

CERTIFICATE



स्वामी विवेकानन्द योग अनुसंधान संस्थान Swami Vivekananda Yoga Anusandhāna Samsthāna

(Declared as Deemed-to-be University under Section 3 of the UGC Act, 1956)

Eknath Bhavan, # 19, Gavipuram Circle, Kempegowda Nagar, Bangalore - 560 019

Ph: 080 - 2661 2669, Telefax: 080 - 2660 8645

E-mail: svyasa@svyasa.org Website: www.svyasa.org

Certificate

This is to Certify that the Doctoral Committee confirms that this is an authentic approved copy of the thesis titled “**Anomalous Variations in Microbial Growth Explained by Traditional Knowledge**” submitted by **Vegaraju Prabhakar** bearing **Registration No. PhD/Cat2/08/Jan2014**.

The Viva-voce examination was conducted on Tuesday, 23rd August 2022 through online google meet with session link: meet.google.com/qzj-phqu-vcb

The committee recommends the award of the PhD Degree.

Dr. Manmath Manohar Gharote
National Reviewer & Examiner
Director, The Lonavala Yoga Institute
Lonavala, Pune, Maharashtra.

Dr. Sanjay Chahar,
International Reviewer & Examiner
IGMM, CNRS,
University of Montpellier, France.

Dr. Ramesh Mavathur
Guide & Dean of Academics
S-VYASA, Bengaluru

Dr. Alex Hankey
Co-Guide
S-VYASA, Bengaluru

Dr. Sony Kumari
Registrar - Evaluation
S-VYASA, Bengaluru

Dr. M K Sridhar
Registrar
S-VYASA, Bengaluru

Dr. B. R. Ramakrishna
Vice-Chancellor
S-VYASA, Bengaluru

CERTIFICATE

This is to certify that Mr. Vegaraju Prabhakar who has been given Ph.D. Registration No.: PhD / Cat 2 / 08 / January 2014 with effect from January, 2014 by Swami Vivekananda Yoga Anusandhana Samsthana, Deemed to be University under the Division of Yoga and Life Sciences has successfully completed the required training in acquiring the relevant background knowledge and has completed the required course of research for not less than three years to submit this thesis entitled ANOMALOUS VARIATIONS IN MICROBIAL GROWTH EXPLAINED BY TRADITIONAL KNOWLEDGE as per the regulations of the University.

We also declare that the subject matter of this thesis entitled ANOMALOUS VARIATIONS IN MICROBIAL GROWTH EXPLAINED BY TRADITIONAL KNOWLEDGE has not previously formed the basis of the award of any degree, diploma, associate-ship, fellowship or similar titles.



Prof. Ramesh N. Mavathur

(Research Supervisor)

Professor,

S-VYASA, Bengaluru

Date: 23 Aug 2022

Place: Bengaluru



Prof. Alex Hankey

(Co-Research Supervisor)

Professor Emeritus of Biology,

MIT World Peace University, Pune

Date: 23 Aug 2022

Place: Pune/ Bengaluru

DECLARATION

I hereby declare that this study was conducted by me at Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA), Deemed to be University, Bengaluru, under the Division of Yoga and Life Sciences, under the supervision of Prof. Alex Hankey, Professor Emeritus of Biology, MIT World Peace University, Pune and Prof. Ramesh N. Mavathur, Professor, Division of Yoga and Life Sciences, S-VYASA University Bengaluru.

I also declare that the subject matter of my thesis entitled ANOMALOUS VARIATIONS IN MICROBIAL GROWTH EXPLAINED BY TRADITIONAL KNOWLEDGE has not previously formed the basis of the award of any degree, diploma, associateship, fellowship or similar titles.

V. Prabhakar

Date: 23 Aug 2022

V. Prabhakar

Place: Bengaluru

(Research Scholar)

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**STANDARD INTERNATIONAL TRANSLITERATION CODE USED
TO TRANSLITERATE SANSKRIT WORDS**

a	=	अ	ña	=	ढ	pa	=	प
ā	=	आ	ca	=	च	pha	=	फ
i	=	इ	cha	=	छ	ba	=	ब
ī	=	ई	ja	=	ज	bha	=	भ
u	=	उ	jha	=	झ	ma	=	म
ū	=	ऊ	ñ	=	ञ	ya	=	य
ṛ	=	ऋ	ṭa	=	ट	ra	=	र
ṝ	=	ॠ	ṭha	=	ठ	la	=	ल
e	=	ए	Ḍa	=	ड	va	=	व
ai	=	ऐ	Ḍha	=	ढ	śa	=	श
o	=	ओ	Ṇa	=	ण	ṣa	=	ष
au	=	औ	Ta	=	त	sa	=	स
ṁ	=	अं	Tha	=	थ	ha	=	ह
ḥ	=	अः	Da	=	द	kṣa	=	क्ष
ka	=	क	Dha	=	ध	tra	=	त्र
kha	=	ख	Na	=	न	jña	=	ज्ञ
ga	=	ग						
gha	=	घ						

ABSTRACT

Anomalous Variations in Microbial Growth explained by Traditional Knowledge

Background / Introduction

The main cultures of modern India, Hinduism, Jainism, Buddhism and Sikhism find a common source in the Vedas and the Vedic literature, which existed for thousands of years before the rise of subsequent teachers such as Mahavira, Lord Buddha, Adishankara and the later Gurus of the Sikhs. Vedic literature contains statements that have been tested and verified by methods of modern science. Yoga practices from Shad darshanas have been profoundly verified experimentally in both physiological studies and medical trials. *Adishankara's* profound statements from his commentaries and expressions on Advaita Vedanta have been shown to provide a profound basis for understanding consciousness in terms of modern science. Ayurveda passed thorough scientific scrutiny and testing, where thousands of studies have now been published and is shown to agree with deep understanding of biology in both theory and experiment. The limbs of the Veda, the *Vedangas*, have also been tested. The first, Shiksha, has been shown to provide deep insights into the nature of experience, and the foundation for a new approach to cognitive science. The last of the Vedangas, Jyotisha, the Vedic system of sidereal astrology, has also been thoroughly tested.

An earlier S-VYASA PhD study began this process by showing that *Jyotisha* can predict output of microbiological growth processes, where microbes, i.e. bacteria or viruses, are cultured in flasks. Such microbial growth processes are highly variable and thus unpredictable, but by using times of flask-inoculation as the process starting time great reductions in the uncertainty were achieved – variances decreased by up to 80%. This previous PhD thesis and its accompanying publications showed that Jyotisha astrology can correctly

predict output of vaccine production runs based on starting time of flask inoculation. When benefic Grahas were influencing the *Lagna Muhurta*, growth of bacteria was enhanced, while virus propagation was slowed. On the other hand, when malefic grahas were influencing the *Lagna*, growth of bacteria was slowed, and propagation of viruses was enhanced. These results are extended by the work carried out for the present thesis, which studied exponential phase growth of a simple, non-pathogenic variant of *E. Coli* bacteria. Rather than assess final output, the present study measured rates of bacterial growth, in particular during exponential phase growth, when the rate of doubling is constant, to understand the influence of *Jyotisha* factors on it. Such growth rates exhibit variations which have been considered inexplicable, i.e. anomalous artefacts. In addition to refining previous experiments, the current study was designed so that microbiology educational programs at schools and colleges could repeat them because of the safe, easy strain of bacteria used.

The thesis proper starts with an exposition of *Jyotisha* as a supreme spiritual science elucidating deep understanding of Vedic sciences of the soul. Its appellation as the ‘science of sciences’ in the Vedic literature is fully justified. Of primary concern to the soul is its progress on the path of *Sanatana Dharma*, expounded in terms of the four concepts of *Chaturvidha Purushardha*, namely *Dharma – Artha – Kama – Moksha*: spiritual tendencies, ways to make gains of all kinds, probable achievements, and feasibility of attaining spiritual liberation.

Jyotisha’s division of the *Kalapurusha* into 12 *Bhavas* yields a triplet of each of the four. For *Dharma*, individual nature, teachers, and spiritual merit give the greatest contributions, reflected in: *Lagna*, the 1st *bhava*, for the person, the 5th *bhava* for education, teachers and children, and the 9th *bhava* for Nature Support in life, i.e. in the auspicious *Trikona bhavas*. Similar triplets for *Artha*, *Kama* and *Moksha* may be defined. Part 1 of the thesis also gives a short exposition of the fundamentals of *Jyotisha* used to interpret a given *Kundali*.

Jyotisha's significance lies in its ability to make predictions about the course of any process and its outcome based on its starting time. Most usually it is used to predict the main tendencies in a person's life, based on the time of their birth, *Janma*, and how to avoid or mitigate various kinds of suffering if any are predicted. *Jyotisha* expounds that starting times, whether auspicious or inauspicious, influence all processes. Now even microbiological processes and their outcomes are found to vary with quality of starting times, elucidating the dimension of time as heterogeneous.

Experimentally, application of these principles of *Jyotisha* accurately predicts differences in vaccine production when inoculation times of production flasks are taken as *Muhurta*. As microbiologists know, output from such experiments is unpredictable; but the 3 *Grahas*, *Guru* (Jupiter), *Chandra* (Moon), and *Rahu* (the North Node) account for more than 70% of observed variance. Also earlier research assessed the effects of three solar eclipses even though they did not pass through India, since these are said to exert their malefic influence on all life on earth. Comparative values of virus vaccine production on solar eclipse dates showed that their effects were indeed more than *Rahu*'s

Aims and Objectives

The aim of this PhD thesis is to extend those results to continue efforts to establish the validity of *Jyotisha* astrology in modern scientific terms by studying and investigating specific *Jyotisha* influences on Exponential Phase Growth patterns of batch cultures using an easily obtainable non-pathogenic strain of bacterium K12-MG1655 of *E. Coli*. **The objectives** to provide *Jyotisha*-based explanations for the hitherto inexplicable anomalous variations, in bacterial growth rates **are**: (1) to identify factors that contribute to variances in growth rate; and (2) to investigate specific *Jyotisha* influences on Exponential Phase Growth.

Ethical Clearance: Approval was obtained from the I.E.C. of S-VYASA Yoga University.

Selection of Materials and Source: An easily obtainable, non-pathogenic strain of *E. coli*, K-12 MG 1655, was procured from National Centre for Biological Sciences, Bengaluru.

Methods: The *E. coli* was grown according to standard protocols used in Microbiology.

Design: Exponential phase growth rate (EPGR) and variances with reference to different Times of Flask Inoculation (TOFI) were studied.

Intervention: The TOFI was taken as the appropriate valid *Jyotisha* parameter. Natural variations in growth allowed assessment of variations in growth rate.

Novelty: Assessment of *Jyotisha* influences on EPGR of bacteria is novel.

Assessments: OD-600 measurements were made with 1 ml of bacterial culture aliquots at 0, 60, 120, 150, 180, 210, 240, 300 and 360 minutes after TOFI. Mean slopes of exponential phase growth were obtained as regression lines for the five points from 180 to 360 minutes. Experiments measured detailed growth curves, assessed growth, computed Cell Numbers, Growth Rates, Doubling Time or Generation Time and Number of Generations at the above time points after TOFI and further correlated the variations with *Graha Shadbalas*. Also, the study tried to quantify effects of solar and lunar eclipses, both partial and total, on EPGR

Results

Growth Curves Generated: Over an eighteen-month period beginning 16.02.2017 and ending 11.08.2018, a total of one hundred and fifty growth curves (GCs) were generated for one hundred and two start times. These comprised (1) 59 individual growth curves (GCs), which included 30 GCs with eclipse start times, (2) 38 duplicate GCs (done parallel in 2 flasks for each TOFI) generating 76 GCs total, and (3) 5 triplicate GCs (done parallel in 3 flasks for each TOFI), i.e. 15 GCs total.

Variances Obtained: Overall variance of all **150** regression line slopes was **0.1327**; that for

single TOFI obtained from within group doubles and triples (76 + 15 GCs) was **0.0218**. Deliberate choice of start times during the many months of GC experiments permitted intermediate variances to be calculated for sets of GCs both 2 hours and 2 days apart.

F test Analyses of Variances: F test indicated good significance indicating that, as we select and compare groups of GCs with to increasing difference between start times from a same start time to larger time differences, variances steadily increased from small values to larger ones.

Influence of Eclipses: Growth curves on six eclipse days had reduced exponential phase growth rates.

Influence of Planetary Strengths: Further detailed analyses showed that the graha Shadbala, planetary strength, of *Kuja Graha* correlated significantly with the slope of exponential phase segment of growth. Other grahas showed weaker trends. In other words, *Shadbalas of Grahas* correlated with exponential phase growth.

Summary and Conclusion

Incorporating the relevance of the time, space and consciousness dimension embodied in *Jyotisha* astrology; a subtler dimension than those so far incorporated in modern bioscience, the present experiments offer new understanding of variances in bacterial growth that replace previous ideas.

While the previous experimental results were concerned with effects of *Grahas* on vaccine production the current study tests the possible effects of *Saptagrahas* on exponential phase of growth curves of the non-pathogenic bacterium, *E. Coli* K-12 MG 1655. Another salient finding was the effect that Mars (*Kuja graha*) dominance exerts on exponential phase growth, a discovery that confirms the effect exerted by planetary bodies on the biology of cells. The data of *Kuja Shadbala* reducing the growth rates during the exponential phase is an

evidence of *Kuja*'s malefic nature manifesting.

Eclipses were observed to have similar malefic, life-opposing influences. Although the solar eclipses, during which experiment was conducted, could not be seen in India; its effect appeared to act globally. Present results also support earlier research observation of strong life-opposing effects of eclipses, consistent with statements in the *Jyotisha*. Unlike earlier experiments that require license to grow pathogenic organisms, the methodology explained in the current study can be repeated in any ordinary biology laboratory, possibly creating wider acceptance & appreciation of *Grahas*' influence on bacterial growth and enabling any researcher **to experimentally test the hypothesis that variances in exponential phase growth rates of bacteria are smaller for smaller times between starting TOFIs**. Biologists can now empirically test the validity of *Jyotisha* principles to offer scientific explanations for the high variances attributable to *Navagrahas*. Thus, this information not only helps to add a new dimension to microbiology, that of Bio-astrology / *Ayur-Jyotisha* supported by the astrophysical theory, but also explain how such influences are generated – one such being the influence of quantum correlations associated with each of *Navagrahas*.

Jyotisha may become a source for innovative biological teaching and research, and revolutionize perspectives on biomedicine. Medical *Jyotisha* / *Bio-Jyotisha* may gain the primary role accorded to it by Ayurveda. This research study will have implications for Ayurveda and Yoga in addition to *Jyotisha* itself which helps to prove Time and Space become heterogeneous complex variables in their influence on biological processes.

Key Words: Vedanga *Jyotisha*, *Chaturvidha Purushardha*, Exponential Phase Growth Rate, Heterogeneity of time dimension, Variance, Starting Time Clustering, Eclipses. (7 words)

CONTENTS

Sl. No.	DETAILS	PAGE NO.
1.0	INTRODUCTION	1
2.0	TRADITIONAL LITERATURE REVIEW	11
2.1.1	Introduction: Basic Concepts in <i>Jyotisha</i>	11
2.1.2	Fundamental Aspects of <i>Jyotisha</i>	14
2.1.3	The Twelve <i>Rasis</i> – Signs of the Zodiac	15
2.1.4	The Twelve <i>Bhavas</i> – Houses	18
2.1.5	Sets of Bhavas	19
2.1.6	<i>Vargas</i> , the Divisions of Each <i>Rasi</i>	19
2.1.7	The 27 <i>Nakshatras</i> and the <i>Vimsottari Dasa</i> System	20
2.1.8	Parashara Vimsottari Dasa Paddhati	21
2.2.1	Vedic Culture And Path Of Sanatana Dharma	24
2.2.2	Chaturvidha Purushardha: The <i>Jyotisha</i> Perspective	25
3.0	SCIENTIFIC LITERATURE REVIEW	31
3.1	Starting Time Effects	31
3.2	Medical Astrology Research	31
3.3	Previous Work At S-Vyasa	32
3.4	Future Scope	34
4.0	AIMS AND OBJECTIVES	35
4.1	Aim Of This Research	35
4.2	Objectives Of This Research	35
4.3	Justification Of The Study	35

4.4	Hypotheses And Null Hypotheses	36
5.0	MATERIALS AND METHODS	37
5.1	MATERIALS	37
5.1.1	Bacterial strain	37
5.1.2	Bacterial Glycerol stock and Growth Media	37
5.1.3	Glassware	38
5.1.4	Equipment	38
5.2	METHODS	39
5.2.1	Making a Streak plate	39
5.2.2	Finding the potential TOFI / <i>Lagna Muhurta: Jyotisha</i> Intervention	40
5.2.3	Culturing bacteria for generating growth curves	40
5.2.4	Steps in Measuring OD-600 and Data Extraction	42
5.2.5	Generating growth curves	43
5.2.6	Calculating <i>Graha Shadbalas</i>	44
5.3	Eclipse Day Experiments	44
5.4	Study Variables	44
5.5	Data Analysis	45
6.0	RESULTS	49
6.1	Two Fundamental Laws	51
6.2	Variance Analysis And Sub Group Variances	51
6.3	Guru in Kanya lagna and Rahu in Simha lagna	55
6.4	Correlation Analysis	56
6.5	Results From Eclipse Day's Experiments	61
6.6	Three Main Findings Of Research Study	63

7.0	DISCUSSION	64
7.1.	Concerning The Main Study Hypotheses	64
7.1.1	Two New Laws Concerning Variances in Bacterial Growth	66
7.1.2	Effects of Individual <i>Jyotisha Grahas</i>	68
7.1.3	Eclipse days' <i>E. Coli</i> bacterial growth experiments	72
7.2	Strengths, Limitations And Future Scope Of The Research	73
8.0	SUMMARY and CONCLUSIONS	75
8.1	Summary	75
8.2	Implications Of The Study	76
8.3	Applications Of The Study	77
8.4	Conclusions	78
9.0	REFERENCES (APA 7 th edition style)	80

APPENDICES

No.	DETAILS	Page No.
A 1.0	A 1: INSTITUTIONAL ETHICAL COMMITTEE APPROVAL	93
A 2.0	A 2: PUBLICATIONS FROM THIS DOCTORAL THESIS	94 A -94'O'
A 3.0	A 3: COMPUTATIONAL PROCEDURES FOR SHADBALAS	95
A 3.1	Table A 3.1: Constituent Components of Six - fold Graha Shadbala	96
A 3.2	Table A 3.2: Seven Graha Shadbala Pinda in 'Rupas'	107
A 4.0	A 4: SHADBALA AND OD-600 DATA FOR ECLIPSE DAYS	109
A 4.1	Table A 4.1: Shadbalas of Sapta grahas at 30 TOFI of "Eclipse" days	109
A 4.2	Table A 4.2: OD 600 data for "Eclipse" days G.C. Experiments	110
A 5.0	Graphs Of "EFFECTIVE" Shadbalas and of "Tithi" Vs Slope	111-122

A 6.0	Table A 6.0 Descriptive Statistics of Six Cell Growth Parameters	123
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LIST OF TABLES

Table No.	TITLE	Page No.
2.0 TRADITIONAL LITERATURE REVIEW		
2.1	Table 2.1: Zodiac signs and lords in Jyotisha and western astrology	13
2.2	Table 2.2: Jyotisha Twelve Rasis as body Parts of Kalapurusha	17
2.3	Table 2.3: Grahas Rasis of Moolatrikona, Uchcha, Neecha and Drishti	18
2.4	Table 2.4: Twenty-Seven Nakshatras of Bha Chakra Zodiac	22
2.5	Table 2.5: Selected Properties of Sapta Grahas	23
2.6	Table 2.6 Jyotisha Bhavas analyzed to know Pravritti	30
3.0 SCIENTIFIC LITERATURE REVIEW		
3.1	Table 3.1 Details of Jyotisha research by conducted at AIMS, Kochi	34
5.0 MATERIALS AND METHODS		
5.1	Table 5.1 Compositions of the different growth media used in grams	37
5.2	Table 5.2: Timeline for a Single Growth Curve Experiment	39
5.3	Table 5.3: Graha Shadbalas	47
5.4	Table 5.4: Sapta Graha Shadbalas 'Rupas' for 3 T.O.F.I. <i>Muhurtas</i>	48
6.0 RESULTS		
6.1	Table 6.1: Summary of Bacterial Growth Experiments	50
6.2	Table 6.2 Slope data for the 150 growth curves: single web page file	ON-LINE
6.3	Table 6.3: Dates & No. of 150 <i>E. Coli</i> Bacterial Growth Experiments	52
6.4	Table 6.4: Comparison of Variances Within & Between Subgroups	53
6.5	Table 6.5: Within and Overall Variances for Subgroups	54

6.6	Table 6.6: Slope values for 16 sets of 4 G.C.s with two TOFIs/day	55
6.7 A	Table 6.7 A: Shadbala values of Sapta Grahas	57
6.7 B	Table 6.7 B: Shadbala values of Sapta Grahas	58
6.8 A	Table 6.8 A: Data of O.D 600 nm	59
6.8 B	Table 6.8 B: Data of O.D 600 nm	60
6.9	Table 6.9 Eclipses By Type & Date, G.C. Ids & Slopes	62
7.0 DISCUSSION		
7.1	Table 7.1 Ten Starting Time Expts in Veterinary Microbiology	69

LIST OF FIGURES

Figure No.	TITLE	Page No.
2.0 TRADITIONAL LITERATURE REVIEW		
2.1	Figure 2.1 The Body of <i>Kala Purusha</i> , Time Lord, Finite and Infinite	16
5.0 MATERIALS AND METHODS		
5.1	Figure 5.1: Sequence of steps in a growth curve experiments	42
5.2	Figure 5.2: Model Bacterial G.C. showing Main Phases	46
5.3	Figure 5.3: Typical <i>E. Coli</i> Bacterial G.C.s started at two TOFIs	47
6.0 RESULTS		
6.1	Figure 6.1: Different Categories of the 150 Growth Curves	49
6.2	Figure 6.2: Graph of Increasing Variance between TOFIs	54
6.3	Figure 6.3: Eclipse Type Vs Mean Slopes of G.C. Exponential Phases	62