bhadraśāla forest at their bases, and 500 yojanas above this forest there is Nandana forest, 55500 yojanas above this is Saumanasa forest, and 28000 yojanas above this is the Pāṇḍuka forest. Thus, the sum of intervals of these four forests is 500 + 55500 + 28000 = 84000 yojanas. This 84000 yojanas is the height of every meru. The foundational depth of all the five meru is, however, 1000 yojanas.

That which decreases from top towards bottom is called the decrease. That which increases from bottom to top is called the increase. When there is $\frac{1}{11}$ yojana increase or decrease at one yojana, then the height of meru bottom is 1000 yojanas, the height of Nandana forest is 500 yojana. In the Nandana forest there is a cut 500 yojanas. In breadth, simultaneously there is one thousand yojanas of decrease (both sides 500 each), hence there is no decrease 11000 yojanas. Above the frustram, same all around at the top is Saumanasa forest. What is the increase or decrease at 51500 yojana ? Thus, by rule of sets (three), the measure of diameter of meru-bottom is $\frac{1000}{11} = 90\frac{10}{11}$ yojana, the decrease of Nandana forest = $\frac{500}{11} = 45\frac{5}{11}$ yojana and the decrease upto Saumanasa forest is $\frac{51500}{11} = 4681\frac{9}{11}$ yojanas. Again, from the place of frustrum-cut, at 25000 yojanas, upto Pāṇḍuka forest, there is decrease of $\frac{25000}{11} = 2272\frac{8}{11}$ yojanas.

Note- The Saumanasa forest is 62500 yojanas above Nandana forest, but in the above mentioned verse, the measure of height for decrease upto Saumanasavana has been mentioned as 51500 yojanas. The reason is that the meru mountain decreases in sequence from the earth and on reaching 500 yojanas, it becomes contracted by 500 yojanas, hence on both sides there is decrease of 1000 yojanas, hence in order to supplement the decrease there is equal width upto 11000 yojana all around from there, in sequence there is decrease in width of 500 yojanas after going up a height of 51500 yojanas. Here equifrustrum measure is 11000, after which there has been decrease upto a height of 25000 yojanas, hence for the measure to be found out for decrease upto Pāṇḍuka forest, 25000 yojanas have been taken. (Vide TPT(V). vol.1, p.376).

(v.5.615)

In the earlier verse, the increase in meru bottom was obtained as $90\frac{10}{11}$ yojanas, On adding this to the width of meru on earth, $10000 + 90\frac{10}{11} = 10090\frac{10}{11}$ yojanas, which is the width of bottom portion of meru at the last part of the Citrā earth. On reduction of $\frac{1}{11}$ yojana, a height of 1 yojana, is obtained and therefore on a reduction of $90\frac{10}{11}$ how much height will be obtained ? By the rule of three sets $90\frac{10}{11} \times \frac{11}{1} = 1000$ yojana is the height of the meru from the last part of Citrā earth upto the earth's surface.

The Nandana forest is at a height of 500 yojanas from earth's surface. In earlier verse, the deerease obtained was $45\frac{5}{11}$ yojanas. This is subtracted from width at the bottom, ie. from 10000 yojanas, getting $10000 - 45\frac{5}{11} = 9954\frac{6}{11}$ yojanas as the external diameter of the Nandana forest. The-width of Nandana forest's one lateral portion is 500 yojanas, hence the width of both lateral parts is $500 \times 2 = 1000$ yojanas. On subtracting this from external diameter, $9954\frac{6}{11}$, of Nandana forest, we get, $9954\frac{6}{11} - 1000 = 8954\frac{6}{11}$ yojana as the internal diameter of Nandana forest in form of equi-frustrum, ie. the internal diameter of Nandana forest is $8954\frac{6}{11}$ yojanas.

(v.5.616)

When at the decrease of $\frac{1}{11}$ yojana, their is height of 1 yojana, hence at the decrease of 1000 yojanas, how much height will be obtained ? By the rule of three sets, the height is obtained as $1000 \times \frac{11}{1} = 11000$ yojana. This is equifrustrum height between Nandana and Saumanasa forests of Sudarśana meru. Then in both lateral portions, simultaneous decrease of 1000 yojanas, the shape of cutting has been built up. On this cutting, there is Nandana forest. From the centre of this forest, the width of 11000 yojanas of meru has gone upto the top in an equal manner. There has been no decrease in width. The decrease of saumanasa up to its forest is $4681\frac{9}{11}$ yojana, and the interval diameter of meru on Nandana forest was $8154\frac{6}{11}$ yojana, hence on decreasing from this the Saumanasa, we get the external diameter as $8954\frac{6}{11} - 4681\frac{9}{11} = 4272\frac{8}{11}$ yojanas on Saumanasa as width of meru.

On adding the numerator of fractional part of $4681\frac{9}{11}$ or on converting it into fraction as

. defining decrease, we can find the height if there is a height of one yojana at a decrease

yojana. By rule of three sets, the height is $\frac{11 \times 51500}{11}$ = 51500 yojana. Thus after an equifrustrum upto 11000 yojanas, the decrease in width begins, which goes up to 51500 yojana. After this, there reduction of 1000 yojanas in both lateral portions in simultaneous width of 500 yojanas of Sumeru mountain. Due to this cutting is built up, on that cutting there is situated the Saumanasa forest. On subtracting 1000 yojanas from external diameter of Saumanasa, we get

$4272\frac{8}{11} - 1000 = 3272\frac{8}{11}$ yojanas as the interval diameter of Saumansa. Here also, there is equal width (equifrustrum) of meru upto a height of 11000 yojanas, starting from the above mentioned measure of Saumanasa. It is without any decrease throughout. After this, from the top of equifrustrum, upto a height of 25000 yojana, there has been sequential decrease. Thus, on a height of 1 yojana there is decrease of $\frac{1}{11}$ yojana, hence at a height of 25000 yojanas, the decrease is how much ?

By rule of three sets, the decrease of Pāṇḍuka forest = $\frac{1 \times 25000}{11 \times 1} = 2272\frac{8}{11}$ yojana.

On subtracting this from the interval diameter of meru at saumanasa forest, we get $3272\frac{8}{11} - 2272\frac{8}{11}$ = 1000 yojanas. This is the external diameter of Pāṇḍuka forest in form of diameter of meru there. This decrease of $2272\frac{8}{11}$ is $\frac{25000}{11}$ yojana on breaking the numerator form of whole and part. If there is a decrease of $\frac{1}{11}$ yojana at a height of 1 yojana, then at a decrease of

$\frac{25000}{11}$ yojana, what will be the height. By rule of three sets, we get the height of $\frac{11 \times 25000}{11}$ = 25000 yojanas. Thus there begins the decrease of $\frac{1}{11}$ yojana at a height of of 1 yojana each, and goes on upto a height of 25000 yojanas. Hence, the height of Sumeru from equifrustrum diameter of Saumanasa upto Pāṇḍuka forest is 25000 yojanas. Hence the width of meru has a sequential decrease upto that. After that Sumeru goes on simultaneously contracting in width by 494 yojana, and there is built up a cutting, and at this last cutting, there is situated the last Pāṇḍuka forest.

In this way, from the bottom of Citrā, decreasing in widht, upto earth's surface there is the height of 1000 + 500 yojana, above which there is Nandana forest + height of 11000 equifrustrum + gradual decrease in width upto 51500 yojanas, + 11000 yojanas height of equifrustrum + gradual decrease in width upto 25000 yojanas, the total height of the great Mandara mountain is 1,00,000 yojanas.

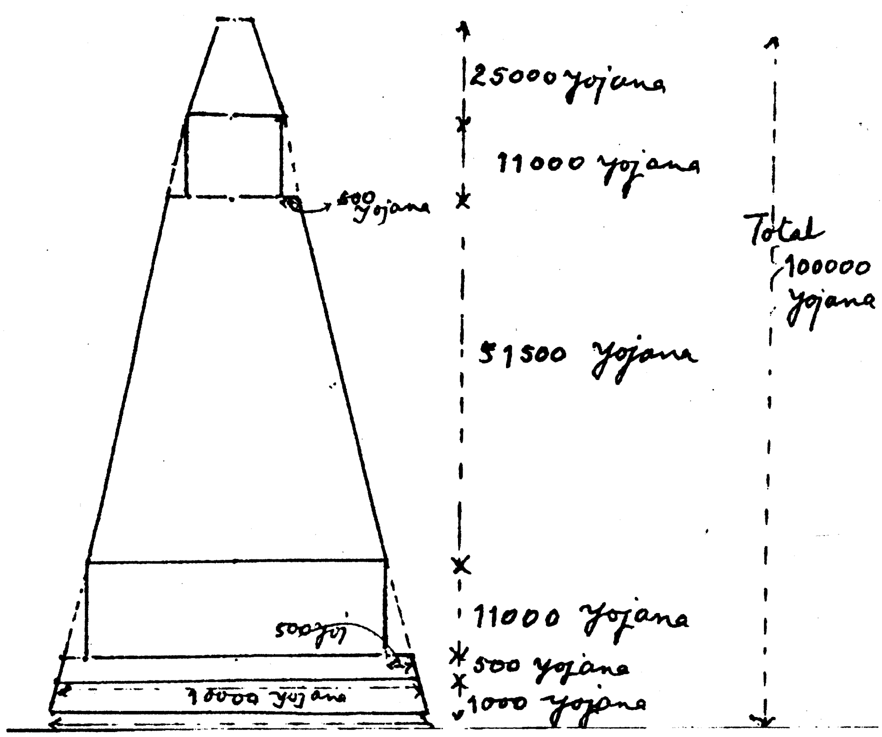


Figure 5.14

(v.5.617)

This verse gives a similar description of obtaining the decrease-common difference (hāni cayа) of small four meru mountains. On the decrease of $\frac{1}{10}$ yojana from below ie. base, there is a height of one yojana, than at the decrease of 1000 yojanas in both lateral parts, how much height will be obtained ? By the rule of three sets, there is obtained a height of 10000 yojanas, or square of 100. This volue of 10000 yojanas of height is the measure of diameter of equifrustrum above Nandana forest as well as the diameter of equifrustrum above Saumanasa forest. The width of the bottom portion of four small meru mountains is 9400 yojanas, and the width of the peak is 1000 yojanas. In this sequence are the base and top (bhūmi and mukha). The total height of these mountains is 84000 yojanas. On subtracting 1000 top from 9400 yojanas of base, the decrease of 8400 yojanas is obtained. When there is a height of 84000 yojanas, there is a decrease of 8400 yojanas, then at a height of 1 yojana what will be the decrease? By the rule of three sets, $\frac{8400}{84000} \times 1 = \frac{1}{10}$ yojana decrease or increase everywhere is obtained. Thus, placing this, at a height of 1 yojanas, there is an increase of $\frac{1}{10}$ yojana, then at a height of 1000 yojanas, what will be the increase? By rule of three sets, the measure of increase is obtained as $\frac{1000 \times 1}{10} = 100$ yojanas. On adding this to the earth diameter 9400 yojanas, correspoding to the four small meru, we get 9400 + 100 = 9500 yojanas as the width of the four small meru at the bottom portion of the Citrā earth. Further at a decrease of $\frac{1}{10}$ yojanas, there is obtained a height of one yojanas, then at the decrease of 100 yojanas what height will be obtained ? By rule of three sets, the height from meru bottom at Citrā earth upto plane earth (same bhumi) is obtained as $\frac{100 \times 10}{1}$ = 1000 yojanas. When at the height of 1 yojana, there is a loss of $\frac{1}{10}$ yojana, then at the height of 500 yojanas what will be the decrease ? By the rule of three sets, we get the decrease of $\frac{1 \times 500}{10 \times 1}$ = 50 yojanas. On subtracting this amount from earth's diameter, we get 9400-50 =

9350 yojanas as the measure of width of the meru mountains external to Nandana forest.

When there is a decrease of $\frac{1}{10}$ yojana, there is a height of 1 yojana, hence at the decrease of 50 yojanas, what will be the height ? By the rule of three sets, we get the height of Nandana forest from Bhadraśāla forest as 50 × 10 = 500 yojanas. When at a height of 1 yojana, there is a decrease of $\frac{1}{10}$ yojana, hence at a height of 10000 yojanas, what will be the decrease? By rule of three sets, the measure of decrease is obtained as 1000 yojanas. On both lateral parts of the Nandana forest, the measure of decrease is 500 + 500 = 1000 simultaneously, which when subtracted from external meru diameter of Nandana forest gives the internal meru diameter of Nandana forest as 9350 -1000 = 8350 yojanas. As this width of 1000 yojanas at Nandana forest has been a simultaneous contraction, hence upto a height of 10000 yojanas at this height from Nandana forest, there is the uniform width of the equifrustrum of 8350 yojanas. Here a quality has been brought for height of both equifrustrums.

When, at a height of 1 yojana there is a decrease of $\frac{1}{10}$ yojana, then, at a height of 45500 yojanas (after Nandana forest) the decrease is given by $\frac{45500}{10}$ = 4550 yojanas by rule of three sets. On subtracting this from lower equifrustrum thickness, 8350, we get 8350 -4550 = 3800 yojanas as the external diameter of Saumanasa forest (the upper region). Similarly, height at the decrease of 4550 yojanas is 4550 × 10 = 45500 yojanas by rule of three sets. Similarly, the decrease at height of 10000 yojanas is $\frac{10000}{10}$ = 1000 yojanas. Where this is subtracted from 3800, we get, 3800 - 1000 = 2800 yojanas as the equifrustrum diameter of Saumanasa. This 2800 yojanas is the similar width upto a height of 10000 yojanas. With the same proportionate decrease, there is a decrease of 1800 yojanas at a height of 18000 yojanas. When this is subtracted from 2800 or internal diameter of Saumanasa forest, the height at such a diffrence of 2800 - 1800 = 1000 yojanas, the top-upper diameter of meru, is obtained at 1800 decrease, by the same formula of rule of three sets, because of 1800 × 10 is 18000 yojanas, at the Pāṇḍuka forest from the Saumanasa height of equifrustrum diameter.

Further, there is a peak at centre of each of the Pāṇḍuka forests of the five meru.

(vv.5.635-637)

On the top of meru there are four rocks in four sub-directions, the northeast etc., named as Pāṇḍuka, Pāṇḍukambalā, Raktā and Raktakambalā, corresponding to Bharata region, West Videha region, Airāvata region and East Videha region, where the corresponding ford founders of different region are anointed (abhiṣikta) at their birth. These rocks are 100 yojanas in length and 50 yojanas in breadth. This breadth is of very central portion from which there is reduction both sides, describing the base as unstable and top as stable. All these rocks are semi-lunar in shape, their thickness is eight yojanas. Over these rocks there are three thrones of the ford founder, Saudharmendra and Aiśānendra, respectively. The middle throne corrsponds to Lord Jina, the southern being for Saudharmendra and northern for the rest, called bhadrāsana. These seats or thrones are spherical.

The thrones are 500 dhanuṣas in rise, 500 dhanuṣas in earth (basic) width, and mouth's diameter is 250 dhanuṣa. Their mouth is towards east. In the centre of Pāṇḍuka forest there is peak of meru, with height of 40 yojanas, with bottom width as 12 yojanas and top width as 4 yojanas. The diagram of the four rocks and thrones for Pāṇḍuka etc. is as follows: four rocks are all around with three thrones each.

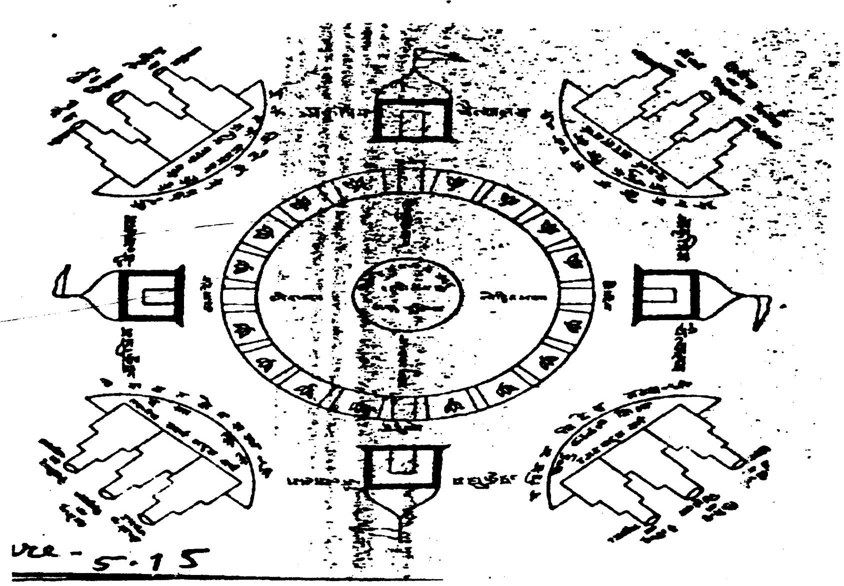


Figure 5.15

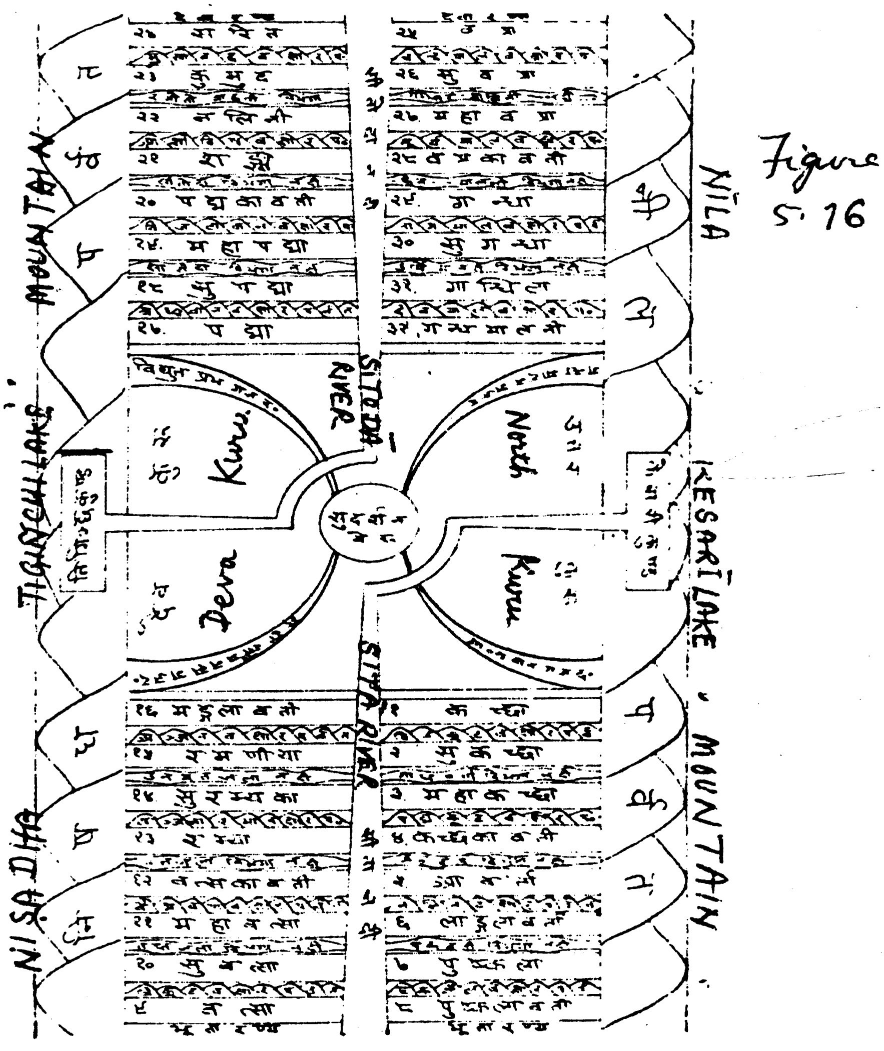


Figure 5.16

(vv.5.666-5.670)

The adjoining figure is about the east and west Videha regions with their divisions made due to mountains and rivers. The diagram is self expressing about mountains, countries and rivers. The geographical maps have been based on cartography, everywhere discoidal, wheel like, or T-O maps, with Babylonion characteristics[1]. In place of li , here we find yojana, meaning a pattern in both the cases. After the geography is reduced to earth's scale, we could sort out the various regions of the Jambū island, specifically the Bharata region and the Videha regions. The names of mountains, rivers, cities, divisions and so on, along with their measures may be helpful in the discoveries.

(v.5.681-5.686)

Corresponding to one meru there are 32 Videha countries, hence corresponding to 5 meru mountains there are 32 × 5 =160 Videha. In every Videha, if separately there are one fordfounder (Tīrthankara), Emperor (cakravartī), semi-emperor or Nārāyaṇa, and counter-Nārāyaṇa, they could be 160, at most.

Corresponding to one meru, former and latter, two Videha regions, are divided into four regions due to Sītā, Sītodā rivers at the south-north banks. Thus, corresponding to 5 meru, total regions are 20. In every division, if separately, there be one ford founder, one emperor, one semi-emperor, then at least, total 20 may be those. Thus including five Bharata, five Airāvata, and 160 videha countries, there could be at most 160 + 5 + 5 = 170 ford-founders, emperors and semi-emperors simultaneously.

Every emperar (cakravartī) possesses 8400000 elephants, 8400000 chariots, 180000000 horses, nine treasures (Kāla, Māhākāla, Pāṇḍu, Maṇavaka, Turya, Naisarpa, Padma, Piṅgala, Gems), Seven non-conscious gems (Cakra, Asi, Chatra, Daṇḍa, Maṇi, Carma and Kākiṇī), seven conscious gems (Grhapati, Senāpati, Hāthī, Aśva, Takṣa, Strī and Purohita), and 96000 queens.

Other kings hold their own ranks. There is commander-inchief, astrologer-head, commircial-head, commandant, counsellor, family-senior, city-superintendent, four castes, four types of armies, priest, minister, prime-minister, whose governor is called a king (rājā). This holds a crown. Such crowned 500 kings (rājā) has a master called the adhirājā, 1000 rājā has a master called mahārājā, 2000 raja have a master called ardha māṇḍalika, 4000 rājā have a master called a māṇḍalika, 8000 rājā have a master called mahā māṇḍalika, 16000 rājā have a master called trikhaṇḍādhipati, (or semi-cakravartī, nārāyaṇa, prati nārāyaṇa). Further 32000 crowned rājā has a master called a cakravartī or emperor or sovereign. The ford-founder, however, is an unparalleled Lord of the whole universe, who is formed by 64 flowery, moon-lit-like, fans. Thus the Tīrthaṇkara is a specific Lord of the universe.

(v.5.691)

There are 32 Videha countries, in every one of which there is one Vijayārdha mountain, dividing the country into two, hence it is called Vijayārdha. In the central province, the vijayārdha are situated, at half the interval between family-mountain and Mahānadi. In every one of these countries, there two rivers in each like the Gaṅgā and the Sindhu. Which are $6\frac{1}{4}$ yojanas wide at origin and $62\frac{1}{2}$ yojana wide at mouth. These two rivers in each and each Vijayārdha mountains have divided each of 32 province × 6 pieces each. This has been illustrated in the following figure-Those Vijayārdha mountains are east-west extended and janapada are at the centre. There are 16 countries at southern bank of the sīta, the sītodā rivers. There are the Gaṅgā and the Sindhu in them. Similarly, the 16 countries at the northern bank of the Sītā, the sītodā, in each of which there are two rivers called the Raktā, the Raktodā. These form tributories to the Sītā, and the Sītodā.

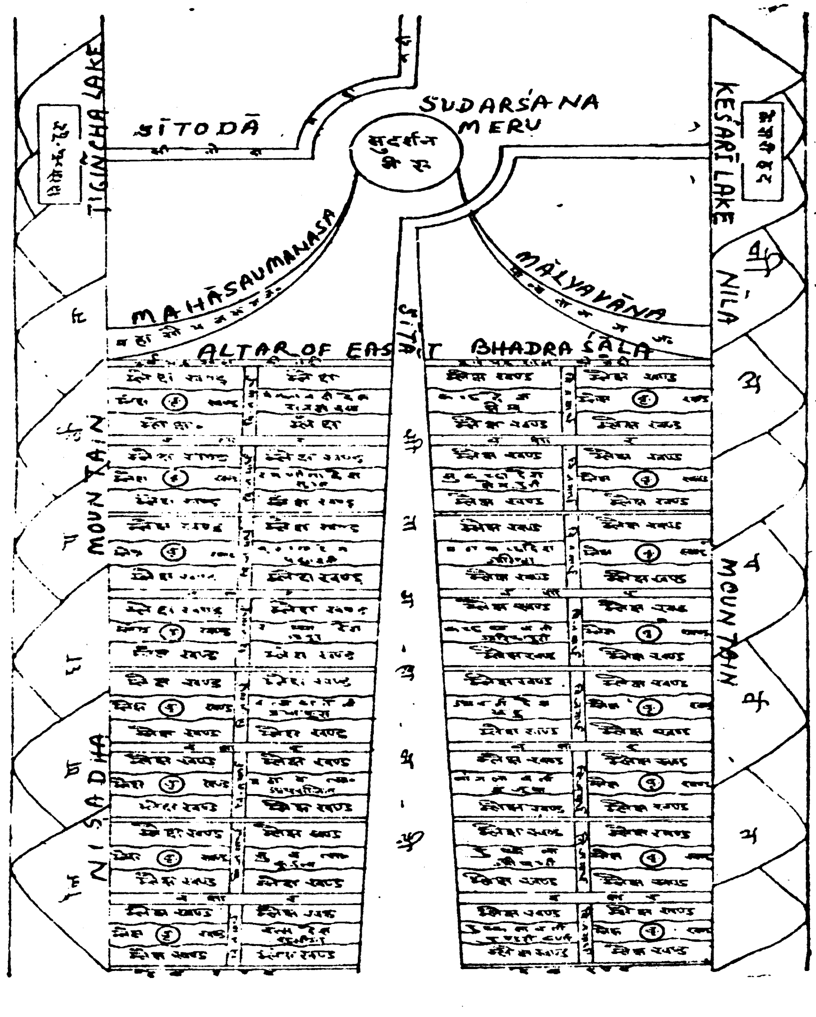


Figure 5.17

(v.5.693)

The total height of those Vijayārdha mountains is 25 yojanas, in which, upto a height of ten yojanas from bottom, the width is 50 yojanas. Above this in the south-north directions, leaving the ten yojanas of cutting in the middle, upto a height of ten yojanas, it is 30 yojanas wide. Again in the south-north directions, leaving 10 yojanas of cutting, it is 10 yojanas wide to a height of 5 yojana. This is illustrated in the following figure-

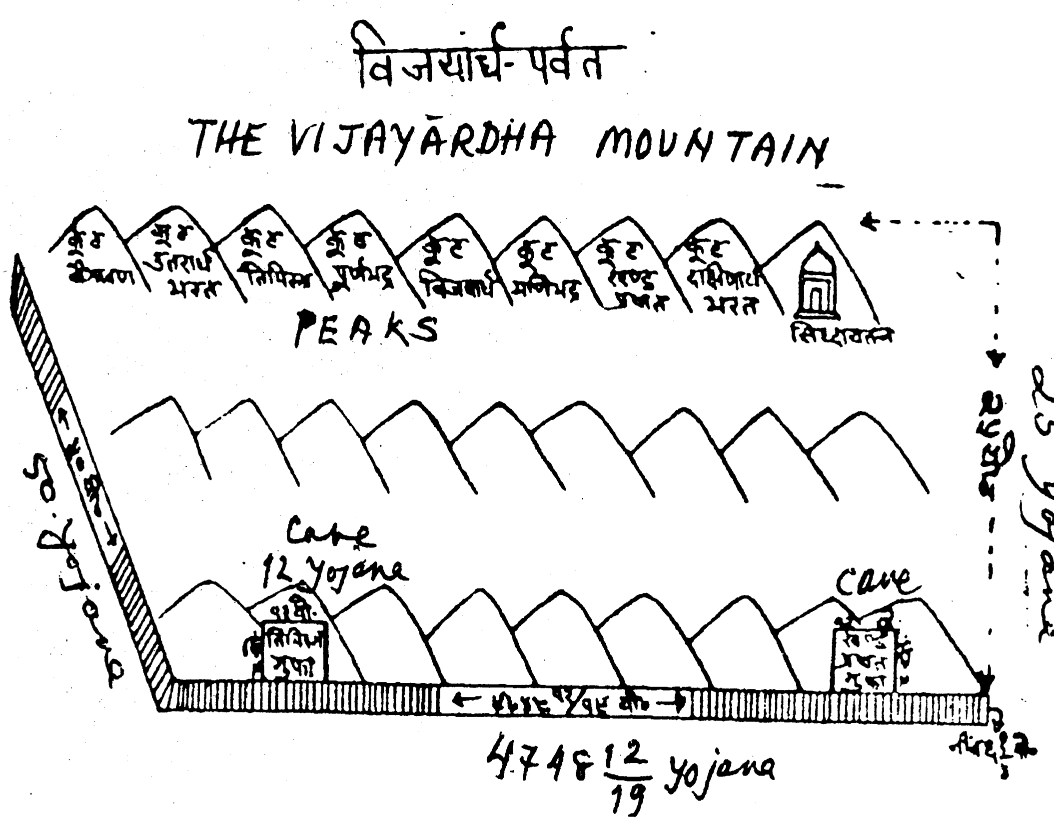


Figure 5.18

(v.5.731)

This verse relates the number of altars every where on the mountains etc. In the Jambū island, there are 311 altars full of gems, for 311 mountains, 90 altars for 90 wells, and 26 altars for 26 lakes, all the altars being full of gems. The number of altars is double of that of rivers. The details are as follows: In Jambū island there are 1 Sudarśana meru, 6 Kulācala, 4 Yamaka mountains, 200 Kañcana mountains, 8 Diggaja mountains, 16 vakṣāra mountains, 4 Gajadanta, 34 Vijayārdha mountains, 34 Vṛṣabha mountains and 4 Nābhi mountains, thus totalling to 311 mountains.

Where the Gaṅga, Sindhu, Rohit, Rohitāsyā etc.14 great rivers fall from the Kula-Mountains, there are wells below, 14 in number. The origin wells of 12 Vibhaṅga rivers is 12. As every country in 32 videha countries, there are two rivers like the Gaṅgā and the Sindhu originating from two wells; hence there are such 64 wells. Thus, the total number of all these wells is 90.

There are 6 lakes on Kula mountains, 10 in the Sītā river, and 10 in the Sītodā river, thus total number of lakes is 26.

Situated in the Bharata and Airāvata regions are the four great rivers, the Gaṅgā, the Sindhu, the Raktā, the Raktodā each of which have their 14000 family rivers, hence the total number of family rivers there is 14000 × 4 = 56000. Situated in the Haimavata and Hairaṇyavata regions are the great four rivers, the Rohit the Rohitāsyā, the Suarṇakūlā and the Rūpyakūlā, each of which has its 28000 tributories, hence the total number of family revers is 28000 × 4 = 112000. Situated in the Hari and Ramyaka regions, are the 4 great rivers, the Harita, the Harikāṇtā, the Nārī and the Narakāntā, each of whose family rivers are 56000, hence their total number of family rivers is 56000 × 4 = 224000. Situated in the Devakuru and Uttarakuru are the two great rivers, the Sītā and the Sītodā each of whose family rivers is 84000, hence their total number is 84000 × 2 = 168000. Each of the 12 Vibhaṅga rivers have 28000 tributories, hence their total number is as 28000 × 12 = 336000 family rivers. In 32 Videha countries, there are 64 rivers called the Gaṅgā, the Sindhu, the Raktā, the Raktodā, each of which has 14000 family rivers, hence their total number is 14000 × 64 = 896000.

Thus, the grand total of all the above total rivers is 56000 + 112000 + 224000 + 168000 + 336000 + 896000 = 1792000. Here the multipliers of chief rivers has a total of 4 + 4 + 4 + 2 + 12 + 64 = 90. On adding this number to the number of family rivers we get, the total number of rivers = 1792000 + 90 = 1792090, corresponding to the Jambū island. The following figure depicts the 90 chief rivers, situated in the Jambū island -

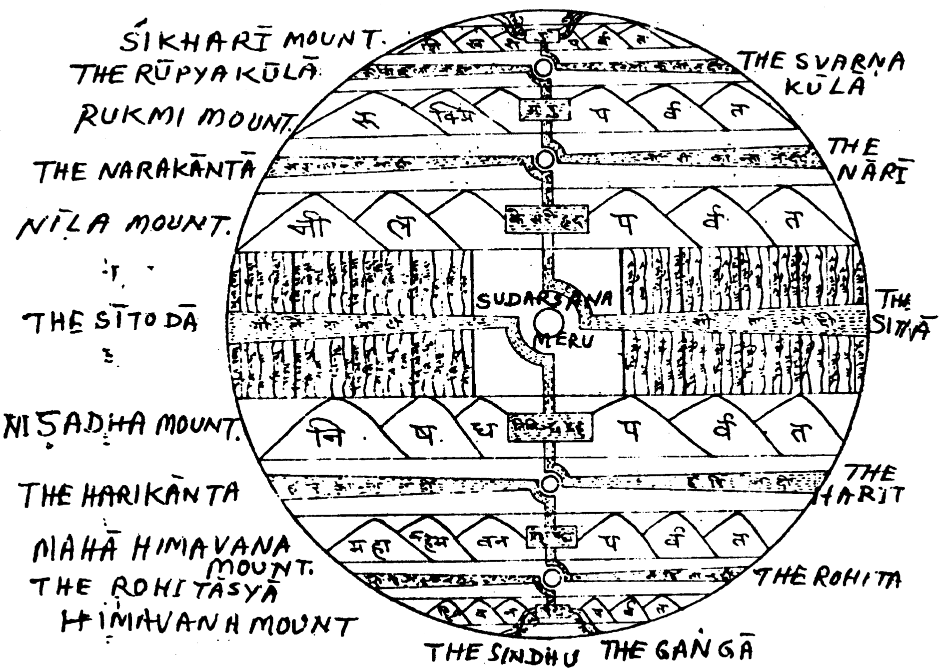


Figure 5.19

Now, there are altars on both banks of the rivers, hence the number of altaras corresponding to rivers is 1792090 × 2 = 3584180.

In this way, there are 311 altars of 311 mountains situated in the Jambū island in which there are also 90 altars of 90 wells, 26 altars of 26 lakes, 3584180 + 311 + 90 + 26 = 3584607. These are all full of gems.

(vv.5.744-5.746)

The four Gajadanta (mountains in shape of tusks) and 16 vakṣāra mountains total to be 20 Vakṣāra mountains. Above these, ie. at their tops there are 9, 7, 9, 7 and 4, 4, ----peaks. Out of 96 peaks, the near by peaks (20 peaks) have the residence of directional-virgins, and on 20 peaks, the first Siddha (accomplished) of each mountain has a Jina temple and 7 peaks each of two Ganjadanta, and five each of two Gajadanta and two each of 16 Vakṣāra mountains, thus on 56 peaks reside the Vyantara deities.

The length of Gajadanta mountains is $30209\frac{6}{19}$ yojana and the length of Vakṣāra mountains is $16592\frac{2}{19}$ yojana. On dividing these by their own number of peaks, 9, 7 and 4, the interval between their mutual peaks is obtained for example, the total distance is $30209\frac{6}{19}$ when there are 9 peaks, hence, for one peak, the interval is $30209\frac{6}{19} \div 9 = 3356$ yojanas and $\frac{5}{9}$ yojana is the remainder. On dividing $\frac{6}{19}$ by 9, and adding $\frac{5}{9}$ we get $[\frac{5}{9} + \frac{6}{19} + \frac{1}{9}] = \frac{101}{171}$. Hence the mutual interval between peaks, from one to another is $3356\frac{101}{171}$ yojanas. Similarly, for 7 peaks of the Gajadanta, the mutual interval is $30209\frac{6}{19} \div 7 = 4315\frac{82}{133}$.

Further for the Vakṣāra mountains the mutual intervalbetween peaks = $16592\frac{2}{19} \div 4 = 4148\frac{1}{38}$ yojanas.

The Vakṣāra mountains along with the Gajadanta for a meru are 20, hence for five meru, the total is 100, whose lateral parts are 400 yojanas high. This goes on in creasing gradually, till near the Videha's Sītā-Sītodā rivers, the height of Gajadanta at lateral parts of meru is 500 yojana, and they have peaks on which there are Jina temples.

The formula for finding out the height of the nine etc. peaks in now given. The height of Vakṣāra mountains is 400 or 500 yojana. One fourth parts of the both are the heights of first and last peaks, ie. $\frac{400}{4} = 100$ yojanas of first peak and $\frac{500}{4} = 125$ yojana of last peak. Their difference is 125 - 100 = 25 yojana. In the first peak, there is absence of decrease or increase, hence on dividing 25 yojanas by terms (pada) less unity, gives the decrease-common-difference (hāni caya) as $\frac{25}{9-1} = 3\frac{1}{8}$, $\frac{25}{7-1} = 4\frac{1}{6}$ and $\frac{25}{4-1} = 8\frac{1}{3}$. This decrease-common-difference is multiplied by desired number of terms less one, getting

$$\frac{25}{8}\times 1, = 3\frac{1}{8}, \frac{25}{8}\times 2 = 6\frac{1}{4}, \frac{25}{8}\times 3 = 9\frac{3}{8}, \frac{25}{8}\times 4 = 12\frac{1}{2},$$

$$\frac{25}{8}\times 5 = 15\frac{5}{8}, \frac{25}{8}\times 6 = 18\frac{3}{4}, \frac{25}{8}\times 7 = 21\frac{7}{8},$$

and $\frac{25}{8}\times 8 = 25$ yojanas. On adding all these respectively in the top (mukha) of 100 yojanas, getting $(100 + 3\frac{1}{8}) = 103\frac{1}{8}$, $106\frac{1}{4}$, $109\frac{3}{8}$, $112\frac{1}{2}$, $115\frac{5}{8}$, $118\frac{3}{4}$, $121\frac{7}{8}$ and 125 yojanas are the heights of the second etc. desired peaks. Similar method is adopted for finding height corresponding to 7 and 4 peaks. For example, $\frac{25}{6}\times 1 = 4\frac{1}{6}$, $\frac{25}{6}\times 2 = 8\frac{1}{3}$, $\frac{25}{6}\times 3 = 12\frac{1}{2}$, $\frac{25}{6}\times 4 = 16\frac{2}{3}$, $\frac{25}{6}\times 5 = 20\frac{5}{6}$, and $\frac{25}{6}\times 6 = 25$ yojanas. All these are added to the top (mukha), 100, the heights of second etc. peaks respectively are given by $104\frac{1}{6}$, $108\frac{1}{3}$ yojanas, $112\frac{1}{2}$, $116\frac{2}{3}$, $120\frac{5}{6}$ and 125 yojanas, over second and fourth Gajadanta. Similarly, for peaks on Vakṣāra mountains, the heights are $\frac{25}{3}\times 1 = 8\frac{1}{3}$, $\frac{25}{3}\times\frac{2}{1} = 16\frac{2}{3}$, $\frac{25}{3}\times 3 = 25$ yojanas. On adding these to top (mukha), 100 yojanas, the peaks have a height respectively given by 100, $108\frac{1}{3}$, $116\frac{2}{3}$ and 125 yojanas. Similarly peaks of Vakṣāra may be calculated.

(vv.5.756-756)

In Dhātakīkhaṇḍa island the width of Videha countries is $9603\frac{3}{8}$ yojanas and in the

Puṣkarārdha island that is $19794\frac{1}{4}$ yojanas. The length of Gajadanta mountains in two and a half islands is given as follows: The lengths of the four Gajadanta in Jambū island are similar, each being $30209\frac{6}{19}$ yojanas. The lengths of the two small Gajadanta towards Lavaṇa sea, in Dhātakī khaṇḍa are 356227 yojanas and the two bigger Gajadanta towards Kālodadhi are each 569259 yojanas long. Similarly, the two small Gajadanta in Puṣkarārdha towards Kālodadhi, each has a length of 1626116 yojanas and the bigger Gajadanta towards Mānuṣottara are each 2042219 yojanas in length.

The Devakuru and Uttarakuru regions are in shape of a bow, because the length of the family mountains between both Gajadanta is the chord (jīvā) and the region between the chord and meru mountain is the arrow (bāṇa), and the length of both Gajadanta jointly form the arc (cāpa)

(vv.5.758)

The next nine verses decribe the method of obtaining arc etc. In Jambū island the width of Vakṣāra (Gajadanta) is 500 yojanas and the width of Bhadraśāla forest east-west is 22000 yojanas. The width of Gajadanta is subtracted from that of Bhadraśāla forest, the remainder is doubled and added to width of meru, giving the chord of Kurukṣetra. For example, 22000 - 500 = 21500; 21500 × 2 = 43000; 43000 + 10000 = 53000 yojanas, the chord of Kurukṣetra. Thus both Gajadanta touch the mountains near altar of east-west Bhadraśāla, hence the length of mountains in between both Gajadanta is 53000 yojanas. Length of every Gajadanta is $30209\frac{6}{19}$ yojanas.On adding length of both Gajadanta, $30209\frac{6}{19} + 30209\frac{6}{19} = 60418\frac{12}{19}$ yojanas is the measure of arc of kuru region.

(V.5.759)

When Jambū island has 190 reckoning rods the region is 100000 yojanas Hence when Videha kṣetra has 64 reckoning rods, how much region it will have? By rule of three sets, $\frac{100000 \times 64}{190} = \frac{640000}{19}$ yojanas is the width of Videha kṣetra. From this the earth diameter of meru mountain ie. 10000 yojanas is subtracted and then halved, as $\frac{640000}{19} - \frac{1000}{1} =$

$\frac{450000}{19}$, and $\frac{450000}{19} \times \frac{1}{2} = \frac{225000}{19}$ or $11842\frac{2}{19}$ yojana is the width of Kuru region, and this is also the arrow of Kuru region, from which chord square and arc square are obtained.

(v.5.760)

The squared quantity is called kṛti. In the Jambū island the measure of diameter of circle of Devakuru and Uttarakuru is $\frac{12165490}{171}$ yojana and the arrow of Kuru region is $\frac{225000}{19}$ yojana. The latter is divided by 9 getting $\frac{225000}{19} \times \frac{1}{9} = \frac{2025000}{171}$ which when subtracted from the former gives $\frac{12165490}{171} - \frac{2025000}{171} = \frac{10140490}{171}$ yojana. The remainder is multiplied by four times the arrow, giving $\frac{10140490}{171} \times (\frac{225000}{19} \times 4 = \frac{900000}{19}) =$ $\frac{1014049000000}{361}$ yojana. Or else establishing the multiplier $\frac{900000}{19}$ yojana with five-point multiplicand $\frac{10140490}{171}$, we get $\frac{1014049000000}{171}$ and remainder is $\frac{9}{19}$. This divisor 171 is canelled by 9, getting 19, and on mutually, the divisors of both the multiplicand and the multiplier, the divisor $19 \times 19 = 361$ is obtained, hence the square of the chord of Devakuru and Uttarakuru is obtained as $\frac{1014049000000}{361}$ yojana. On extracting its square root we get $\frac{1007000}{19}$, and dividing it by its divisor, the chord of Devakurn Uttarakuru is obtained.

The arrow of Kuru region is $\frac{225000}{19}$ yojana, when squared it becomes

$\frac{50625000000}{361}$. On multiplying this by 6, we get $\frac{50625000000}{361} \times \frac{6}{1} = \frac{303750000000}{361}$ yojana. This is the six times the square of arrows. When this square is added to square of chord (jīvā) we get $\frac{303750000000}{361} + \frac{1014049000000}{361} = \frac{1377799000000}{361}$ yojana as the square of the arc (cāpa or dhanuṣa), and if its squareroot $\frac{1147954}{19}$ is divided by 19 we get $60418\frac{12}{19}$ yojanas as the chord of Devakuru and Uttarakuru. The square root of the square of arrow, $\frac{50625000000}{361}$ is $\frac{225000}{19}$ or $11842\frac{2}{19}$ yojanas which is the arrow of the kurukṣetra.

In order to give the use of the formulae here, we shall give symbols to the various parts of a circle and straightline, as follows:

Here, let the diameter

(Viṣkambha or vyāsa)

= AB = d

the chord (jīvā, ḍorī, cāpakarṇa)

= CD = C

the arc (dhanuṣa, cāpa)

= a the height of segment

(iṣu, bāṇa) = h

Now

$(\text{chord})^2 = (\text{diameter} - \text{arrow}) \times 4 \times \text{arrow}$

or $c^2 = (d - h)\,4h$ ....(5.1)

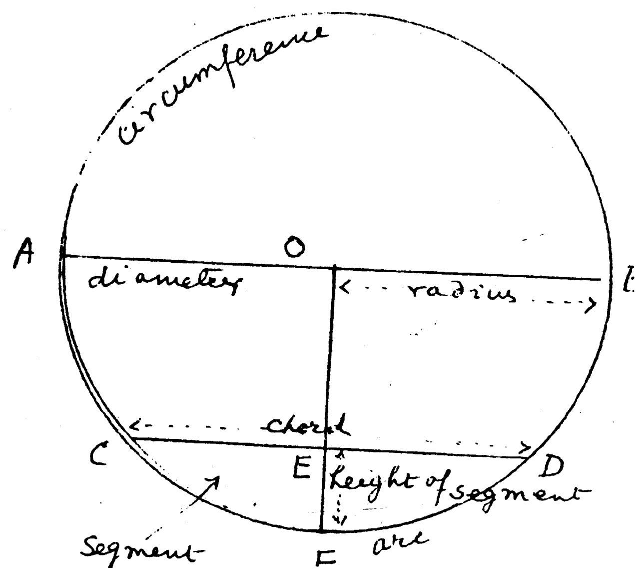


Figure 5.20

or $c = \sqrt{\{d^2 - (d - 2h)^2}$ ....(5.2)

Similarly, $(\text{arc})^2 = 6\,(\text{height of segment})^2 + (\text{chord})^2$

or $a^2 = 6h^2 + c^2$ ....(5.3)

or $a = \sqrt{2\{(d + h)^2 - d^2}$ . ...(5.4)

The same formulae are given in TPT, v.4.180 and v.4.181, as well as in JPS, vv.2/23, 6/9; 2/24, 29; 6.10.

(v.5.761)

Here the formula used is

$$\text{diameter} = \frac{4(\text{arrow})^2 + (\text{chord})^2}{4\ \text{arrow}}$$ ....(5.5)

$$\text{or} \quad d = \frac{4\,h^2 + c^2}{4\,h}$$ ....(5.6)

In the Jambū island, on squaring the arrow, $\frac{225000}{19}$ yojanas of Kuru region, we get $\frac{50625000000}{361}$ yojana, and on making it four times it gives $\frac{202500000000}{361}$ yojana, or $\frac{2025}{361}$ and $\frac{0}{8}$ or 8 zeros to be placed ahead of 2025 in the numerator. In to this is added the square of chord or $\frac{1014049}{361}$ and $\frac{0}{6}$ or six zero to be placed ahead of the numerator, or $\frac{1014049000000}{361}$ yojana. The sum is then divided by four times the arrow, ie. by $\frac{900000}{19}$, giving $\left(\frac{202500000000}{361} + \frac{1014049000000}{361}\right) \div \frac{900000}{19}$

or this gives $\frac{12165490}{171}$ or $71143\frac{37}{171}$ yojanas as the diameter of the circle of Kurukṣetra. This is the arrow of Kuru region.

(v.5.762)

The fine area of the segment (dhanuṣākāra kṣetra) of a circle =

$$\sqrt{10\ (\text{chord} \times \frac{\text{arrow}}{4})^2} = \frac{hc}{4}\sqrt{10} \qquad \text{...........(5.7)}$$

The gross area of the segment (dhanuṣākāra kṣetra) of a circle

$$= \frac{\text{cord} + \text{arrow}}{2} \times \text{arrow} = \left(\frac{c+h}{2}\right) h. \qquad \text{..........(5.8)}$$

For fine area, vide TPT v. 4. 2374.

Application of the above is as follows:

The arrow of Kururegion is $\frac{225000}{19}$ yojana. Its fourth part, $\frac{56250}{19}$, is multiplied by chord, 53000 yojanas, getting $\frac{225000}{19} \times \frac{53000}{1} \times \frac{1}{4} = \frac{2981250000}{19}$. This is separately established. Further $53000 \times \frac{19}{19} = \frac{100700}{19}$ yojana, the chord measure, and arrow $\frac{225000}{19}$ yojana are added to give $\frac{1007000}{19} + \frac{225000}{19} = \frac{1232000}{19}$ yojana. Its half is $\frac{1232000}{19} \times \frac{1}{2} = \frac{616000}{12}$ yojana is established separate. Then the first established $\frac{2981250000}{19}$ is as per formula, squared and multiplied by 10, getting $\frac{2981250000}{19} \times \frac{2981250000}{19} \times 10 =$

$\frac{88878515625}{361}(10)^9$ or $\frac{888785156250000000000}{361}$. On extracting its square root, the

$\frac{9427540274}{19}$ square yojana is the fine area of Kuru region meaning that the number of 1 yojana by 1 yojana pieces is $\frac{9427540274}{19}$. The latter established $\frac{616000}{19}$ yojana is multiplied by arrow, $\frac{225000}{19}$ yojana, getting $\frac{616000}{19} \times \frac{225000}{19} = \frac{138600000000}{361}$ square yojana, which is the gross area of Kurukṣetra.

(v.5.763)

Another formula for finding out the diameter of the circle and arrow measure :

$$\text{diameter} = \frac{[\{2\ (\text{arrow})\}^2 + \{(\text{chord})^2\}]}{4\ \text{arrow}} \qquad \text{..........(5.9)}$$

$$\text{or}\quad d = \frac{(2\ h)\}^2 + c^2}{4\ h} \qquad \text{..........(5.10)}$$

$$\text{Again,}\quad \text{arrow} = \sqrt{\frac{(\text{arc})^2 - (\text{chord})^2}{6}} \qquad \text{...........(5.11)}$$

$$\text{or}\quad h = \sqrt{\{(a)^2 - (c)^2\}\frac{1}{6}} \qquad \text{...........(5.12)}$$

Example - The arrow of Kururegion of Jambū island is $\frac{225000}{19}$ yojana. Square of twice the arrow is $\frac{450000}{19} \times \frac{450000}{19} = \frac{202500000000}{361}$. In this, the square of chord or

$53000 \times 53000 = 2809000000$, or $2809000000 \times \frac{361}{361}$ or $\frac{1014049000000}{361}$ is added getting

$\frac{202500000000}{361} + \frac{1014049000000}{361} = \frac{1216549000000}{361}$. This is divided by fourtimes the

arrow, i.e. by $\frac{900000}{19}$, getting $\frac{1216549000000}{361} \times \frac{19}{90000} = \frac{12165490}{171}$ yojana as the diameter of the circle of kuru region by formula (5.10). Further, the square of chord, $\frac{1014049000000}{361}$ is subtracted from the square of arc, $\frac{1317799000000}{361}$, getting $\frac{303750000000}{361}$ which is divided by 6, getting $\frac{303750000000}{361 \times 6}$ or $\frac{50625000000}{361}$ whose square root is $\frac{225000}{19}$ yojana, which is the measure of the arrow of Kurukṣetra. Here formula (5.12) has been applied.

(v.5.764)

An alternate formula for finding out the arrow or height of segment is given in this verse-

$$\text{arrow} = \frac{\text{diameter} - \sqrt{(\text{diameter})^2 - (\text{chord})^2}}{2} \qquad \text{..........(5.13)}$$

$$\text{or} \quad h = \frac{d - \sqrt{(d)^2 - (c)^2}}{2} \qquad \text{...........(5.14)}$$

The same formula appears in TPT, v. 4.182 and JPS, v.2/25, v. 6/11. This formula can be derived on solving the equation $4h^2 + c^2 - 4dh = 0$ ....(5.15).

Example: The chord of Kuru region of Jambū island is 53000 yojanas, and its square is

2809000000. The diameter is $\frac{12165490}{171}$ which on squaring is $\frac{147999146940100}{29241}$. On multipling the square of chord by $\frac{29241}{29241}$, we get $\frac{82137969000000}{29241}$. On subtracting this from square of diameter we get $\frac{147999146940100}{29241} - \frac{82137969000000}{29241} = \frac{65861177940100}{29241}$. The square root of this remainder is $\frac{8115490}{171}$ is subtracted from the diameter, getting $\frac{12165490}{171} - \frac{8115490}{171} = \frac{4050000}{171}$. On making it half we get $\frac{2025000}{171}$ or $\frac{225000}{19}$ on cancellation by 9, which gives the measure of arrow of Kuru region.

(v.5.765)

This verse gives alternative formulae to find out the diameter and the height of segment as follows-

$$\text{diameter} = \frac{\frac{(\text{arc})^2}{2\ (\text{arrow})} - \text{arrow}}{2}, \qquad \text{...........(5.15)}$$

$$\text{or} \quad d = \frac{\frac{a^2}{2\ h} - h}{2} \qquad \text{...........(5.16)}$$

$$\text{Again, arrow} = [(\text{diameter})^2 + \frac{(\text{arc})^2}{2}]^{1/2} - \text{diameter} \qquad \text{...........(5.17)}$$

$$\text{or} \quad h = [d^2 + \frac{a^2}{2}]^{1/2} - d. \qquad \text{...........(5.18)}$$

This can be obtained from the previous verse.

Example- The arrow of Kuru region of Jambū island is $\frac{225000}{19}$ yojanas. Its twice is $\frac{450000}{19}$. The square of arc is $\frac{1317799000000}{361}$ which is divided by $\frac{450000}{19}$, getting $\frac{131779900}{855}$ which on cancellation by 5 gives $\frac{26355980}{171}$ .On subtracting $\frac{2025000}{171}$ as arrow measure from this gives $\frac{24330980}{171}$ as remainder, half of which is $\frac{12165490}{171}$ or $71143\frac{37}{171}$ yojana which is measure of diameter of circle. Vide eqnation (5.16) Square of this diameter is $\frac{147999146940100}{29241}$. To this, is to be added half of square of arc which is $\frac{1}{2}(\frac{1317799000000}{361}) = \frac{658899500000}{361}$ or $\frac{658899500000}{361} \times \frac{81}{81} = \frac{53370859500000}{29241}$. Thus the ddition is $\frac{1317799000000}{361} + \frac{53370859500000}{29241} = \frac{201370006440100}{29241}$ yojana which when its square root is extracted gives $\frac{14190490}{171}$ from which diameter is subtracted. This yields $\frac{14190490}{100} - \frac{1216549}{171} = \frac{2025000}{171} = \frac{225000}{19}$ on cancellation, which is the arrow or height of segment h of the Kururegion. This is application of formula (5.18)

(v.5.766)

Now the formulae for finding out the squares of arc and chord are being given in an alternative way.

$$(\text{arc})^2 = (\frac{\text{arrow}}{2} + \text{diameter})\ 4\ (\text{arrow}) \qquad \text{...........(5.19)}$$

or $a^2 = (\frac{h}{2} + d)\,4h.$ ....(5.20)

Again

$(\text{chord})^2 = (\text{arc})^2 - (\text{arrow})^2 \times 6$ ....(5.21)

or $c^2 = a^2 - 6h^2$ ....(5.22)

Example- We apply formula (5.20) to get square of arc, a^2. The arrow of Kururegion of Jambu island is $\frac{225000}{19}$ yojana. Half of this is $\frac{112500}{19}$ or $\frac{1012500}{171}$. On adding this to diameter $\frac{12165490}{171}$, we get $\frac{13177990}{171}$ yojana. This is multiplied by four times the arrow, i.e. $\frac{13177990}{171} \times 4 \times \frac{225000}{19}$ getting $\frac{1317799000000}{361}$ yojana. This has been effected by cancellation etc.

Now we apply formula (5.22) for getting chord square, or c^2. The square of arrow of Kuru region is $(\frac{225000}{19})^2$ or $\frac{50625000000}{361}$. This is multiplied by six getting $\frac{303750000000}{361}$. This is subtracted from square of the arc, getting $(\frac{1317799000000}{361} - \frac{303750000000}{361}) = \frac{1014049000000}{361}$ = 2809000000 is the square of the chord in yojana.

The same formula may be applied from v.760 to v.766, for finding out the unknowns of the Bharata region etc. and Himavān mountain etc.

(v.5.767)

Now the arrows of south Bharata, Vijayārdha and north Bharata region are calculated from the method given below-

The diameter or width of Bharata region is $526\frac{6}{19} - 50 = 476\frac{6}{19}$ yojanas. On halving it, $238\frac{3}{19}$ yojana gives the south half Bharata region. In this $238\frac{3}{19}$, we add 50 yojanas, getting $288\frac{3}{19}$ yojanas as arrow of Vijayārdha chord. When in the arrow of Vijayārdha we add the width $238\frac{3}{19}$ yojanas of north Bharata, we get $288\frac{3}{19} + 238\frac{3}{19} = 526\frac{6}{19}$ yojana, getting the arrow of the whole Bharata region. Thus these may be witten respectively as $\frac{5425}{19}$, $\frac{5475}{19}$ and $\frac{10000}{19}$ yojanas.

NOTE: We quote here different formulae from H.R.Kapadia* for a comparative study with the above formulae on mensuration -

The bhāṣya (p.258) on the Tattvārthādhigama sūtra (III, 11), gives the following 6 formula-

1. Circumference = $\sqrt{10\ d^2}$ for a circle = $\sqrt{10}$ d
2. Area of circle = $\frac{1}{4}$ (circumference) d = $\frac{1}{4}\sqrt{10}\ d^2$
3. chord = c = $\sqrt{4\ h\ (d - h)}$ with the same notations
4. h = $\frac{1}{2}$ [d - $\sqrt{d^2 - c^2}$, where h is height of segment or arrow

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* Introduction to Gaṇita Tilaka by Śrīpati, with comentary of Siṁhatilaka Sūri, 1937, Baroda, pp. XII et seq. Vide also Anuyogadvāra Sūtra (sūtra, 146, p. 235). Vide also Gaṇitānuyoga introduction by L.C. Jain, op. cit.

5. arc or dhanuṣa = $\sqrt{6h^2 + c^2}$

6. diameter = d = $(h + \frac{c^2}{4})/h$

7. In Kṣetrasamāsa,

$$h = (a^2 - c^2)/6$$

However, in the Trilokasāra, here, we have found the following formulae, as quoted in the verses above-

(1) Gross circumference = 3d

(2) Subtle or neat circumference = $\sqrt{10\ d^2}$ v.4.311

(3) Area = $\frac{1}{4}$ (circumference) d = $\frac{1}{4}$ (3 d or $\sqrt{10}$ d) d for gross or fine areas

(4) $r = \frac{9}{16}$ s where r is the radius of the circle, equivalent to a square of side s;

thus $\pi = (\frac{16}{9})^2$ v.1.18

(5) $c^2 = 4h(d - h)$

(6) $a^2 = 6h^2 + c^2$ ... v.5.760

(7) $d = \frac{c^2 + 4h^2}{4h}$ v.5.761

(8) A (gross) = $\sqrt{10} \cdot c \cdot \frac{h}{4}$ v.5.762

(9) A (neat) = $\frac{1}{2}(c + h)h$

(10) $d = \frac{c^2 + (2h)^2}{4h}$

(11) $h = \frac{\sqrt{a^2 - c^2}}{6}$ v.5.763

(12) $h = \frac{1}{2}(d \sqrt{d^2 - c^2})$ v.5.764

(13) $d = \frac{1}{2}(\frac{a^2}{2h} - h)$

(14) $h = \sqrt{d^2 + \frac{1}{2}a^2} - d$ v.5.765

(15) $a^2 = 4h(d + \frac{h}{2})$

(16) $c^2 = a^2 - 6h^2$ ....-v.5.766,

v.5.768

Now method is given for finding out the arrows of the Himavat etc. mountains and Haimavat etc. regions:-

The total number of reckoning-rods for all regions and mountains of the Jambū island is 190, hence when 190 is proportionataly meant for 100000 yojana, those for 2, 4, 8, 16 and 32 reckoning rods, the measures after rule of three sets, are $\frac{20000}{19}$ for Himavat, $\frac{40000}{19}$ yojana for Haimavata, $\frac{80000}{19}$ for Mahā himavan, $\frac{160000}{19}$ for Hari region, $\frac{320000}{19}$ yojana for Niṣadha. On doubling then, we get $\frac{40000}{19}, \frac{80000}{19}, \frac{160000}{19}, \frac{320000}{19}$, and $\frac{640000}{19}$ yojana. On subtracting the width of Bharata from all these, the arrows of mountains and regions are obtained from Haimvat upto Niṣadha, as

$\frac{30000}{19}$, $\frac{70000}{19}$, $\frac{150000}{19}$, $\frac{310000}{19}$, and $\frac{630000}{19}$ yojanas. On adding half of width of Videha, $\frac{640000}{19}$ into arrow of Niṣadha, $\frac{630000}{19}$, we get $\frac{950000}{19}$ yojana as the measure of arrow of half videha.

Now from the above, as per v.760, the squares of chords and arcs may be obtained- for example-

The arrow of south India is $238\frac{3}{19}$ yojanas or $\frac{4525}{19}$ yojana. The diameter of Jambū island is 100000 yojanas, or $\frac{1900000}{19}$ yojana. On subtracting the arrow from the diameter, we get $\frac{1900000}{19} - \frac{4525}{19} = \frac{1895475}{19}$. This multiplied by four times the arrow, getting $\frac{1895475}{19} \times \frac{4525}{19} \times 4 = \frac{34308097500}{361}$, is the square of chord. Its square root is $\frac{185224}{19}$ yojana or $9748\frac{12}{19}$ yojanas.

Further, the arrow of south Bharata when squared is $(\frac{2425}{19})^2$ or $\frac{20475625}{361}$. This is multiplied by 6 and added to square of the chord for getting the square of arc as $(\frac{34308017500}{361} + \frac{20475625}{361} \times 6) = \frac{34430951250}{361}$, and on finding out its square root as $\frac{185555}{19}$ or $9766\frac{1}{19}$ yojana as the arc measure.

Similarly the measurement for the Vijayārdha and north Bharata are obtained. Similar measurement for other regions and mountains are obtained.

(vv.5.765-778)

Having found the measurements, the following definitions are given

Peak (cūlikā) - Regarding the Bharata regions and Himavân etc. mountains in the south, and Airāvata etc. regions and Śikharin etc. mountains in the north, when the greater chord is subtracted by the smaller chord and the remainder is halved, the quotient is called the peak or cūlikā. Similarly, from the greater arc is subtracted the smaller arc and the remainder is halved, the result is called the lateral side (pārśva bhujā).

Example-

The chord of south Bharata is $9748\frac{12}{19}$ yojanas and chord of Vijayārdha is

$10720\frac{11}{19}$ yojanas, hence half of the difference of both is

$485\frac{37}{38}$ which is peak of the Vijayārdha in yojana.

(Here the commentary gives details of calculations of integers and fractions separately for getting the above result-

Similarly, the arc of south Bharata is $9766\frac{1}{19}$ yojanas and that of Vijayārdha is

$10743\frac{15}{19}$ yojanas, hence half of their difference is

$488\frac{33}{38}$ yojanas which is the lateral side of the Vijayārdha mountains.

The following tables are given for various data obtained as in the earlier verses, through various formulae and methods.

TABLE - 5.7
TABLE FOR PEAKS (CŪLIKĀ)

Ser No.	Name of region & mountain	earlier (former) chord in yojana	latter chord in yojana	difference in yojana	peak's measure in yojana
1.	north Bharata	$\frac{203691}{19}$	$\frac{274954}{19}$	$\frac{71263}{19}$	$\frac{71263}{19}\times\frac{1}{2}=1875\frac{13}{38}$
2.	Himavān mountain	$\frac{274954}{19}$	$\frac{473709}{19}$	$\frac{198755}{19}$	$\frac{198755}{19}\times\frac{1}{2}=5230\frac{15}{38}$
3.	Haimavata region	$\frac{473709}{19}$	$\frac{715822}{19}$	$\frac{242113}{19}$	$\frac{242113}{19}\times\frac{1}{2}=6371\frac{15}{38}$
4.	Mahāhimavān	$\frac{715822}{19}$	$\frac{1024695}{19}$	$\frac{308873}{19}$	$\frac{308873}{19}\times\frac{1}{2}=9985\frac{9}{38}$
5.	Harikṣetra	$\frac{1024695}{19}$	$\frac{1404136}{19}$	$\frac{379441}{19}$	$\frac{379441}{19}\times\frac{1}{2}=9985\frac{11}{38}$
6.	Niṣadha mountain	$\frac{1404136}{19}$	$\frac{1788966}{19}$	$\frac{384830}{19}$	$\frac{384830}{19}\times\frac{1}{2}=10127\frac{2}{19}$
7.	South Videha	$\frac{1788966}{19}$	$\frac{1900000}{19}$	$\frac{111034}{19}$	$\frac{111034}{19}\times\frac{1}{2}=2921\frac{18}{19}$

TABLE-5.8
FOR LATERAL SIDES (PĀRŚAVA BHUJĀ)

Ser No.	Name of region & mountain	earlier (former) chord in yojana	latter chord in yojana	difference in yojana	Lateral side(half of difference(in yojana)
1.	north Bharata	(204132/19	(276043)/19	(71911)/19	$1892\frac{15}{38}$ or $\frac{71911}{19}\times\frac{1}{2}$
2.	Himavân	(276043)/19	(479374)/19	(203331)/19	$5350\frac{31}{38}$ or $\frac{203331}{19}\times\frac{1}{2}$
3.	Haimavata region	(479374)/19	(736070)/19	(256696)/19	$\frac{256696}{19}\times\frac{1}{2}=6555\frac{3}{19}$
4.	Mahāhimavan	(736070)/19	(1088577)/19	(332507)/19	$\frac{352507}{19}\times\frac{1}{2}=9276\frac{1}{2}$
5.	Harikṣetra	$\frac{1088577}{19}$	$\frac{1596308}{19}$	$\frac{507731}{19}$	$\frac{507731}{19}\times\frac{1}{2}=13361\frac{13}{38}$
6.	Niṣadha mountain	$\frac{1596308}{19}$	$\frac{2362583}{19}$	$\frac{766275}{19}$	$\frac{766275}{19}\times\frac{1}{2}=20165\frac{5}{38}$
7.	South videha	$\frac{2362583}{19}$	$\frac{3004164}{19}$	$\frac{641581}{19}$	$\frac{641581}{19}\times\frac{1}{2}=16883\frac{27}{38}$

TABLE-5.9

CONSOLIDATED TABLE FOR PEAK AND LATERAL SIDE ETC. IN YOJANA

Ser. No.	Name	Width	Arrow	Chord	Peak	Arc	Lateral side
1	South Bharata	$238\frac{3}{19}$	$238\frac{3}{19}$	$9748\frac{12}{19}$	x	$9766\frac{1}{19}$	x
2	Vijayārdha	50	$288\frac{3}{19}$	$10720\frac{11}{19}$	$485\frac{37}{38}$	$10743\frac{15}{19}$	$488\frac{33}{38}$
3	North Bharata	$238\frac{3}{19}$	$523\frac{6}{19}$	$14471\frac{5}{19}$	$1875\frac{13}{38}$	$14528\frac{11}{19}$	$1892\frac{15}{38}$
4	Himavan mountain	$\frac{20000}{19}$	$\frac{30000}{19}$	$24932\frac{1}{19}$	$5230\frac{15}{38}$	$25230\frac{4}{19}$	$5350\frac{31}{38}$
5	Haimavata	$\frac{40000}{19}$	$\frac{70000}{19}$	$37674\frac{16}{19}$	$6371\frac{15}{38}$	$38740\frac{10}{19}$	$6755\frac{3}{19}$
6	Mahāhimavāna	$\frac{80000}{19}$	$\frac{150000}{19}$	$53931\frac{6}{19}$	$8128\frac{9}{38}$	$57293\frac{10}{19}$	$9276\frac{1}{2}$
7	Harikṣetra	$\frac{160000}{19}$	$\frac{310000}{19}$	$73901\frac{17}{19}$	$9985\frac{11}{38}$	$118401\frac{4}{19}$	$13361\frac{13}{38}$
8	Niṣadha	$\frac{320000}{19}$	$\frac{630000}{19}$	$94156\frac{2}{19}$	$10127\frac{2}{19}$	$124346\frac{9}{19}$	$20165\frac{5}{38}$
9	South Videha	$\frac{320000}{19}$	$\frac{950000}{19}$	100000	$2921\frac{18}{19}$	158114	$16883\frac{27}{38}$

10	North Videha	$\frac{320000}{19}$	$\frac{950000}{19}$	100000	$2921\frac{18}{19}$	158114	$16883\frac{27}{38}$
11	Nīla	$\frac{32000}{19}$	$\frac{630000}{19}$	$94156\frac{2}{19}$	$10127\frac{2}{19}$	$124346\frac{9}{19}$	$20165\frac{5}{38}$
12	Ramyaka	$\frac{160000}{19}$	$\frac{310000}{19}$	$7390\frac{17}{19}$	$9985\frac{11}{38}$	$84016\frac{4}{19}$	$13361\frac{13}{38}$
13	Rukmi	$\frac{80000}{19}$	$\frac{150000}{19}$	$53931\frac{6}{19}$	$8128\frac{9}{38}$	$57293\frac{10}{19}$	$9276\frac{1}{2}$
14	Hairanyavata	$\frac{40000}{19}$	$\frac{70000}{19}$	$37674\frac{16}{19}$	$6371\frac{15}{38}$	$38740\frac{10}{19}$	$6755\frac{3}{19}$
15	Śikharin	$\frac{20000}{19}$	$\frac{30000}{19}$	$24932\frac{1}{19}$	$5230\frac{15}{38}$	$25230\frac{4}{19}$	$5350\frac{31}{38}$
16	South Airāvata	$238\frac{3}{19}$	$523\frac{6}{19}$	$14471\frac{5}{19}$	$1875\frac{13}{38}$	$14528\frac{11}{19}$	$1892\frac{15}{38}$
17	Vijayārdha	50	$288\frac{3}{19}$	$10720\frac{11}{19}$	$485\frac{37}{38}$	$10743\frac{15}{19}$	$488\frac{33}{38}$
18	North Airāvata	$238\frac{3}{19}$	$238\frac{3.}{19}$	$9748\frac{12}{19}$	x	$9766\frac{1}{19}$	x

(v.5.783)

In the beginning of the first period, the height of human beings is 3 kośas and in the end is 2 kośa. In the beginning of the second period it is 2 kośa and in the end is 1 kośa. In the third period beginning, it is one kośa and in the end is 500 dhanuṣa.In the beginning of the fourth peried it is 500 dhanuṣa and in the end it is 7 hands. In the beginning of fifth period it is 7 hands and in the end it is 2 hands. In the beginning of sixth period it is 2 hands and in the end it is one hand.

(v.5.784)

The body colour of human beings during first period is like the colour of rising sun, in the second period it is like the colour of full moon, in the third period it is like creepers greenish blackish colour, in the fourth period it is like all the five colours, and in the fifth period it is like lustreless fine colours, and in the sixth period it is like black like smoke.

(v.5.785)

The following table gives the information of periods, period-measure, aga of man, height. body's colour and food:-

TABLE-5.10

Ser. No.	Name of Period	Measure of period	Longevity of human	Height of body	Colour	Food interval
1	Suṣamā suṣamā	4 $(\text{crore})^2$ sāgara	3 palya-2 palya	3 kośa -2 kośa	of rising sun	after 3 days
2	Suṣamā (pleasant)	3 $(\text{crore})^2$ sāgara	2 palya-1 palya	2 kośa-1 kośa	of full moon	after 2 days
3	Suṣamā -duṣamā	2 $(\text{crore})^2$ sāgara	1 palya-pūrva koṭi	1 kośa-500 Dhanuṣa	of creeper	after 1 day
4	Duhṣamā-Suṣamā	42000 years less	1 Pūrva koṭi-120 years	500 Dhanuṣa -7 Hasta	fivecolours	Everyday once
5	Duhṣamā (unpleasant)	21000 years	120 years -20 years	7 Hasta -2 Hasta	lustreless five colours	Manytimes
6	Duhṣamā -duhṣamā	21000 years	20 years -15 years	2 Hasta -1 Hasta	Smoke-colour	Frequently

(v.5.796)

The longevity of kulakara (family-generators) is stated in this verse. The longevity of the first kulakara is $\frac{1}{10}$ palya, that of remaining 12 kulakara is in a geometric regression, with common ratio $\frac{1}{10}$, ie. $\frac{1}{100}$ palya, $\frac{1}{1000}$ palya, ..., $\frac{1}{(10)^{13}}$ palya. The longevity of the last or fourteenth kulakara was one pūrva koṭi years. Excepting the one koṭi, the total of the remaining 13 kulakara longevity is, by formula for summing a geometric-regression

$$\frac{1}{10} + \frac{1}{(10)^2} + ... + \frac{1}{(10)^{13}} = \frac{1111111111111}{(10)^{13}}. \qquad ....(5.23)^*$$

If to the above amount, $\frac{1}{9(10)^{13}}$ be added, then the sum is $\frac{1111111111111}{(10)^{13}} + \frac{1}{9(10)^{13}}$

$$= \frac{(10)^{13}}{9\ (10)^{13}} = \frac{1}{9} \qquad ....(5.24)$$

and

$$\frac{1111111111111}{(10)^{13}} - \frac{1}{9(10)^{13}} = \frac{9999999999998}{9\ (10)^{13}}. \qquad ....(5.25)$$

Application of formula for geometrical sum has been given by the commentator, Mādhavacandra Traividya:

$$S = a\left(\frac{a\ (r^n - 1)}{r - 1}\right) = \frac{a\ (1 - r^n)}{r - 1}. \qquad ....(5.26)$$

$r = \frac{1}{10}$, $a = \frac{1}{10}$ or the other way $r = 10$, $a = \frac{1}{(10)^{13}}$,

* Note that $(10)^{13}$ is called one lac crore $(8)(10)^{13}$ is 8 lac crore.

$$n = 13 \therefore \quad S = \frac{\frac{1}{(10)^{13}}[(10)^{13} - 1]}{(10) - 1} = \frac{9999999999999}{(10)^{13}(9)}$$

$$= \frac{1111111111111}{(10)^{13}}. \qquad \text{...........(5.27)}$$

The expression (5.25) is slightly less than $\frac{1}{9}$ palya. ....(5.28)

or

Explanation through numerical symbolism-

Let the quantity be $\frac{60}{4}$, from which let the -20/4 negative quanitity, be added or we have

$$\frac{60}{4} + (\frac{20}{4}) = \frac{40}{4} = 10.$$

On adding 2 to denominator 4 of $\frac{60}{4}$, we get $= \frac{60}{4+2} = \frac{60}{6} = 10$. On dividing minus 20 by quotient 10, the measure 2 of excess of denominator is obtained:

$\frac{60}{4 + e} = 10$, where e is the excess, ...(5.28)

or $60 = 40 + 10e \therefore$ $60 - 40 = + 10e$, hence $e = 2$. ....(5.29)

Let 20 be denoted as the deficit, unknown as d, for numerator,

then $\frac{60 - d}{4} = 10$, ...(5.30)

hence $60 - d = 40 \therefore -d = 40 - 60 = -20$ ....(5.31)

In this way, the deficiency of numerator, as 20 or negative 20, when unknown as d is determined.

(v.5.797)

The first difference is $\frac{1}{80}$ palya and remaining difference is obtained on division by ten,

for example, $\frac{1}{80\ (10)}$, $\frac{1}{80\ (10)^2}$, $\frac{1}{80\ (10)^3}$, ..., $\frac{1}{80\ (10)^{12}}$. On adding them through

common LCM, we get $\frac{1111111111111}{80\ (10)^{12}}$. On multiplying the last by 9 in both the numerator

and denominator, we get $\frac{9999999999999}{72\ (10)^{13}}$. ....(5.32)

On adding the negative set $\frac{1}{72\ (10)^{13}}$ in this we get $\frac{(10)^{13}}{72\ (10)^{13}} = \frac{1}{72}$. On subtracting

$\frac{1}{72\ (10)^{13}}$ from $\frac{1}{72}$, we get a set slightly less than $\frac{1}{72}$ as $\frac{1}{72} - \frac{1}{72\ (10)^{13}} = \frac{(10)^{13} - 1}{72\ (10)^{13}} =$

$\frac{9999999999999}{72\ (10)^{13}}$. ....(5.33)

This is proved by the formulae-

Starting with $\frac{1}{8\ (10)^{13}}$ or $\frac{1}{8 \text{ lac crore}}$, on multiplying each term by ten as common

ratio, the last term (anta dhana) is obtained as $\frac{1}{80}$ palya. On multiplying by 10, $\frac{1}{80} \times 10 = \frac{10}{80}$,

from this, the initial term (ādi dhana)*, $\frac{1}{8\ (10)^{13}}$ is subtractedas follows. $\frac{(10)^{13}}{8\ (10)^{13}} - \frac{1}{8\ (10)^{13}} =$

$\frac{9999999999999}{8\ (10)^{13}}$. ....(5.34)

On dividing this by common ratio (guṇakāra) as reduced by unity, i.e. 10 - 1 or 9, we get

$\frac{9999999999999}{8\ (10)^{13}}$. On adding the earlier mentioned negative quantity, $\frac{1}{72\ (10)^{13}}$, we get $\frac{(10)^{13}}{72\ (10)^{13}}$ palya or $\frac{1}{72}$ palya, and on subtracting $\frac{1}{72\ (10)^{13}}$ from $\frac{1}{72}$, we get slightly less than $\frac{1}{72}$ palya.

The formula for summing a geometrical progression -

$\frac{1}{8\ (10)^{13}}$, ..., $\frac{1}{8\ (10)^{2}}$, $\frac{1}{8\ (10)}$ has been used as

$$S = \frac{a\ (r^n - 1)}{r - 1} = \frac{\frac{1}{8\ (10)^{13}}\ ((10)^{13} - 1)}{10 - 1} = \frac{1111111111111}{8\ (10)^{13}} \qquad \text{...........(5.35)}$$

Further in $\frac{1}{72}$ palya, the longevity of all kulakara, slightly less than $\frac{1}{9}$ palya, we get $\frac{8}{72} + \frac{1}{72} = \frac{9}{72}$ palya, as slightly less, is obtained. On cancellation by 9, we get $\frac{9}{72}$ or slightly less than $\frac{1}{8}$ palya.

On the next page is given the table, comparing the height, longevity, etc. of the kulakara, Tirthankara (ford-founder) and the cakravartī (emperors), in a chronological sequence.

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* Note that the term or word 'dhana' has been used for a term and not sum here, by the commentator.

P = palya

TABLE - 5.11

KULAKARSA				TĪRTHAṄKARA				CAKRAVARTĪ				attained		
Ser. no.	Name	Height dhanusa	longevity	Ser. no.	Name	Height dhanusa	longevity	Ser. no.	Name	Height dhanusa	longevity years	obtained life course	nine treasures	14 gems
1.	Pratiśruti	1800	P/10	1.	Vrașabhanātha	500	840000 pū.	1	Bharata	500	$(8400000)^3$	Liberation	1. Kāla	1.Senāpa…
2.	Sanmati	1300	$P/(10)^2$	2.	Ajitanāthanātha	450	720000 pū.	2	Sagara	450	$(7200000)^3$	Liberation	2.Mahākāla	2.Gṛhapa…
3.	Kṣemaṅkara	800	$P/(10)^3$	3.	Sambhavanātha	400	600000 pū.	3	Maghavāna	$42\frac{1}{2}$	$(500000)^3$	2nd paradise	3.Māṇavaka	3.Stapat…
4.	Kṣemandhara	775	$P(10)^4$	4.	Abhinandana	350	500000 pū.	4	Sanatkumāra	$41\frac{1}{2}$	$(300000)^3$	2nd paradise	4.Pingala	4. Purohit…
5.	Sīmaṅkara	750	$P(10)^5$	5.	Sumatinātha	300	400000 pū.	5	Śānti	40	$(100000)^3$	Liberation	5.Naisarpa	5. Gaja
6.	Sīmandhara	725	$P(10)^6$	6.	Padmaprabha	250	300000 pū.	6	Kuntha	35	95000	Liberation	6.Padma	6.Aśva
7.	Vimalavāhana	700	$P(10)^7$	7.	Supārśvanātha	200	200000 pū.	7	Araha	30	84000	Liberation	7.Pāṇḍu	7. Yuvati
8.	Cakṣumāna	675	$P(10)^8$	8.	Candraprabha	150	100000 pū.	8	Subhauma	28	60000	7th hell	8. Śhaṅkha	8.Kākiṇi
9.	Yaśasvī	650	$P(10)^9$	9.	Puṣpadanta	100	200000 year	9	Mahāpadma	22	30000	Liberation	9.Various	9.Cūḍāma…
10.	Abhicandra	625	$P(10)^{10}$	10.	Śītalanātha	90	100000 "	10	Hariṣeṇa	20	10000	Liberation	Gems	10. Carma
11.	Candrābha	600	$P(10)^{12}$	11.	Śreyānsanātha	80	8400000"	11	Jaya	15	3000	Liberation		11. Asi
12.	Marudeva	575	$P(10)^{13}$	12.	Vāsupūjya	70	7200000"	12	Brahma datta	7	700	7th hell		12. Daṇḍa
13.	Prasenajit	550	$P(10)^{14}$	13.	Vimalanātha	60	600000 "				years			13. Chatra
14.	Nābhi	525	Pūrva koṭi varṣa	14.	Anantanātha	50	300000 "							14. Cakra
				15.	Dharmanātha	45	100000 "							
				16.	Śāntinātha	40	10000 "							
				17.	Kunthunātha	35	95000 "							
				18.	Arahanātha	30	84000 "							
				19.	Mallinātha	_5	55000 "							
				20	Munisubrata	20	30000 "							
				21	Naminātha	15	10000 "							
				22.	Neminātha	10	1000 "							
				23	Pārśvanātha	9 hasta	100 "							
				24.	Mahāvīra	7 "	72 "							

Note: On the next page is another table of data for a comparative study of how the height is related to longevity, chronologically. It is about the other important personalities, at the ranks below those, in the above chart.

TABLE 5.12

TABLE FOR THE NAME, HEIGHT AND LONGEVITY ETC. OF BALABHADRA ETC.

BALABHADRA					NĀRĀYANA AND PRATINĀRĀYANA					RUDRA					NĀRADA										
Ser. no.	name	Height in dhanuṣa	Longevity	Attained Life course	Ser. no.	name	Height in dhanuṣa	Longevity	Attained Life course	Ser. no.	name	Height in dhanuṣa	Longevity	Attained Life course	ser. no	Name	Attained life course								
1	Vijaya	80	87 lac years	Liberation	1	Triprṣtha Aśvagrīva	80	84 lac yo.	7th hell	1	Bhīma vali	500	83 lac pu	7th hell	1	Bhima	hell								
2	Acala	70	77 lac years	Liberation	2	Dviprṣtha Tāraka	70	72 lac yo.	6th hell	2	Jitaśatru	450	71 lac pu.	7th hell	2	mahā bhīma	hell								
3	Sudharma	60	67 lac years	Liberation	3	Svayaṁbhū mereka	60	60 lac yo.	6th hell	3	Rudra	100	2 lac pu.	6th hell	3	Rudra	hell								
4	Suprabha	50	37 lac years	Liberation	4	Puruṣottama niṣumbha	50	30 lac yo.	6th hell	4	Viśāla nayana	90	1 lac pu.	6th hell	4	Mahā rudra	hell								
5	Sudarśana	45	17 lac years	Liberation	5	Puruṣasiṁgha madhukai	45	10 lac yo.	6th hell	5	Suprati ṣṭha	80	84 lac yr.	6th hell	5	Kāla	hell								
6	Nandi	29	67 thousand y.	Liberation	6	Puruṣa bali	29	65 lac yo.	6th hell	6	Acala	70	60 lac yr.	6th hell	6	Mahā kāla	hell								
7	Nandimitra	22	37 thousand y.	Liberation	7	Puruṣadatta praharaṇa	22	32 tho. yr.	5th hell	7	Puṇḍarīka	60	50 lac yr.	6th hell	7	Dur mukha	hell								
8	Rāma	16	17 thousand y.	Liberation	8	Lakṣamaṇa Rāvaṇa	16	12 tho. yr.	4th hell	8	Ajitaṅ dhara	50	40 lac yr.	5th hell	8	Naraka mukha	hell								
9	Padma	10	1200 years	Brhma paradise	9	Kṛṣṇa Jarāsindha	10	1 tho. yr.	3rd hell	9	Jitanābhi	28	20 lac yr.	4th hell	9	Adho mukha	hell								
										10	Pītha	14	1 lac yr.	4th hell											
										11	Satya kitnaya	7 hands	69 years	3rd hell											

Note: 83 lac pūrva years = $(8400000)^2 \times (8300000)$ years.

Note: Height and longevity of the Nārada are not available.

(vv.5.843-846)

The verses describe the ordered arrangements of various ranks of important personalities, choronologically, be marking of zero showing their absence at the time of another personality. Zero means here as wanting. (vide. p. 659, Table in the text).

(vv.5.850 et seq.)

These depict the chronology of events, important from the point of view history of science-

(1) Śaka king is born after lapse of 605 years 5 months (vikrama) from liberation (freedom) of Lord Vīra.

(2) Kalkī is born after a lapse of 394 years seven months from the birth of Śaka king.

Note: The above shows a difference of interval in Lord Vīra liberation and Kalkī's birth as 605 years 5 months + 394 years seven months or a total of 1000 years.

(3) In this way, in this 5th period, after every one thousand years there will be one Kalkī king and after twenty Kalkī kings, There will be the final Kalkī king, named Jalamanthana king. At that time, there will be the last ascetic called Vīrāṅgada, as the disciple of Indrarāja preceptor, there will also be the Āryikā Sarvaśrī, the best layman Aggile, and lay woman, Paṅgusenā. When there remain 3 years $8\frac{1}{2}$ months of fifth period, that Jalamanthana king will accept or take out the first food-piece (grāsa) from the palm of the ascetic, and then all those four will resort to Yama-sallekhanā, and that they, after 3 days of sallekhanā, on kārtika dark Amāvasyā, in the forenoon, die in Svāti nakṣatra. They will be born in Saudharma paradise, the ascetic with longevity of 1 sāgara and the remaining three with longevity of 3 years in excess of one palya. On that day, religion will be destroyed in the morning, the king will die in noon and in the evening the fire will exist nomore. After that incident, human beings will remain naked and take fish as their food, without any king or guide in religion.

The verses also describe, what happend at the end of the sixth period, like a big-bang on the earth, when up to the end of seven days each there are storms, extreme cold, alkaline liquids, porson, hard fire, dust and smoke, rainfall thus for 49 days. And when the hyperserpentine period begin after the hyposerpentine period, there will be rain of clouds of vapour, ghee, milk, nectar and liquid, each for seven days each. These will produce the following:

1. Bela - the plant spreading without roots

2. Lata - the plant climbing up its support

3. Gulma- the plant which can not be as a gross tree

4. Vṛkṣa- Tree

Then in the first period, the living beings or bios which were left alive in the caves, banks etc, come out and fill up the earth. In the second period, when its lapse is left to be after a thousand years, at that time, there happen to be 16 kulakara (family-ge nerators).

It is further important to note, that these periods, upto six, have various types of life, environment and ecology etc. described in the text, extending from a paradise, a pleasure land to a hell type and misery land type. Similarly there are regions in which the periods of the 1st to 6th types are found with similar ecology, environment, and so on, in subsequent verses. It is also to be noted that in Bharata and Airāvata barbarian regions, and in the regions of the learned technicians, there is decrease-increase, from Duḥṣamā-Suṣamā upto their end.

(v.5.896)

There are four under-regions or wells in four directions of middle circumference of Lavaṇa sea, and each in four subdirections. There are 1000 under regions in eight intervals. The height of the under region corrsponding to eight intervals. The height of the under-regions corsesponding to directions is one lac yojana, and exactly at the centre of height, the diameter of the under-region is 100000 yojanas. The diameters of the bottom and top are each one tenth part of the height, ie. ten thousand yojanas each. The Ratna prabhā earth is one lac eighty thousand yojanas thick, out of which leaving 80000 thick Abbahula (excess of water) part, the rough and mud part define the depth of these under-regions.

The diameters etc. of the under-regions corresponding to sub-directions (vidiṣā) are each tenth part of that of the under regions of the directions. Thus depth of sub-directional under-regions is $\frac{100000}{10}$ or 10000 yojana, the middle diameter is also 10000 yojanas. The diameters of bottom and top are each $\frac{10000}{10}$ or 1000 yojanas. The interior directional under regions have their middle diameters, each $\frac{10000}{10}$ = 1000 as depth also, and the diameter of bottom and top are each $\frac{1000}{10}$ = 100 yojanas.

The following figure gives the idea of the under regions:

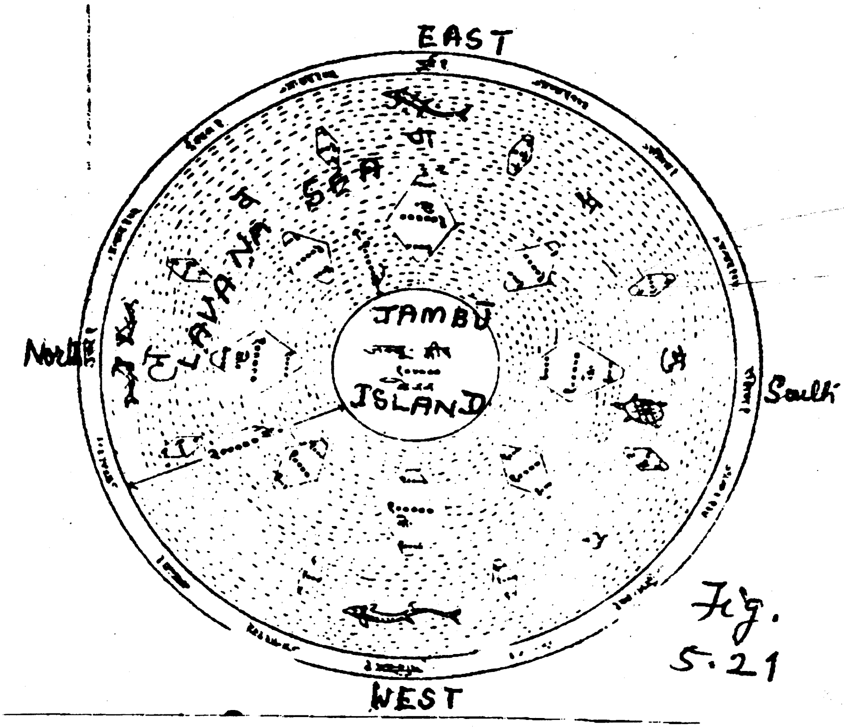


Fig. 5.21

(v.5.897)

In the east, Baḍavāmukha, in the south, Kadambaka, in the west pātāla and in the north Yūpakeśara are the names of the under regions. The thickness of the wells of the under regions is 500 yojanas, and that of the subdirectional is 50 yojanas, and that of the interior is 5 yojanas. All these wells are circular and strong as diamond.

(v.5.898)

Relative to height, the above three typas of under regions are respectively $33333\frac{1}{3}$, $3333\frac{1}{3}$ and $333\frac{1}{3}$ yojana. They have air in the lower one third part, water and air mixed in the middle one third part and water alone in the upper one third part. In the dark half, there is increase in water of middle one-third part, and in the white half, there is increase in air of middle one-third part.

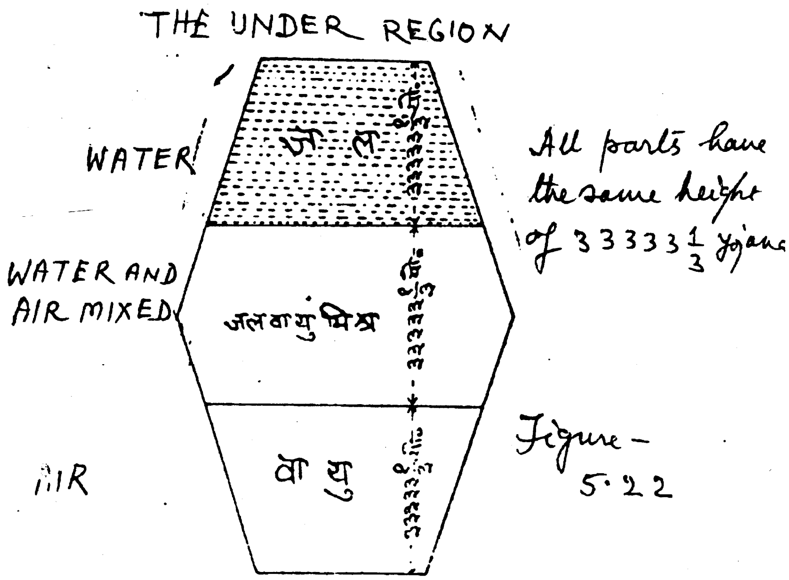


Figure 5.22

(v.5.899)

The measure of that decrease-increase is stated. In those directional under-regions, the middle part is divided by 15, and $\frac{33333\frac{1}{3}}{15}$ giving $2222\frac{2}{9}$ yojanas. Similarly, the middle parts of the second and third types on being divided by 15, yield respectively $\frac{3333\frac{1}{3}}{15} = 222\frac{2}{9}$ yojanas and $\frac{333\frac{1}{3}}{15} = 22\frac{2}{9}$ yojanas as the increase in water and air, respectively in the dark half and white half.

In the Lavaṇa sea, the water above the level-earth is called peak (śikhā). On dividing 5000 yojanas, the last part of peak we get $\frac{5000}{15} = 333\frac{1}{3}$ yojanas as the increase in water every day. In Lavaṇa sea, the water as 11000 yojana higher than level earth is natural, and above it in the white half there is water-increase of $333\frac{1}{3}$ yojanas everyday, when on full moon, the total height of water is 16000 yojanas and in dark half, the level goes on decreasing till the height of water on new moon (amāvasyā), is 11000 yojanas. For example, when in 15 days the decrease-common-difference is $33333\frac{1}{3}$ yojanas, hence in one day this will be $33333\frac{1}{3} \div 15 = 2222\frac{2}{9}$ yojanas. This gives the decrease and increase of water and air in the third part of middle. This is the decrease-common difference (hāni-caya) of directional under regions. Similar calculations are done for the remaining two types of under-regions.

(v.5.900)

In this way, the earth diameter and mouth diameter or width of Lavaṇa sea with decrease-increase are stated. In the middle of Lavaṇa sea, on new moon, the height of water from level earth is 11000 yojanas. After this, every day, the increase of $333\frac{1}{3}$ yojanas per day, ultimately makes that height on full moon as 16000 yojanas. Again, everyday there is a decrease of $333\frac{1}{3}$ yojanas everyday, till on the new moon, the height of water remains 11000 yojanas. When water is 16000 yojanas high, then its earth diameter, or breadth above is 10000 yojanas.

When at the height of 16000 yojanas, there is decrease of 190000 yojanas, then at the height of 16000 - 11000 = 5000 yojanas, how much will be the decrease ? By rule of three sets, it is $\frac{110000 \times 5000}{16000}$ or 59375 yojanas. On adding the mouth diameter of 10000 yojanas to this, the mouth width is obtained as 59375 + 1000 = 69375 yojanas. That is, when water is 11000 yojanas higher from level earth, then its breadth above is of 69375 yojanas and the earth-diameter or height water on earth is 200000 yojanas. (Here, diameter is width).

(v.5.901)

Water of Lavaṇa sea has taken a shape of a drum and is situated at a height of 880 yojana from the earth of moon and 800 yojanas hight from the earth of sun. (This seems to be angular distance as for height of the planets, worked out by Lishk, op.cit). On halving the decrease in Lavaṇa sea, $\frac{95000}{16000}$, and on multiplying it by moon and sun's height respectively, and from the result on subtracting the orbital region of Lavaṇa sea, the horizontal interval between moon-sun in Jambū island and water of Lavaṇa sea is obtained.

Explanation- In the waters of Lavaṇa sea, where there is increase of 16000 yojanas, there top is 10000 yojanas and bottom is 200000 yojanas. Subtrating top from bottom, and on halving, we get $\frac{200000 - 10000}{2} = 190000 \div 2 = 95000$ yojanas, as the decrease in one lateral part. When at the height of 16000 yojanas, there is decrease of 95000 yojanas, then what is the decrease at a height of 1 yojana ? By rule of three sets, we get $\frac{95000}{16000} = \frac{95}{16}$ yojana as decrease-common-difference. When at a height of 1 yojana, there is a decrease of $\frac{95}{16}$ yojana, then what is the decrease at 800 yojanas height moon ? By the rule of three sets it is $\frac{15 \times 880}{16 \times 1}$ $= 15 \times 55 = 5225$ yojanas. The orbital region in sea is $330\frac{48}{61}$ yojanas. Out of 5225 on subtracting this, we get $4894\frac{13}{61}$ yojanas. This is the horizontal interval between the moon and the water of sea.

The vertical interval between the moon and the sea-water is calculated thus: On moving by $\frac{95}{16}$ yojanas, the height of water is obtained as 1 yojana, then on moving $330\frac{48}{61}$ yojanas ahead of the sea-shore, how much height of water is obtained ? By rule of three sets, this is

$\frac{16 \times 330 \frac{48}{61}}{95}$. On solving this we get $55\frac{4123}{5795}$ yojanas as the height of water from moon downwards, from earth-level. Thus on entering $330\frac{48}{61}$ yojanas inside from sea-shore, the last orbit of the moon is found. From the earth there, the moon is 880 yojanas high, and there the height of water of sea is $55\frac{4123}{5795}$ yojanas higher than water level-earth. On subtracting $55\frac{4123}{5795}$ from 880, we get $824\frac{1672}{5795}$ yojanas as the vertical interval between sea-water and moon.

The horizontal interval of sun and sea's water: The calculations are done, similarly, by replacing 880 by 800, getting $4419\frac{13}{61}$ yojanas as the horizontal interval. Similarly, the vertical interval is obtained as $744\frac{1672}{5765}$ yojanas.

Now, the height of water near suns of Lavaṇa sea is that in every orbit there are two (the red and the counter ?). The diameter of a sun is $\frac{48}{61}$ yojana, hence the diameter of two suns total to be $\frac{96}{61}$. The width of the Lavaṇa sea is 200000 yojanas, hence on subtracting $\frac{96}{61}$ from it after least common multiple process (samacchedana), we get $200000 - \frac{96}{61} = \frac{12200000}{61} - \frac{96}{61} = \frac{12199904}{61}$ yojanas. This is the sum of both intervals, hence one interval is $\frac{6090952}{61}$ yojanas, or $99999\frac{13}{61}$ yojanas gives the interval between one sun to the other, which are situated on the orbit. On halving it we get $49999\frac{37}{61}$ yojana as the interval between the sun and the altars.

Hence the first sun of first orbit is $49999\frac{37}{61}$ yojana distant from altar of Jambū island, and the second sun of the second orbit is $49999\frac{37}{61}$ yojanas towards interior of altar of Lavaṇa sea.

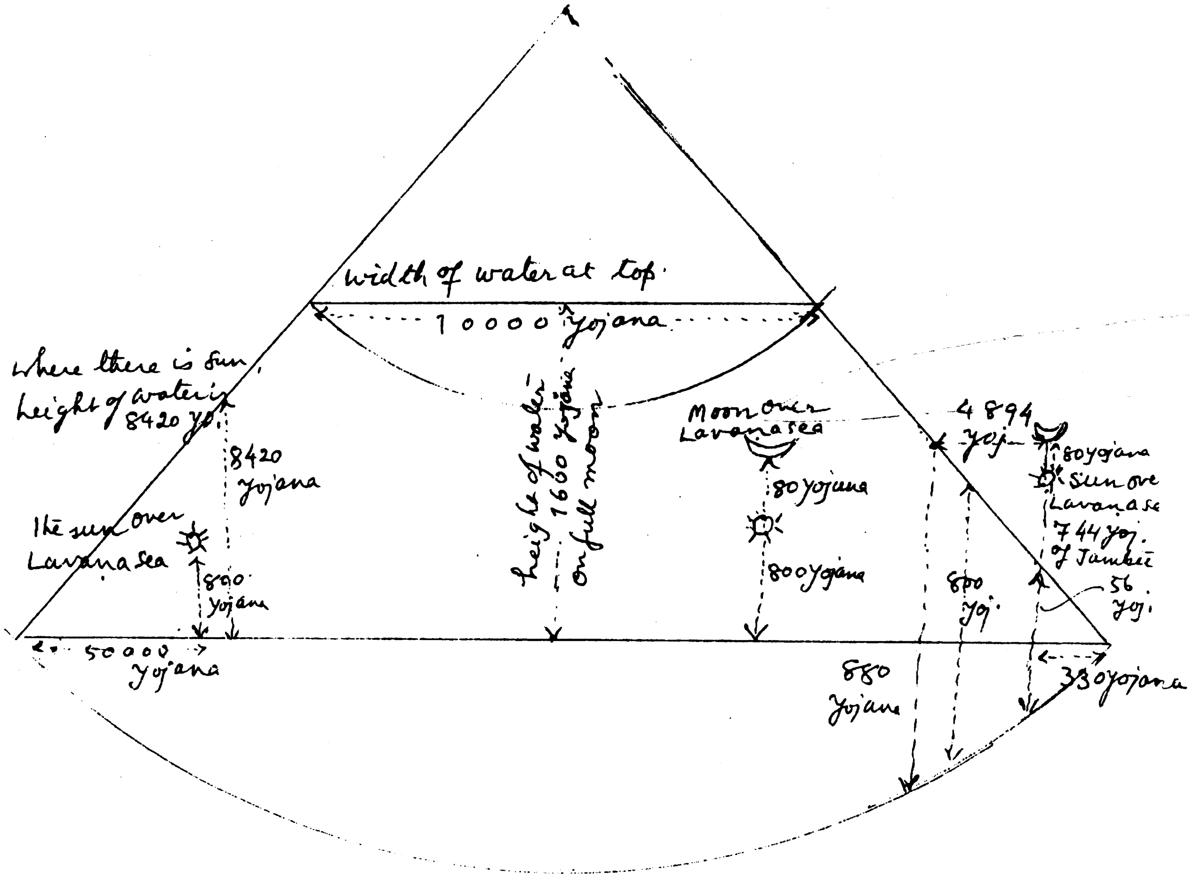
In this way, the first sun is $49999\frac{37}{61}$ yojanas distant from Jambūdvīpa altar, $\frac{48}{61}$ yojana is sun's diameter, $99999\frac{13}{61}$ yojanas is distance from real and counter suns. And the total of these is the width of Lavaṇa sea, ie. 200000 yojanas.

Now fraction of $49999\frac{37}{61}$ is $\frac{3049976}{61}$, the distance entering which, the height of water will be in proportion of $\frac{95}{16}$: 1.

This rule of three sets gives the height as $\frac{16}{95} \times \frac{3049976}{61} = \frac{48799616}{5795}$ yojanas,

or $8420\frac{5716}{5795}$ yojanas, as the height of water.

The orbit of sun is $49999\frac{37}{61}$ yojanas distant from altar, where the sun is 800 yojana hights from earth-level and water is $8420\frac{5716}{5795}$ yojanas higher, hence here the propagation of sun etc. is over waters, as shown in the figure-



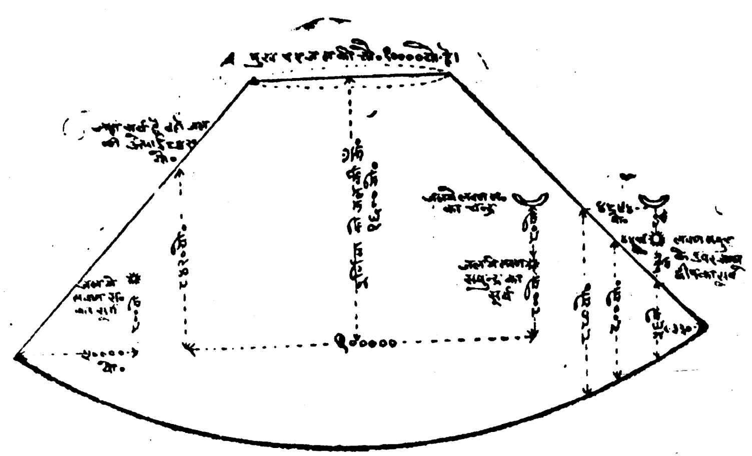


Figure 5.23

Figure 5.24

(v.5.902)

Now the description of intervals of the under regions is given- The middle diameter of Lavana sea is 300000 yojanas. Its gross circumference is 900000 yojanas. Its fourth part is 225000 yojanas which is the single directional interval from the top of the under region upto end of top of second under region in the same direction. Out of these topos 225000 yojanas, the middle diameter, 100000 yojanas, of directional under regions is subtracting 225000 - 100000, getting 125000 as the remainder. This is the middle interval of directional under-regions. Out of 225000 if the top diameter of directional under regions, 10000 yojanas, is subtracted, we get the interval between tops of under regions as 215000 yojanas.

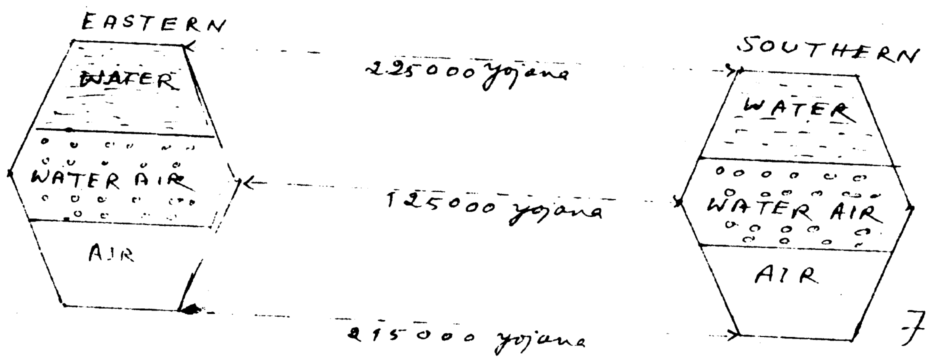


Figure 5.25

Out of this 215000 yojanas interval if the top diameter 1000 yojanas of under regions in subdirections be subtracted the remainder is 215000 - 1000 = 21400 which when halved, ie. $\frac{21400}{2}$ = 107000 yojanas, becomes the interval of tops of directional and sub-directional under regions.

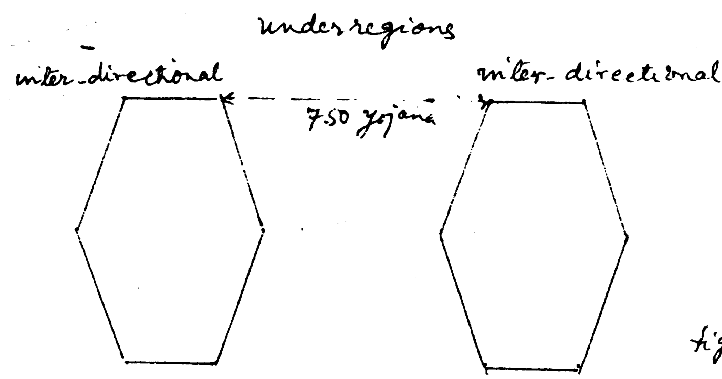


figure 5-26

From this 107000 yojana interval, $(5)^3 \times 100 = 12500$ is reduced, getting 94500 yojana as remainder. This isdivided by 126 intervals of 127 under regions, getting 750 yojana as the interval between tops of the under regions lying among directional and subdirectional under-regions.

(v.5.913)

This verse describes 96 islands inside the Lavaṇa sea and Kālodaka sea on their internal banks as shown in the following figure. In these the picture of 48 evilpleasure islands have been shown of Lavaṇa sea alone.

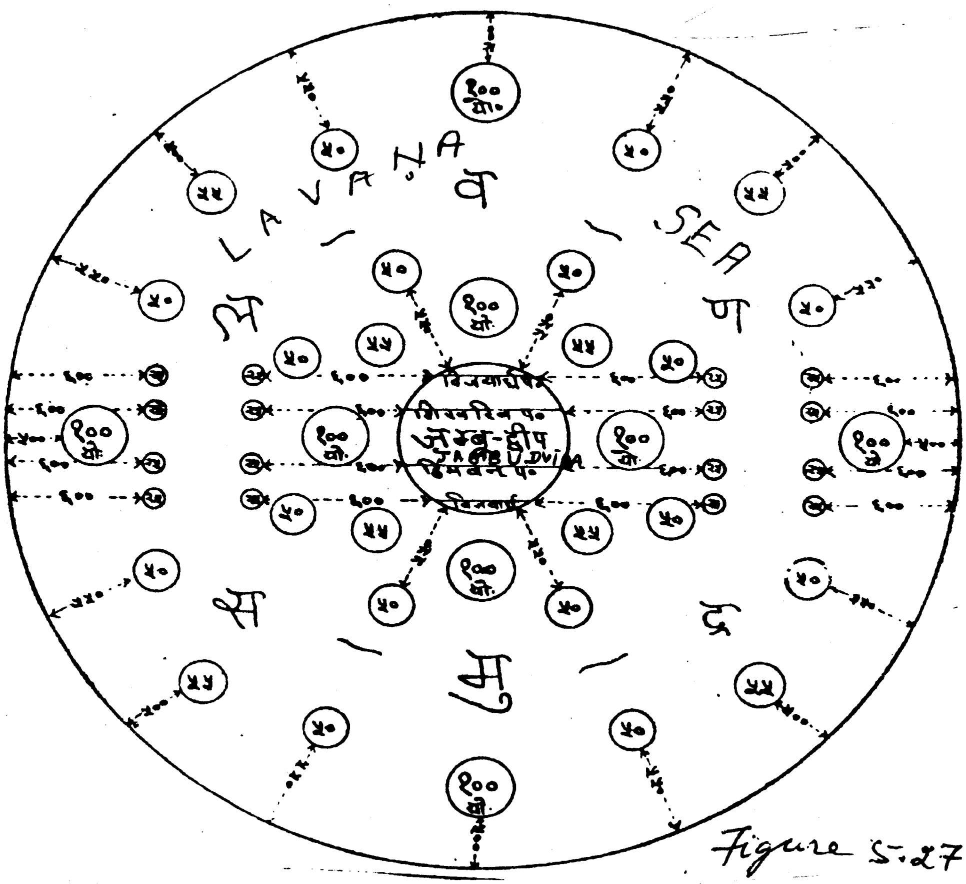


Figure 5.27

(v.5.915)

Now the rise (height or udaya) of upper and below or lower islands relative to water-level have been described-

On entering one yojana into the Lavaṇa sea from the shore, the depth $\frac{1}{95}$ yojana of water is found as follows: The width of the Lavaṇa sea ring water is 200000 yojanas at earth level. This is the base (bhūmi) and gradually decreasing down the level-earth, where there is 1000 yojanas of depth there is diameter 10000 yojanas of water, which is its top (mouth = mukha). On subtracting top from bottom, we get 200000 - 10000 = 190000 yojanas remainder which is halved for accepting one lateral portion, ie. 95000 yojanas is obtained. When there is a decrease of 95000 yojanas in water-diameter, then the height of water is 1000 yojana, hence at decrease of 1 yojana, the height of water will be, by rule of three sets as $\frac{1000 \times 1}{95000} = \frac{1}{95}$ as the height of water.

Further, here itself the height is $\frac{1}{95}$ yojana, at entrance of 1 yojana in Lavaṇa sea from shore. When we enter 1 yojana, the height of water is $\frac{1}{95}$ yojana, then 500 yojanas (relative to direction), 500 yojanas (relative to sub-direction), and 550 yojanas (relative to inter-direction) and 600 yojanas (near mountain) of entrance, what will be the depth (or height) of water ? The rule of three sets gives, respectively, $\frac{1 \times 5500}{95}$, $\frac{1 \times 500}{95}$, $\frac{1 \times 550}{95}$ and $\frac{1 \times 600}{95}$ yojana, or $5\frac{5}{19}$, $5\frac{5}{19}$, $5\frac{15}{19}$ and $6\frac{6}{19}$ yojana of heights or depths of water, respectively for the directional, sub directional and inter-directional; eight islands for each, having these depths. The height means depth here.

Now the method is given for finding out the height above level earth of water : The width of water ring on level-earth is 200000 yojanas. This is base, and at 16000 yojanas height, the diameter or width of water is 10000 yojanas, which is top. Subtracting top from bottom and on halving, we get $\frac{200000 - 10000}{2}$ or a decrease of 95000 yojanas. The water is 16000 yojanas above level earth. When there is a height of 16000 of water, then there is a decrease in water diameter by 95000 yojanas, then what it will be at a height of one yojana ? By the rule of three sets, this gives the decrease of water diameter by $\frac{95000}{16000} = \frac{95}{16}$ yojana.

When the entrance is of $\frac{95}{16}$ yojana from shore, there is a water height of 1 yojana, then on going 1 yojana into water distance-level, what will be the height ? By rule of 3 sets, the height of $\frac{16}{95}$ yojana is obtained.

When, from the shore, at a distance of one yojana the height of water is $\frac{16}{95}$ yojana, hence for respective distances, 500 yojanas, 500 yojanas, 550 yojanas, and 600 yojanas, what is the height of water ? By rule of 3 sets, we get 4 results as $\frac{16 \times 500}{95}$, $\frac{16 \times 500}{95}$, $\frac{16 \times 550}{95}$, and $\frac{16 \times 600}{95}$ yojana. These are $84\frac{4}{19}$ for directional, $84\frac{4}{19}$ for sub directional, $92\frac{12}{19}$ for inter directional, and $101\frac{1}{19}$ yojana for islands near mountains.

In this way, the depth and height of water level from level-earth when combined,give the total immersion of water, which is the height of those islands. Altar of every island is 1 yojana, hence the island along with altar is at a height of 1 yojana above water level. Where ever the islands are situated, there the heights and depths are as under-

Depth + Height = Inmersion + Altar = Height of Islands with Altar

1. $5\frac{5}{19} + 84\frac{4}{19} = 89\frac{9}{19} + 1 = 90\frac{9}{19}$ yojana-directional height islands

2. $5\frac{5}{19} + 84\frac{4}{19} = 89\frac{9}{19} + 1 = 90\frac{9}{19}$ yojana - subdirectional islands

3. $5\frac{15}{19} + 92\frac{12}{19} = 98\frac{8}{19} + 1 = 96\frac{8}{19}$ inter-directional islands

4. $6\frac{6}{19} + 101\frac{1}{19} = 107\frac{7}{19} + 1 = 108\frac{7}{19}$ mountain proximity islands

Through this above method, the height of mountains like Kaustubha etc. can be known. Now in one and a half islands, the shape of the family-mountains (kulācala) and regions situated there in are described:-

In the Dhātakīkhaṇḍa and half-Puṣkara island, the shape of the region is like the shape between two spokes of a wheel of a cart, and the mountains are like the spokes of the wheels. These have inner side shape as lap-mouth (aṅkamukha) and have the outerside as the hoof-mouth (kṣura-mukha). It has the following figure-

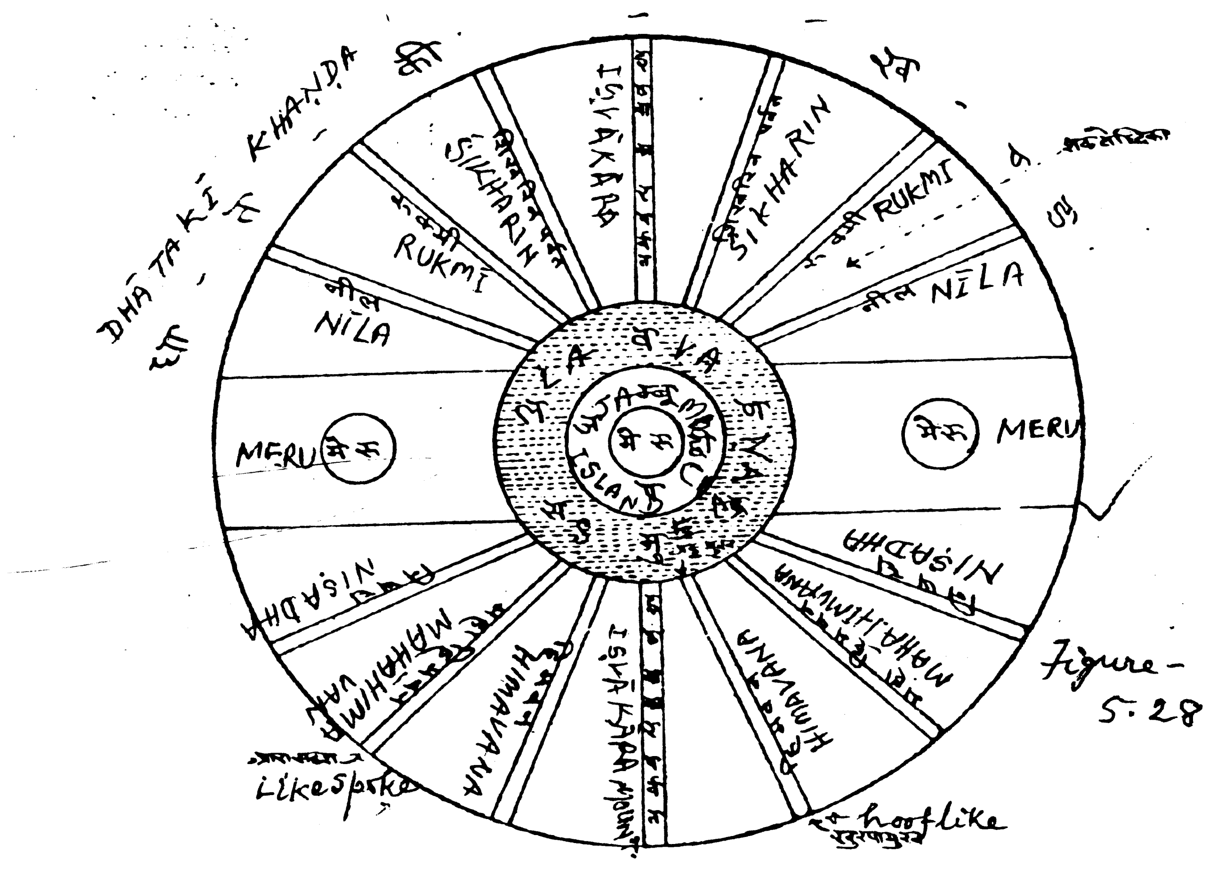


Figure 5.28

(v.5.928)

The region occupied by mountains of Dhātakīkhaṇḍa is $178842\frac{2}{19}$ yojanas and that occupied by those of the semi-Puṣkara is $355684\frac{4}{19}$ yojanas. In order to know the width of the Bharata etc. regions situated in both these islands, first of all the initial, middle and external circumferences are required to be known. The method of finding out the occupied region by mountains-

The combination of the logs of (reckoning rods of) all the mountains and regions is called combination-logs. For example, The logs of Bharata etc. regions in Jambu island are respectively 1, 4, 16, 64, 16, 4 and 1, totalling to 106. The logs corrsponding to logs of mountains of this island are respectively 2, 8, 32, 32, 8 and 2, totalling to 84. The total of logs these two. regions and mountains is 106 + 84 = 190, called the combination-logs (miśra-śalākā). When 190 reckoning logs have a mixed region of 100000 yojanas, the how much region well be occupied by 84 pure reckoning logs or counting-logs? then by the rule of three sets, the occupied area is = $\frac{100000 \times 84}{190}$ by the mountains.

Now as compared with Jambū island, the counting logs of Dhātakīkhaṇḍa is twice that of the Jambū island in each case. Hence for the Dhātakīkhaṇḍa, the occupied area by mountains corresponding to a part of the meru, is $\frac{200000 \times 84}{190}$, and twice is the occupied area for two parts of both meru, as $\frac{400000 \times 84}{190}$.

Alternative Method: The width of mountains and plane regions of Dhātakīkhaṇḍa is twice the width of those of the Jambū island, hence those of the Dhātakīkhaṇḍa counting logs are 84 × 2 = 168. Similarly the mixed counting-logs will also be 190 × 2=380.

When for 168 pure counting logs of mountains, the width obtained is $\frac{400000 \times 84}{190}$, hence for 380 mixea logs, how much region be obtained? Thus by rule of three sets the result is

$\frac{[illegible] \times 4 \times 380}{[illegible] \times 168}$ yojanas. Here the result is 400000 yojanas. Further. for 380 mixed counting logs has a region of 400000 yojanas. hence for 168 pure counting rods. the result by the rule of three sets gives $\frac{400000 \times 168}{380} = 176842\frac{2}{19}$ yojanas. In to this, two results the 2000 yojanas diameter (width) of two arced mount ns (Isvākāra parvata) is added, getting $178842\frac{2}{19}$ yojanas the area occopied by mountains in the Dhātakīkhaṇḍa. Futher. twice the former into 2 gives the occupied area by mountains of the Puṣkarārdha island as $178842\frac{2}{11} \times 2 = 353684\frac{4}{19}$ and further $353684\frac{4}{19} + 2000 = 335684\frac{4}{19}$ yojanas.

Method for finding out the diameters (vyāsa) of regions: The ring width or diameter 4 lac yojana of Dhātakīkhaṇḍa is the width and it is established at three places and respectively multiplied by 213 and 4 and reduced by 3 for getting 3 typs of diameters as:

internal diameter = 4 lac × 2 - 3 lac = 5 lac yojanas

middle diameter = 4 lac × 3 - 3 lac = 9 lac yojanas

external diameter = 4 lac × 4 - 3 lac = 13 lac yojanas ....(5.36)

From these, the circumferences may be obtained by multiplying the square of the above quantities by 10 and then extracting their square roots respectively as

internal circumference = $\sqrt{(5 \text{ lac})^2 \times 10}$ = 1581139 yojanas

middle circumference = $\sqrt{(9 \text{ lac})^2 \times 10}$ = 2846050 yojanas

external circumference = $\sqrt{(13 \text{ lac})^2 \times 10}$ = 4110961 yojanas . ...(5.37)

Form the above circumferences the occupied region of mountain of Dhātakīkhaṇḍa,

$178842\frac{2}{19}$ yojanas is subtracted, getting the width of the regions without the occupied widths as:

$$1581139 - 178842\frac{2}{19} = 1402296\frac{17}{19},$$

$$2846050 - 178842\frac{2}{19} = 2667207\frac{17}{19}, \text{ and}$$

$$4110961 - 178842\frac{2}{19} = 3932118\frac{17}{19} \quad \text{...........(5.38)}$$

(v.5.929)

This verse states about the internal etc. widths or diameters of the Bharata etc. regions.

The width of Videha regions is four times those of the Bharata and Airāvata regions, hence the counting logs are: Bharata -1, Haimavata-4, Hari-16, Videha-64, Airāvata-1, Hairaṇyavata-4, and Ramyaka -16. The sum of all these is 1 + 4 + 16 + 64 + 1 + 4 + 16 = 106. In order to count for both meru, they are doubled, getting 106 × 2 = 212 counting logs which are the divisors of the circumference excluding the mountains. How ? That is explained-when of 212 counting-logs in the interval circumference the region without mountains is 1402297 yojanas then for 1, 4, 16, 64, 1, 4, 16 counting logs of Bharata etc. regions excluding mountain occupation, the region would be, by rule of three sets, as

$$\text{Bharata's internal diameter} = \frac{1402297}{212} = 6614\frac{129}{212} \text{ yojanas}$$

$$\text{Bharatas middle diameter} = \frac{2667208}{212} = 12581\frac{36}{212} \text{ yojanas}$$

$$\text{Bharatas external diemeter} = \frac{3932119}{212} = 18547\frac{155}{212} \text{ yojanas} \quad \text{..........(5.39)}$$

Similarly, diameter for Haimavata etc. regions may be calculated.

Alternatively, multiplying the internal diameter, $6614\frac{129}{212}$, middle diameter $12581\frac{36}{212}$, and external diameter $18547\frac{155}{212}$ of Bharata by four, the diameter of Haimavat internal, middle and external are respectively $26458\frac{92}{212}$, $50324\frac{144}{212}$, and $74190\frac{196}{212}$ yojanas..........(5.40)

When these are again multiplied by four, the internal, middle and external diameters of Harivarṣa are respectively, $105833\frac{156}{212}$, $201298\frac{152}{212}$ and $296763\frac{148}{212}$ yojanas. ....(5.40A)

Again on multiplying the above diameters by four, the internal, middle, and external diameters of Videha region are obtained respectively as $423334\frac{200}{212}$, $805194\frac{184}{212}$, $1187054\frac{168}{212}$ yojanas. ....(5.40B)

Similarly, the diameters for regions extending from Airāvata to Videha may be calculated.

The internal diameter of Puṣkarārdha island near kālodaka is 29 lac yojanas, middle diameter is 37 lac yojanas and external diameter near Mānuṣottara mountain is 45 lac yojanas. Thus, as in the given figure.

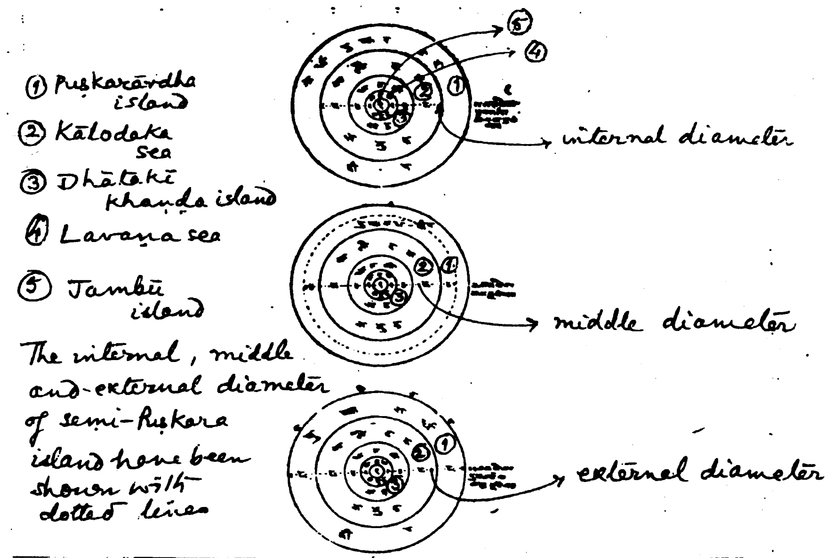


Figure 5.29

the internal circumference, 9170605 yojanas, middle circumference 11700427 yojanas and external circumference 14230249 yojanas, each is subtracted by 355684 yojanas of occupied mountains, getting those devoid of that as 8814921 yojanas, 11344743 yojanas and 13874565 yojanas respectively. From these on multiplication by 1 and division by 212 counting logs, the internal, middle and external widths or diameters are respectively found as

$$\frac{8814921 \times 1}{212} = 41579\frac{173}{212} = \text{yojanas}$$

$$\frac{11344743 \times 1}{212} = 53512\frac{199}{212} = \text{yojanas}$$

$$\frac{13874565 \times 1}{212} = 65446\,\frac{13}{212} = \text{yojanas}\,. \qquad \text{..........(5.41)}$$

When these diameters are again multiplied by 4, the internal, middle and external diameters of Harikṣetra are obtained as $665277\frac{12}{212}$ yojanas; $856207\frac{4}{212}$ yojanas and $1047136\frac{208}{212}$ yojanas respectively. ....(5.42)

When these are again multiplied by 4, the internal, middle and external diameters for Videha region are obtained as $2661108\frac{48}{212}$ yojanas, $3424828\frac{16}{212}$ yojana $4188547\frac{196}{212}$ yojanas respectively. ....(5.43)

The same calculations may be done for those from Airāvata to videha regions.

(v.5.930)

The length (āyāma) of Kaccha etc. countries situated in Videha region of Dhātakīkhaṇḍa-

The southern-northern length of the kaccha etc. countries in Videha region of Dhātakīkhaṇḍa is inside the circumference, hence its circumference is stated-

On taking half of half diameter of East and West meru mountains of Dhātakīkhaṇḍa, the diameter of one meru is 9400 yojanas. In this the diameter of both external Bhadraśāla forest towards Kālodaka corresponding to two meru is 215758 which is added to 9400 getting 225158 yojanas which is added to middle diameter 900000 yojanas, getting 1125958 yojana as the external diameter towards Kālodaka sea of Bhadraśāla forests exterior to east-west meru mountains. From that middle diameter of 900000 yojanas, (half of half width of both those meru mountains and 215758 yojanas of internal Bhadraśāla forests, 215758 yojanas is added to 9400 getting) 225158 yojanas is subtracted getting 900000 - 225158 = 674842 yojanas as internal diameter (towards Lavaṇa sea) of both internal Bhadraśāla forests.

In order to get the circumference of internal Bhadraśāla,this internal diameter is squ ared getting $(674842)^2$ or 455411724964 and multiplied by 10 getting 4554117249640. On extracting it squareroot we get 2134037 yojanas as the required internal diameter's circumference. From this measure the occupied region by monutains, 178842 yojanas is subtracted,

getting 2134037-178842 = 1955195 yojanas as the circumference without mountains.

This is illustrated in the following figure, showing the internal, middle, external diameter pertaining to the Bhadraśāla forests-

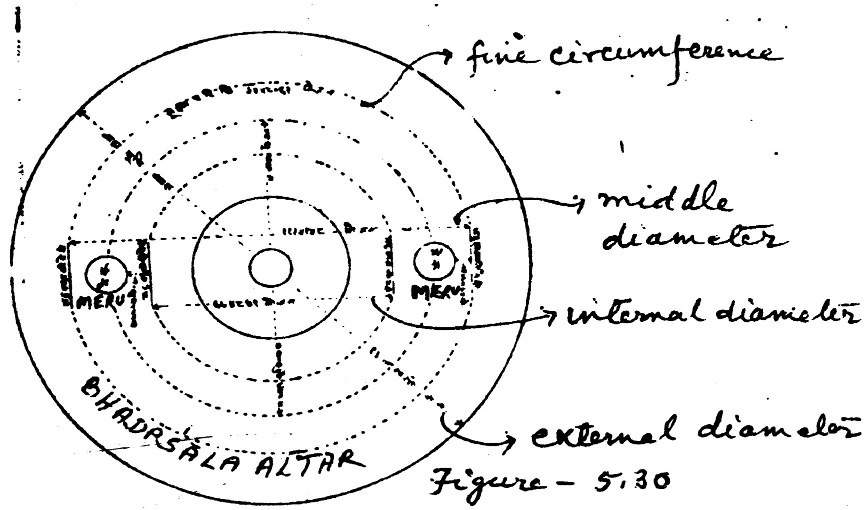


Figure 5.30

(v.5.931)

When for 212 counting logs, the mountainous regions without mountains is 1955195 yojanas, hence when there are 64 counting logs of videha, by rule of three sets, we get

$\frac{1955195 \times 64}{212} = 590247\frac{116}{212}$ yojanas. From this amount the width 1000 yojanas of Sītodā river is subtracted, the remainder is halved, which gives the south to north length of altar of internal Bhadraśāla's altar near Gandhamālinī country as $294623\frac{164}{212}$ yojanas.

On squaring 1125158 yojanas, the external diameter of Bhadraśāla of Dhātakīkhaṇḍa and multiplying by 10 get $(1125158)^2 \times 10$ or 12659805249640 whose square root is 3558062 yojanas, the circumference. Subtracting occupied region by mountains,

we get 3558062 - 178842 = 3379220 yojanas. When this is multiplied by square of 8 ie. 64, we get $\frac{216270080}{212} = 1020141\frac{188}{212}$ yojanas as the width of the Videha region, near Bhadraśāla altar in place of external diameter of Bhadraśāla towards the Kālodaka. From this the width of Sītā river is subtracted getting $1019141\frac{188}{212}$ yojanas as remainder. Its half part or $509570\frac{200}{212}$ yojanas is internal length of kaccha country near Bhadraśāla altar.

(v.5.932-933)

These verses explain how to find out the intermediate length and the end-length (antāyāma) of kaccha etc. countries.

When the circumferences of Videha, Vakṣāra mountain, Vibhaṅga river, and Devāraṇya forest are separately multiplied by 32 each and then divided by 212, the measure of increase at own places are obtained. When the increases at own places are obtained. When the increases at own places is added to own place's first length, the middle (intermediate) length (āyāma) is obtained. On adding the measures of the middle lengths, the end or final length of own places are obtained.

Explanation- from the width 400000 of Dhātakīkhaṇḍa, the width 225158 yojanas of both Bhadraśāla forests and the meru are subtracted, we get the remainder 174842 yojanas as the end region in East West ahead of Bhadraśāla forests at Videha. Half of this, 87421 yojanas is the length of one side half province region from meru. That is 87421 yojanas is the length from East West Bhadraśāla's altar upto sea, of Videha region. From this the four Vakṣāra mountains width 4000 yojanas. Three Vibhaṅgā rivers width 750 yojanas and Devāraṇya width 5844 yojanas, totalling to 4000 + 750 + 5844 = 10594 yojanas is subtracted getting 87421 - 10594 = 76827 yojanas as pure region width corresponding to one portion of Videh, without mountains. This is the region of eight Videha countries.

When pure region of 8 Videha countries is 76827 yojanas, then one country will be $\frac{76827 \times 1}{8} = 9603\frac{3}{8}$ yojanas by rule of 3 sets, as the width of East West part of Kaccha country. By the rule, " Viṣkambhavaggadahaguṇa" formula of v.5.96, the circumference is obtained first by squaring, $\frac{76827}{8}$ and after multiplying it by 10, squared root is obtained of the product, getting $\frac{242948}{8}$ or $30368\frac{1}{2}$ yojanas.

In a portion of Dhātakīkhaṇḍa, the circumferences of Kaccha width is $\frac{60737}{2}$ yojanas, hence the measure of both sides is $\frac{60737}{2} \times 2$ or 60737 yojanas. As the widths of mountains are similar, therefore there is no increase, hence on subtracting 168 counting logs of mountains from 380 mixed counting logs of Dhātakīkhaṇḍa, remainder is 212 counting logs. The increase-region $\frac{60737 \times 2}{2}$ yojanas is of 212 counting logs, then for 64 counting logs, the region is $\frac{60737 \times 64 \times 2}{2 \times 212}$ yojanas. When this is the increase-region of two provinces, then of one, it will be $\frac{60737 \times 64 \times 2}{2 \times 212 \times 2}$ yojanas as the increase-region of length at the end of the Kaccha country. Then by the formula, "mukha bhūmi samāsārdhaṁ madhya phalaṁ", half of the difference between the initial and final icrease, getting $\frac{60737 \times 64 \times 2}{2 \times 212 \times 2 \times 2}$ yojana or $\frac{60737 \times 32}{212 \times 2}$ proving the earlier statement. This is, on cancellation given by $\frac{971792}{212} = 4583\frac{196}{212}$ yojanas. On adding this amount in the internal length, $509570\frac{200}{212}$ yojanas, of Kaccha country similar to end (last) length of Bhadraśāla, getting $509570\frac{200}{212} + 4583\frac{196}{212} = 514154\frac{184}{212}$ yojanas, as middle length, and on adding the earlier mentioned increase in region, this becomes $514154\frac{184}{212} + 4583\frac{196}{212} = 518738\frac{168}{212}$ yojanas as the end-length of Kaccha country.

The width of Vakṣāra mountain is 1000 yojanas. The paridhi or circumference as per v.5-96, is $\sqrt{(1000)^2} \times 10 = \sqrt{(10)^7} = 3162$ yojanas which is the circumference of Vakṣāra width. For both sides this becomes 3162×2 yojanas. Further for 212 counting logs, the increase region is 3162×2 yojanas, hence for 64 counting logs of Videha the increase is $\frac{3162 \times 2 \times 64}{212}$ yojanas. For one of two banks in two provincial regions, the increase in circumference is $\frac{3162 \times 2 \times 64}{212 \times 2}$ yojanas. This is the increase in circumference of the Vakṣāra at the end. By formula, "mukhabhūmi samāsa-ardhaṁ madhya phalaṁ", half of this is $\frac{3162 \times 2 \times 64}{212 \times 2 \times 2} = \frac{3162 \times 32}{212}$, proving the increase stated earlier. This is $477\frac{60}{212}$ as the increase of middle length over the internal length of Vakṣāra. The external length of Kaccha country, mentioned earlier, as $518738\frac{168}{212}$ yojanas, is the internal length of Vakṣāra, hence on adding the increase in region, $477\frac{10}{212}$ yojanas, in Vakṣāra region, as calculated earlier, we get $(518738\frac{168}{212} + 477\frac{10}{212}) = 519216\frac{16}{212}$ yojanas as the length in middle of Vakṣāra. On adding again in it the very increase-region, we get $(519216\frac{16}{212} + 477\frac{60}{212}) = 519693\frac{76}{212}$ yojanas as the length at the end.

The initial length of Sukacchā country is the external length of Vakṣāra as $519693\frac{76}{212}$ yojanas. On adding to this the increase corresponding to country as obtained earlier, $4583\frac{196}{212}$ yojanas, the middle length $(519693\frac{76}{212} + 4583\frac{196}{212}) = 524277\frac{60}{212}$ yojanas of Sukaccha country is obtained. On adding into it the very increase in region the external length of Sukaccha country is obtained as $(524277\frac{60}{212} + 4583\frac{196}{212}) = 528861\frac{44}{212}$ yojanas.

The width of Vibhaṅga river is 250 yojanas. Its circumference is, per v. 5.96, $\sqrt{62500} \doteq$ 790 yojanas, being that of Vibhaṅgā. For both parts it is 790 × 2. This is for 212 countring logs, hence for 64 counting logs of Videha, this is $\frac{790 \times 2 \times 64}{212}$ yojanas. This is for two provinces, hence for one province it is $\frac{790 \times 2 \times 64}{212 \times 2}$ yojanas.

By the rule, "mukha bhūmi samāsārdhaṁ", on dividng the above by 2 gives $\frac{790 \times 2 \times 64}{212 \times 2 \times 2}$ or $\frac{790 \times 32}{212}$ yojanas, proving the verse 5.932. This is $\frac{25280}{212}$ yojanas, or $119\frac{52}{212}$ yojanas. The external length of Sukacchā country is $528861\frac{44}{212}$ and this is also the measure of initial length of Vibhaṅgā river (ādyāma), hence on adding into the increase region corresponding to Vibhaṅgā, the length in the middle of Vibhaṅgā is $(528861\frac{44}{212} + 119\frac{52}{212}) =$ $528980\frac{96}{212}$ yojanas and on adding into this the very increase, the length in the end of Vibhaṅgā is $(528980\frac{96}{212} + 199\frac{52}{212}) = 529099\frac{148}{212}$ yojanas. Ahead of this, for Mahākacchā etc. countri es, Vakṣāra etc. mountains, and for Vibhaṅgā etc. rivers, their lengths when increased by adding the own increase, may be determined.

The width of Devāraṇya is 5844 yojanas. By v.5.96, the square of this is 34152336. This is multiplied 10 and then the product 341523360 so obtained is subject to square root getting $\sqrt{341523360}$ or 18480 yojanas, as the circumference of Devāraṇya of one portion, hence for two portions, it becomes 18480 × 2 yojanas. Thus for 212 counting logs, the region is 18480 × 2 yojanas, hence for 60 counting logs of Videha, the region will be $\frac{18480 \times 2 \times 64}{212}$. This is for two provinces, hence for one province this width is $\frac{18480 \times 2 \times 64}{212 \times 2}$. Further asper the formula, "mukha bhūmi samāsārdhamiti, on halving the width we get $\frac{18480 \times 2 \times 64}{212 \times 2 \times 2}$ yojanas or $\frac{18480 \times 32}{212}$ yojanas. or $2789\frac{12}{212}$ yojanas. This is the middle increase in region corrsponding to Devāraṇya. The external length of Puṣkalāvatī is the initial length of Devāraṇya. Method for finding out this measure-

There are eight countnies on a bank of river, four Vakṣāra and three Vibhaṅgā rivers, and from initial length to middle and from middle length to the end. Thus in every one, two times increases the own increase. For example, the country-increase is $4583\frac{196}{212}$ yojanas. This is multiplied by 16, giving $73328\frac{3136}{212}$ yojanas. The increase of Vakṣāra mountain is $477\frac{60}{212}$

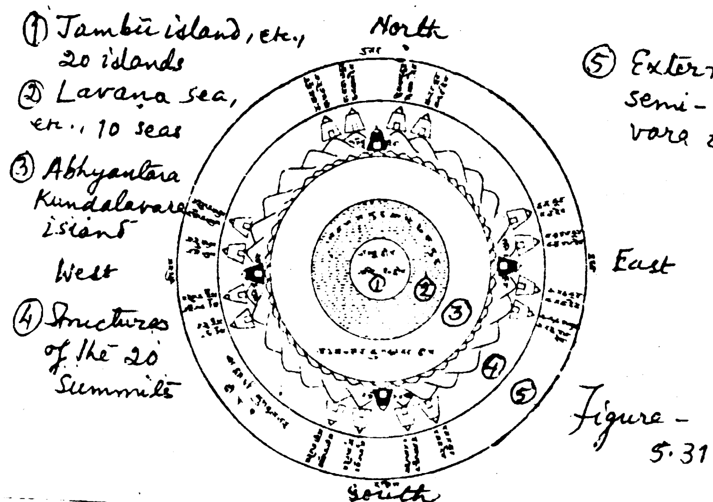
yojanas. On multiplying this by 8 we get $3816\frac{480}{212}$ yojanas. The increase of Vibhaṅgā river is $119\frac{52}{212}$ yojanas, on multiplying this 6 (Vibhaṅgā rivers), we get $714\frac{312}{212}$ yojanas. On adding all these the increase in 16 countries, 8 Vakṣāras and 6 Vibhaṅgā is numerators 509570 and increase 73328 + 3816 + 714 and sum of fractions as 19 totalling to 587447 yojanas which is the initial length of Devāraṇya, Or the initial length of Kaccha country is $50957\frac{200}{212}$, increase in 16 countries is $73328\frac{3136}{212}$, increase in 8 Vakṣāra mountain is $3816\frac{480}{212}$ yojanas and that of 6 Vibhaṅga rivers is $714\frac{312}{212}$ yojanas. The sum of these four is $5877447\frac{100}{212}$ yojanas. This is the initial length of Devāraṇya. If the increased region corresponding to Devāraṇya, $2789\frac{92}{212}$ yojanas into this initial length, we get the middle length of Devāraṇya as $590236\frac{192}{212}$ yojanas. If the same quantity is again added to it, we get $593026\frac{72}{212}$ yojanas as the external length of Devāraṇya near Kālodaka.

Thus, just as the description has been given for northern bank of the Sītā river, Similarly the southern bank of Sītā can be described for width, circumference, increase in region, and length of Videha region, Vakṣāra mountains Vibhaṅga river and Devāraṇya forests. Just as in the east of meru here, it has been described with more and more (increasing) sequence, similarly, the region in the western direction of meru from Bhadraśāla forest may be described in decreasing and decreasing sequence. There the measure of decreace is similar to that of increase.

Similarly in Puṣkarārdha also, the measure of width and circumference of country, Vakṣāra, Vibhaṅgā and Devāraṇya may be found out as far as possible. This is for one part and that for two parts the result is doubled, divided by 212 counting-logs (śalākā). The quotient is multiplied by 64 getting the increase-region of Videha for two parts, and for getting for one part it is divided by two. This givıs the increase in region. This increase-region when added to each of its own initial length the measure of middle length is obtained and on again adding to this, the increase, the measure of external length is obtained separately. The external length of the former is the intial length of the latter. In the west of meru, however the sequential decrease exists.

(vv.5.944-946)

On the peak of this Kuṇḍala giri, in the east, there are in all, five summits, called Vajra, Vajraprabha, Kanaka and Kanakaprabha in the east and on accomplished-summit. Similarly, in the south there are the Rajata, the Rajatābha, Suprabha, Mahāprabha and one accomplished summit. Similarly in the west there are the Aṅka, Aṅkaprabha, Maṇikūṭa, Maniprabha and one accomplished summit, and in the north, Rucaka, Rucakābha, Himavat, Mandara and one accomplished summit. Thus there are 20 summits in all. In the 4 accomplished summits there are Jaina temples, and in the remaining 16 summits there resides the kūṭa deity in each of them



(vv.5.957-959)

In the internal summits of Rucaka mountain, in the east, there is Vimala summit with kanakā deity. In the Nityāloka summit of south there is Śatahṛdā, in the Svayaṁprabha summit of the west, there is Kanaka citrā, and in the Nityodyota summit of the north, there is Saudāminī deity. These four deities, keeps happiness in all directions at the birth time of the ford-founder. In the innerside of these summits, in the Vaiḍūrya summit of east there is Rucaka, Similarly Rucakakīrti in Rucaka summit of south, Rucakakānta in Maṇi summit of west, and Rucakaprabhā in Rajyottama summit of north direction. These four deities serve as obstetrician nurses at the birth time of the ford-founder. They are extremely expert (specialist) in obstetrics. They have been show below:

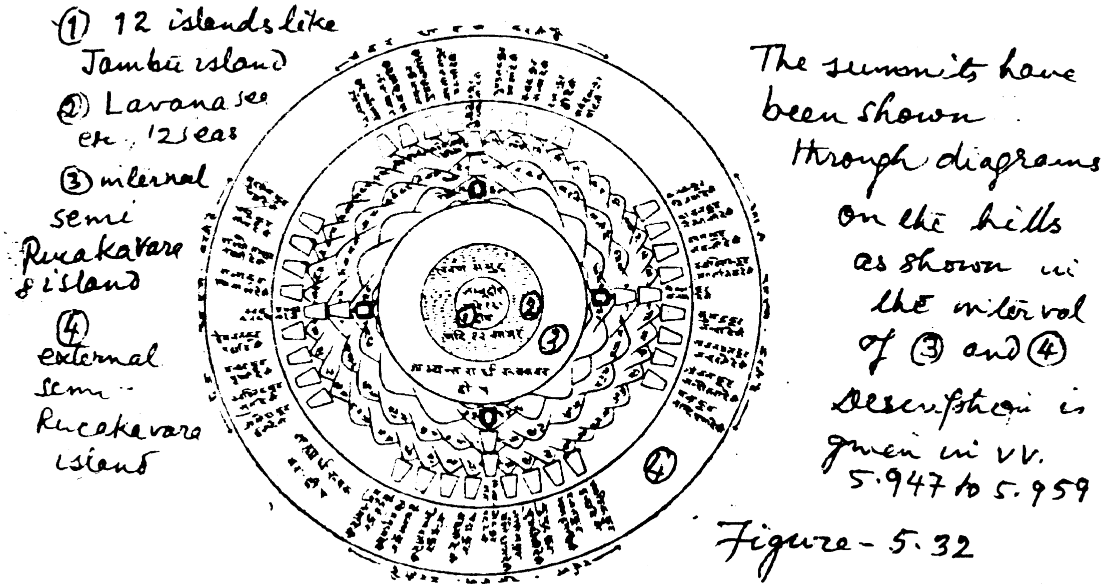


Figure 5.32

(vv.5.966 to 5.977)

These verses describe the Nandīśvara island, which is the eighth island as counted from the Jambū island in the middle universe. Beginning with the Jambū island, the ring width of the Nandīśvara island is 163 crore 84 lac yojanas or 16384 $(10)^5$ yojanas. Counted from Jambū its number among the land and seas is the 15th. By rule in the verse 4.309, " rūūṇahiya pada midaṁ", the number of terms is reduced by unity getting (15 - 1) = 14. This is spread and each log is given two and then mutually multiplied. From the product zero (śūnya) is subtracted, and 5 zeros are added, getting the ring width of Nandīśvara island as 1638400000 yojanas. For example

2 2 2 2 2 2 2 2 2 2 2 2 2 2

1 1 1 1 1 1 1 1 1 1 1 1 1 1

is $(2)^{14}$ = 16384 and adding 5 zero to it and subtracting one zero,

we get (1638400000 - 0) = 1638400000 yojanas, as the ring width of the Nandīśvara island.

In every direction of the Nandīśvara island, in the central portion, there is a mountain called, Añjana. In all the four directions, there are four rectangular wells, in whose c: ntre there is a Dadhimukha mountain, that is four Dadhimukha mountains, and in the two external corners of each of the wells, there are, one for each, hence eight Ratikara mountains. In this way, in a single direction, there are (añjana-1, Dadhimukah-4 and Ratikara-8) = 13 mountains and 4 rectangular wells (bāvaḍī). Hence in the four directions, in all there are (añjana- 4, Dadhimukha-16 and Ratikara- 32) = 52 mountains and 4 rectangular wells.

Now the colour and measure of the mountain is described. The four Añjana mountains are as black as collyrium. The 16 Dadhimukha mountains are as white as curd, and 32 Ratikara mountains are as golden as hot gold. The height of the Añjana mountains as well as their earth-mouth width are 84000 yojanas each, and those of Da.:dhimukha are 10000 yojanas each and those of Ratikara are 1000 yojanas each. Thus their height and top-bottom width are the same. They appear spherical in shape (or circular in shape) as the standing drums. Their total number is 52.

Then the details of the rectangular wells are given. In the east of Nandīśvara island, there are 4 such wells called the Nandā, the Nandavatā, The Nandottarā, and the Nandiṣeṇā. In the south direction, there are the Arjā, Virajā, the Gataśokā and the Vītaśokā. In the west, these are the Vijayā, Vaijayantī, the Jayantī and the Aparajitā. In the north, there are the Ramyā, the Ramaṇīyā, the suprabhā, and the Sarvatobhadrā. The banks of all these rectangular wells are full of gems and they measure 100000 yojanas each.

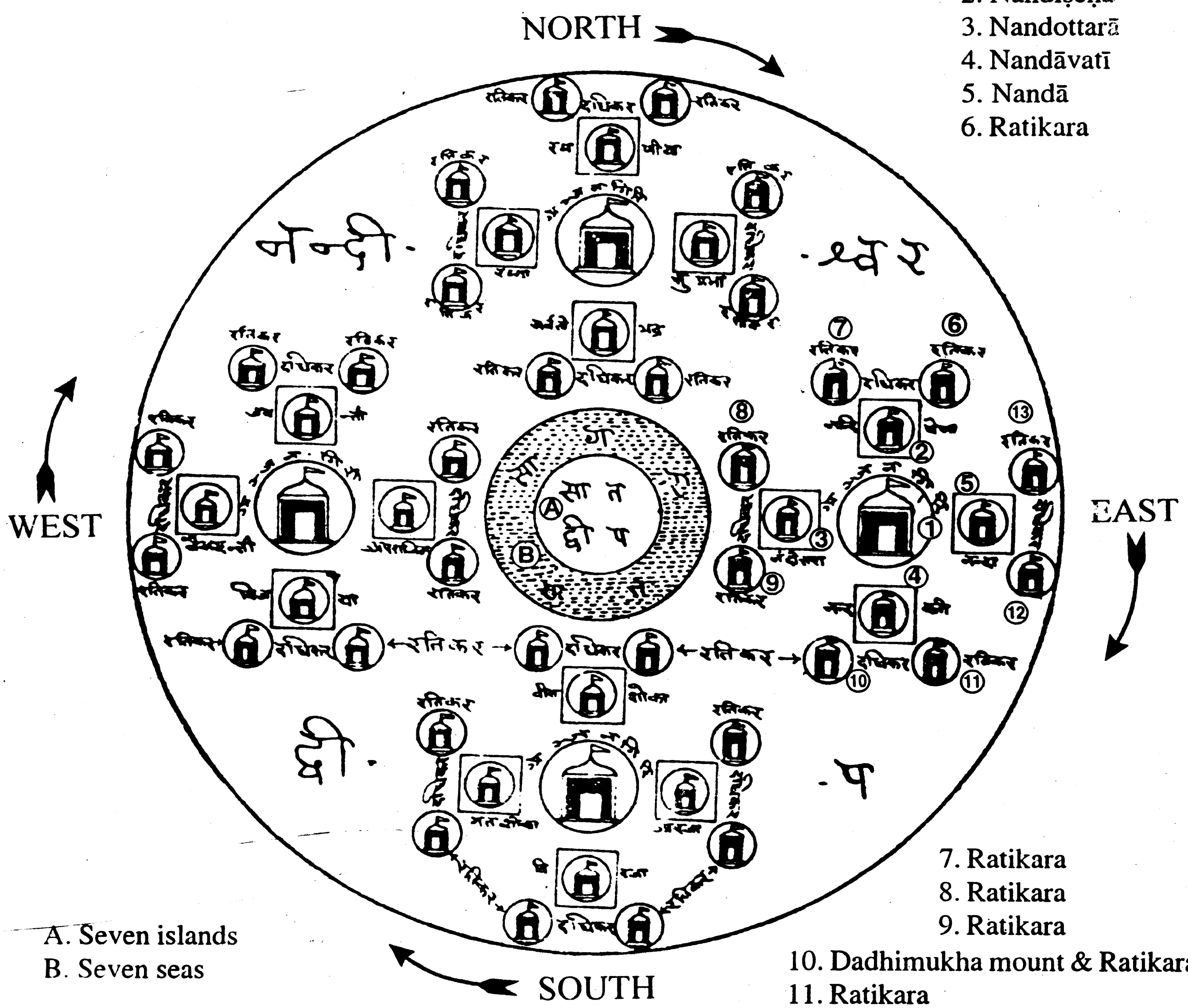
All these rectangular wells are each one lac yojanas in length and breadth, ie. having a square shape, and symmetrically similar from top to botton (taṅkotkīrṇa). Their depth is 1000 yojanas, and these altars have in all the four directions, one forest in each, thus endowed with four forests each. They are without water creatures and are full of water. These forests are 100000 yojanas long as the length of the own well, and broad as half of length, that is 50000 yojanas broad, called the Aśoka, the Saptacchada, the C ampaka and the Āma (mango).

On the 52 mounts, there are 52 Jina temples, which are worshipped by the 12 Indras of Saudharma etc. Kalpa, along with other deities, white moving towards Nandīśvara island on various types of vehicles, on Āṣāḍha, Kārtika, Phālguna every year, from the eighth tithi to the full moon, continuously for two periods, each period being of 3 hours. This is in a cycle all around from North, East, South, West, in pairs of the Paradises.

The following is a diagram of the above description, and about which there :s a measured description in the Tattvārtha rājavārtikaṁ.

THE NANDĪŚWARA ISLAND

1. Añjana giri
2. Nandiṣeṇā
3. Nandottarā
4. Nandāvatī
5. Nandā
6. Ratikara



7. Ratikara
8. Ratikara
9. Ratikara
10. Dadhimukha mount & Ratikara
11. Ratikara
12. Dadhimukha mount &Ratikara
13. Ratikara

A. Seven islands
B. Seven seas

Figure 5.33

ERRATA

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		Minister	Minister
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53	7th from bottom	Astrūpa	Aṣṭarūpa
72	11th from above	univerce	universe
77	9th 10th 18th from above	Kata Svarajana ta na	Kaṭa Svaragaṇa ṭa ṇa
		Panṣti	Pinaṣṭi
80	2nd Figure	Not found Figure No.	Figure 1.55
94	2nd & 3rd from bottom	$\frac{\log_2 P}{A} \cdot \log_2 [(P)^{\log_2 P}]^3$ $\frac{\log_2 P}{A} \cdot [3 \log_2 P \log_2 P]$	$\frac{\log_2 P}{A} \cdot \log_2 [(P)^{\log_2 P}]^3$ $\frac{\log_2 P}{A} \cdot [3 \log_2 P \log_2 P$
96	4th from above	writen	write
99		Figure 1.53	Figure 1.55A

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280	14th from bottom	for	For
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287	5th&7th from bottom	missing & incorrect	१ ० ≡ ३ ३४३ २
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Note- For reserch prupose some figures have been demonstrated as they appear in various texts available in Temple Libraries, and the authors owe their gratitude to the publications and their authors, specefically in the Tiloyapaṇattī and the Trilokasāra texts, commented upon by Pūjya shri 105 Āryikā Viṣuddhamati.

About the Co-author

She was born at Pindari Mandla (M.P.) on 1st July 1962. She passed B.A. and M.A. (Sanskrit) from the Saugar University. Then she topped the list of M.Phil. in 1993, from the Rani Durgavati University in Sanskrit. She was then awarded the Ph.D. from the same University in 1998.

Soon after her M.A. in 1984, she chose the way to asceticism and devoted herself to studies in Logic and Jaina Philosophy, Religion and Culture. She went on Lecturing and preaching and visited the Jaina World Conference on invitation from the Jain Convention United States of America. Then she became the Director of the Brahmi Sundari Prasthashram, Jabalpur in May, 1999. She also took over the charge of administrating the Acharya Shri Vidyasagar Research Institute, Jabalpur, soon after it came under the management of the Prasthashram. Well versed in Computer Techniques, she has been collaborating in publication works, like the INSA projects, of Professor L.C. Jain. She has to her credit, Joint authorship of the Tao of Jaina Sciences, the Labdhisara (vol.1) and a few research papers published in the IJHS and the Arhat Vachan.

She is the Chief editor of the digest magazine, "Rishabh Bharti" devoted for topics on humanities, social sciences, science and technology and Karma theory.

Recently, she has been engaged in organizing the publication of a series of volumes, on the Exact Sciences in the Karma Antiquity. She is also serving as adhoc lecturer in R.D. University, Jabalpur.

Publication of **Professor L.C. Jain** & **Dr. Ku. Prabha Jain**
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