

**Situating Science in Malayalam Social Imaginary:
Popular Science Writing and the
Networks of Production and Circulation 1847- 1957**

*Thesis submitted to Jawaharlal Nehru University
in partial fulfilment of the requirements for the award of the degree of*

DOCTOR OF PHILOSOPHY

URMILA UNNIKRISHNAN



**Zakir Husain Centre for Educational Studies
School of Social Sciences
Jawaharlal Nehru University
New Delhi-110067
India**

2022




ZAKIR HUSAIN CENTRE FOR EDUCATIONAL STUDIES
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067

Dated:15/02/2022

DECLARATION

I, Urmila Unnikrishnan, hereby declare that this thesis entitled **Situating Science in Malayalam Social Imaginary: Popular Science Writing and the Networks of Production and Circulation 1847- 1957** submitted by me for the award of the degree of Doctor of Philosophy is my original work and that it has not been previously submitted in part or full, for any degree to this or any other university.


Urmila Unnikrishnan

CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.


Prof. Saumen Chattopadhyay


Prof. Dhruv Raina

Chairperson
Prof. Saumen Chattopadhyay
Chairperson
Zakir Husain Centre for Educational Studies
School of Social Sciences
Jawaharlal Nehru University
New Delhi-110067



DHRUV RAINA
Supervisor
Professor
Zakir Husain Centre for
Educational Studies
School of Social Sciences
Jawaharlal Nehru University
New Delhi - 110067

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Acknowledgements

I m deeply indebted to Prof. Dhruv Raina for being an amazing mentor.

He never interfered in the work but offered guidance generously whenever I asked for it. His meticulous reading and comments on different drafts of the thesis helped enormously. More importantly, he gave me the time to learn and work through my arguments. The warmth extended by his family- Rajeswari Ma'am, Abu and Amma- is acknowledged affectionately.

At the ZHCES- I thank my teachers Prof. Srinivasa Rao, Prof. Minati Panda and Dr. Arvind Mishra. Prof. Saumen Chattopadhyay was always encouraging with his kind words. Deepak and Mohit at the ZHCES office helped to navigate the administrative labyrinth.

I am grateful to Chitra and Jyothi- staff at the Appan Thampuran Library, Thrissur. Over the several months I spent there, they extended unmatched kindness and friendship, making archival work more fun.

Thanks to Mr. M. P. Parameswaran, Dr. Kavumbayi Balakrishnan, Dr. M. P Mujeebu Rehman and Prof. Udaya Kumar. Conversations with them at different stages have helped sharpen the thesis's arguments. I sincerely thank Prof. G. Dileepkumar and Prof. N. M. Indira. They were always happy to help, and I turned them into my go-to source to clarify doubts about Kerala history, Sanskrit, and Malayalam translations at times.

I acknowledge the valuable suggestions from the two anonymous reviewers and the editor Parvathi Menon at the *Review of Agrarian Studies*. Their comments and writing tips on a paper based on this thesis have helped immensely to improve the overall dissertation.

I extend my boundless gratitude to-

Ratheesh Kumar and Semina Kader, and Nisha Thaikaloor for friendship and providing me with a happy home in Delhi whenever needed. The long conversations with them have helped mould this thesis in numerous ways.

Shamla Mustaffa Mohamed for readily arranging my stay at a crucial time.

Binay Kumar Pathak for being there as an elder brother to whom I turned for words of encouragement.

Pooja Mishra for always being open to discussing my work and helping to see beyond the hurdles.

Linesh V. V, Sharanya Antony, Kumud Ranjan and Prashant Kumar for timely help with the PhD submission process.

Sreedevi D, and Abheesh Sashidharan, for reading and commenting on different chapters. They were with me at every stage of this thesis and partook in the pain and excitement. I also thank Sreedevi for connecting me to M. P. Parameswaran, Prof N. M. Indira and Prof. G. Dileepkumar.

My Yes India family- especially Z. A. Ashraf, Naseeb Jaleel, Anees M. T, Salahuddin M and Mansoor C. T. They cheered me on and gave me the confidence to start with this thesis.

This thesis would not have materialised without the support and encouragement from my family. I thank them for always being there for me.

Rakesh helped to organise the primary sources and read different chapters. He stood by me as my greatest strength and ensured I have 'all the time and space in the universe' to follow the journey of this thesis. But I thank him most for the bottomless cups of delicious, hot tea, which kept me going.

Finally, I dedicate this thesis to my father, C. Unnikrishnan, who, even in his absence, is the greatest source of inspiration.

List of Abbreviations

BAAS	British Association for Advancement of Science
CMS	Church Mission Society
KSDMA	Kerala State Disaster Management Authority
KSSP	Kerala Shastra Sahitya Parishad
LMS	London Missionary Society
NSS	Nair Service Society
SNDP	Sree Narayana Dharma Paripalana Yogam
SPCS	Sahitya Pravartaka Sahakarana Sangham
STEPS	Scientific, Technical and Educational Publishing Co-operative Society
TAR	Report of Administration of Travancore
VSLC	Vernacular School Leaving Certificate

CHAPTER ONE

Social Imaginaries of Science in Popular Periodicals

This thesis explores popular science literature in Malayalam periodicals published during the mid-nineteenth and mid-twentieth centuries. The socio-political and institutional factors engendering popular science, major agents in the process, aims and functions envisaged for popular science, nature of the science popularised, and the strategies of domestication, legitimation and appropriation of science are explored. The popularisation of science is understood as a dynamic process that involves cultural negotiations manifested in the varied social imaginaries of science. The thesis furthers the social history of science in India by drawing attention to the history of princely states. It adds to the regional history by situating science writings in popular periodicals in the social history of Kerala.

Background

The year 2018 featured a bountiful monsoon for Kerala, which later turned into a deluge that brought about the destruction of life and property hitherto unseen in the region.¹ Heavy rains lashed across the coastal state for several days. Massive sea erosion, landslides and flash floods marred the region. The Kerala State Disaster Management Authority (KSDMA) released regular updates on its Facebook page. On July 30, 2018, the KSDMA brought out a post alerting the citizens of the impending opening of the floodgates of a major reservoir in the region. While many followers thanked the KSDMA for the management of the havoc created by rain, one of the netizens chose to comment,

¹ Kerala lies at India's south-western tip and experiences a humid tropical climate. The climate and vegetation of the region are mainly dependent on the two monsoon seasons- the southwest monsoon (June-September) and the northeast monsoon (October-December).

“God be our strength”. KSDMA promptly replied, stating, “science, experience and planning is the collective strength of our state”.² The disaster management authority’s ‘rational’ response garnered much attention and appreciation.³ In a separate but related incident, in May 2018, the Kerala Health Department’s Facebook page had to be shut down due to the uproar created by a comment that credited ‘prayers’ for the negative test results of some of the suspected Nipah virus patients.⁴ The responses that marked these two instances are illustrative of the public discussion on science in the state.⁵ The core question of this thesis—exploring the social imaginaries of science—emanates from an attempt to make sense of the history of this vibrant public engagement with science.⁶

The public engagement with science in Kerala acquired an active and organised form from the second half of the twentieth century with the Kerala Shastra Sahitya Parishad (KSSP).⁷ The Kerala Shastra Sahitya Parishad (translated as the Kerala Forum for Science Literature) was formed in 1962 as a platform for science writers with the aim of science popularisation in Malayalam. In about a decade, the platform gained popularity as a people’s science movement.⁸ KSSP’s commitment to publishing science in the vernacular was

²https://www.facebook.com/KeralaStateDisasterManagementAuthorityksdma/posts/1780637382030301?comment_id=1781633091930730.

³<https://www.theweek.in/news/india/2018/07/31/idukki-dam-worries-disaster-authority-fb-page.html>.

⁴<https://www.thehindu.com/news/national/Kerala/health-dept-takes-down-prayer-post/article24038000.ece>.

⁵ Both these instances happened under the Left Democratic Front government. I have highlighted these contrasting stances taken by different departments of the same government to rule out any suggestion of a direct correlation between the ideology of the ruling party and the attitude to science. What interests us here is the public’s reaction in both cases.

⁶ Engagement with science has always been an essential part of the public sphere in the modern state of Kerala. Droughts, floods, landslides, earthquakes, or more rare phenomena like coloured rains, the sudden formation of sinkholes and the disappearance of wells are all matters for an active public discussion on science. Varughese (2017) presents a detailed analysis of the scientific discussion regarding some of these natural phenomena in the Malayalam public sphere. He puts forward the idea of the ‘scientific public sphere’ (constituted through the regional press) to explore the public engagement of science.

⁷ KSSP is regarded as one of the most successful people’s science movements in India. For more, see <http://www.kssp.in>.

⁸ KSSP engages in science popularisation through various means like the publication of pamphlets, books, and periodicals. It conducts seminars, lectures, annual conferences, street plays and quiz programs for school and college students. In 1971, KSSP started the STEPS (Scientific, Technical and Educational Publishing Co-operative Society) for publication of science related texts. (This was later dissolved). For more on the activities of KSSP and its role in Kerala Society, see Krishnakumar 1977, Zachariah and Sooryamoorthy 1994, Parameswaran 2002.

central to developing a popular science readership in Malayalam, which eventually attracted and encouraged other players in the field.⁹ Today, major publishing houses in Malayalam like DC Books, Mathrubhumi and many others contribute to the rich body of scientific literature. The Kerala State Institute of Languages, popularly known as the Kerala Bhasha Institute, also supports efforts in science popularisation.¹⁰ Apart from numerous books and periodicals published on science popularisation, science-related essays feature regularly in popular periodicals and newspapers.¹¹

Due to its pervasive influence, the history of popular science in Kerala is often reduced to the activities of KSSP.¹² The public engagement with science and science popularisation during the colonial period is only mentioned as a prelude to the discussion on KSSP. The history of popular science in Malayalam before KSSP thus remains obscure. The present thesis attempts to bridge that gap by exploring the social history of popular science in Malayalam during the mid-nineteenth and mid-twentieth centuries.

Situating Kerala in the History of Popular Science in India

The history of science in India witnessed a 'change in focus' in the last decades of the twentieth century.¹³ It began to address science in colonial contexts as a body of knowledge evolving through dynamic processes rather

⁹ For more on the publishing efforts of KSSP, see Balakrishnan 2002.

¹⁰ Kerala State Institute of Languages was set up in 1968 and since then has been active in publishing science in vernacular. The institute was instrumental in bringing out scientific dictionaries and encyclopedias in Malayalam and gave impetus to scientific and technological education in Malayalam. See Vasukuttan (1991) for a detailed account of the formation and functions of the institute.

¹¹ Malayalam science magazines *Shastragathi*, *Info-Kairali* and children's science magazines like the *Shastra Keralam* and *Eureka* have been able to carve a niche for themselves. *Shastragathi* was started by KSSP in 1968 as a quarterly. In 1970 it became bi-monthly and a monthly in 1974. *Info-Kairali* is a popular computer science and information technology magazine that began in 1998. *Shastra Keralam* started in 1969, was aimed at high school students, while *Eureka*, which started in 1970, targeted primary school students. Both publications were started by KSSP.

¹² Varughese (2017) offers a refreshing perspective in this regard. He traces the history of the development of this public engagement with science and explains changing trends in the character of engagement. He explains that the environmental movements and developmental critique that emerged in the 1970s were instrumental in evolving a critical discourse on science in public. He argues that the post-1990s witnessed a new kind of civic engagement of public and science mediated by the regional press. In this process, the KSSP and other similar scientific actors took a backstage.

¹³ Habib and Raina 1989.

than simply a tool of empire. Within this framework, the percolation models of transmission of scientific knowledge were critiqued. It brought the questions of meaning and functions envisaged for science and science popularisation to the forefront. In their study of *Dawn* magazine (1897- 1913, Calcutta), Raina and Habib explained science popularisation as a complex activity shaped by the political and epistemological contexts of popularisation.¹⁴ It entailed a cultural redefinition of science in the indigenous frame so that science could be domesticated and legitimated into the Indian intellectual and social landscape.¹⁵ It proceeds through the process of 'neutralisation of the cultural meaning of science as a western import' by highlighting the instrumentality of science. Tensions and ambiguities embedded in this process of reimagining science in colonial context were pointed out by highlighting the nuances of engagement with modernity and science.¹⁶

At the institutional level, Vigyan Prasar shifted focus to science popularisation in pre-independence India.¹⁷ It organised a couple of seminars and workshops on 'Science Popularisation Efforts in Pre-Independence India' in its early years.¹⁸ Various papers presented in these seminars were later compiled and brought out as a volume titled 'Uncharted Terrains- Essays on Science Popularisation in Pre-Independence India'.¹⁹ The book presented a synoptic history of science popularisation in various regional and linguistic locales. It situated the context, means, and aims of science popularisation in the socio-political history of colonialism and nascent nationalism.²⁰ The local efforts in

¹⁴ Raina and Habib 1996.

¹⁵ Habib and Raina 1989.

Raina and Habib (1996) understand cultural redefinition "as a process of appropriating a new knowledge form, and as a prerequisite to its legitimation" p 29.

¹⁶ Raina and Habib (2004) observe that the tension was between the discourses of "preservation and change, tradition and progress and religion and science" p 66.

¹⁷ In 1989 government of India set up Vigyan Prasar. Its major aim was the inculcation of a scientific temper among the population through the popularisation of science. Albeit slowly, Vigyan Prasar proceeded with various workshops, lectures, demonstrations, and numerous publications aimed at science popularisation in different parts of the nation. By the mid-1990s, the society directed its attention to the history of science popularisation in pre-independence India [Sehgal 2000].

¹⁸ Chandigarh (March 1995), New Delhi (April 1995) Calcutta (May 1995), Allahabad (January 1996).

¹⁹ Sehgal, Sangwan and Mahanti 2000.

²⁰ Sangwan 2000, Raina 2000.

science popularisation through public lectures, demonstrations and popular literature in different vernacular contexts were explored.²¹ The essays in the book highlighted that science popularisation was intrinsically related to politics of knowledge and social reform in pre-independence India. It was embroiled in the nationalist discourse and linguistic politics embedded in the process of vernacularisation. Albeit most of the essays focused on individual popularisers of science, the book also drew attention to the importance of science writings in scientific periodicals and general periodicals.²²

Despite these very insightful works, popular science remained on the fringes of the history of science in India, if not completely non-existent. Similarly, the history of science popularisation in the vernacular continued to be an under-explored area. The history of medicine is one area where the popularisation of science has received considerable attention. Vernacular literature was explored to understand the cultural and epistemological conversations that shaped the institutionalisation and standardisation of modern medicine in colonial India.²³ Research has also explored the questions of social and commercial entrepreneurship, caste, gender, and sexuality through the literature on health and medicine.²⁴ In the history of agriculture also, popular literature is receiving more attention. Agricultural magazines and agricultural essays in general periodicals are being explored to understand the local dynamics of the history of agriculture in colonial India.²⁵ Contexts of production and circulation of popular science in Hindi and the questions of its translation and vernacularisation have also received attention.²⁶

²¹ Chacraverti (2000) discusses the contributions of Ramendrasunder Trivedi in Bengal, Chatterjee (2000) compares the activities of S. N. Bose and M. N. Saha in the context of politics of vernacularisation in Bengal, Ghosh (2000) discusses efforts of Rajendralal Mitra, Habib (2000) discusses the works of Munshi Zakauallah in the context of Delhi Renaissance, Mohan (2000) and Virk (2000) presents an account of the science popularisation activities of Ruchi Ram Sahni in Punjab.

²² Sangwan (2000) presents a general introduction to the role of periodicals and newspapers in science popularisation. Chacraverti (2000) underlined the role of Bengali popular periodicals. Phukan (2000) discussed Assamese periodicals.

²³ Panikkar 1992, Sivaramakrishnan 2006.

²⁴ Sharma 2012, Girija 2017a, 2017b, Prasad 2015, Gupta 2001.

²⁵ *Review of Agrarian Studies* 2016, Kumar and Raha 2016.

²⁶ Mishra 2015, 2017, Singh 2015, 2021.

Nonetheless, the history of science in India is based mainly on the presidencies and major provinces of British India. The princely states administrated indirectly by the British have not received much attention. The varying degree of administrative control presented an 'alternative course' of modernisation and state-building in the princely states.²⁷ By the beginning of the twentieth century, states like Mysore, Travancore, Cochin, and Baroda set up modern scientific and technical administrative and educational institutions.²⁸ Unlike British India, in the princely states, the state acted as a significant agent of modernisation along with the emerging intelligentsia.²⁹ Their peripheral status and relative autonomy enabled these states to direct scientific and technological development towards regional socio-economic development. By introducing policies and institutions tuned to regional development needs, they alleviated the socio-cultural disruptions of modernisation.³⁰

Barbara Ramusack, in her study on the history of princely states in India, argues that the princely state's support to institutionalisation and dissemination of modern science has to be understood in relation to the patronage extended to cultural symbols like arts, craft, religion, literature and history during the nineteenth and twentieth century.³¹ According to her, the patronage of local and western cultural forms and knowledge was an articulation of traditional notions of *raja dharma* in modern idioms to suit the colonial and nationalist registers of modern political authority and social progress. Such articulations, she argues, were sources of legitimacy for the princely states. It simultaneously embodied resistance to the political authority of British rule and served as cultural resources for imaginations of regional and national identities. Although references like the above underline the relevance of the development of science in the princely states, they are generally overlooked in the history of science in India.

²⁷ Kawashima 1998 p 3.

²⁸ Raina 2001.

²⁹ Raina and Habib 2004, pp 182-198.

³⁰ Raina 2001.

³¹ Ramusack 2004.

In the context of Kerala, a few available studies on the history of science generally centre around the mathematical, astronomical and Ayurvedic treatises produced as early as the fifteenth century.³² The cultural and epistemological interactions between modern medicine and local healing traditions have received some attention.³³ Some other noted works include- the study of the metallurgy and craft of the famed bronze mirrors of Aranmula by Srinivasan and Glover, Jessica Ratcliff's study of politics of scientific practices in the British Empire highlighting the case of the Trivandrum Observatory, and Itty Abraham's study that contextualises the history of geological department in Travancore within a larger global politics of rare earth minerals and mining.³⁴ Explorations of the cultural and historical significance of 'Hortus Malabaricus' also needs to be mentioned here.³⁵ Though this cannot be considered a Malayalam text, it was the first book that printed the Malayalam script. Histories of print and literature in the region discuss it among the major scientific works.³⁶ The inclusion of 'Hortus Malabaricus' is also an acknowledgement of the contributions of local physicians and interpreters who collaborated to prepare the text.³⁷

Nevertheless, the history of popular science remained a dark area except for medicine.³⁸ Some works, mainly on the history of Malayalam literature, have brought to notice a rich body of science writings in Malayalam periodicals published during the late 19th and early 20th centuries. In general, these are descriptive studies and bibliographic compilations.³⁹ There are a few focussed

³² Sarma 1972, Joseph 2000 (1991), 2009, Webb 2014, Sarma et al. 2008, Sriram 2008.

³³ For Kerala, see Panikkar 1992, Cleetus 2007, 2014, 2018, Girija 2017a, 2017b, Nair 2012-2013. For Mysore, see Attewell 2014 and Ramusack 2018.

³⁴ Srinivasan and Glover 2007, Ratcliff 2016, Abraham 2011.

³⁵ Hortus Malabaricus (1678- 1703) is a horticultural manual compiled by Van Rheede, the governor of Cochin. The text was in Latin, but the details of the sketches were presented in four different scripts Malayalam, Nagari, Roman and Arabic.

³⁶ Namboothiri 2008, Nair, C. G. R. 2011, Balakrishnan 2007, Pillai 2009 (1998).

³⁷ For more, see Manilal 1980, 2012. Manilal discusses the contributions of Itty Achuthan, an Ezhava physician and three Konkani Brahmin physicians – Ranga Bhat, Vinayaka Pandit and Appu Bhat from Cochin.

³⁸ Panikkar 1992, Cleetus 2007, 2014, 2018 Girija 2016, 2017a, 2017b, Satheesh 2008, Basu 2015, Nair 2012-2013. See chapter four of this thesis for a discussion of these works.

³⁹ Namboothiri 2008, Nair, C. G. R. 2011, Pillai 2009 (1998).

Balakrishnan (2007) presents a detailed review of such bibliographic works. Some of the works that he discussed are- Subramanian, M.N(compiled) (1972) *Shastra Grantha Soochi*, KSSP; Govindanunni, V.R (ed) (1973) *Malayala Shastra Sahitya Parichaya Kosham*, STEPS; Gopalakrishnan, C (1982) *Shastra Sahitya Prasthanam*, STEPS.

studies on science journalism and popular science literature in Malayalam. Anil Kumar Vadavathoor's 'Science Journalism Vikasavum Parinamavum' (Development and Evolution of Science Journalism) (2001) and Kavumbayi Balakrishnan's 'Malayala Shastra Sahitya Prasthanam- Oru Padanam' (A Study on the Science Literature Movement in Malayalam) (2007) belong to that group. While these works serve as an excellent starting point for a history of popular science in Malayalam, they approach popular science from the respective perspectives of the history of journalism and Malayalam literature. The analysis of popular literature is restricted to identifying larger trends. They understand science popularisation as the communication of science to the public. Such positivist readings elude the contextualisation of science in the region's contemporary socio-political and intellectual environment.⁴⁰

The history of the popularisation of modern science in Kerala is traced to the mid-nineteenth century in the works discussed above.⁴¹ It was a period of momentous changes in the socio-political realm, including the development of modern education, popularisation of print and emergence of the reading public.

⁴⁰ Vadavathoor (2001) presents a survey of popular science literature in Malayalam periodicals. He begins with an observation that the history of science journalism in Malayalam corresponds with the history of Malayalam journalism itself and goes on to substantiate it by listing various periodicals that published science-related literature. Excerpts from important articles are given. Different chapters cover magazines for women and children, industrial /commercial magazines, health magazines and agriculture magazines. The book is very informative and based on a broad database. Balakrishnan (2007) explores 'science literature' as a literary genre in Malayalam. The development of 'science literature' is traced through different phases, and factors in its growth are analysed. The discussion on individual effort, periodicals, formal and informal organisations is insightful. The book also draws attention to the influence of science on Malayalam prose and poetry and sheds light on the genre of science fiction. The styles of representations used in Malayalam 'science literature' and the challenges of writing science in vernacular are also discussed.

These works offer valuable insights for this thesis. However, in both the works, the discussion weighs more towards the popular science published in the latter half of the twentieth century. Vadavathoor uses the term 'science journalism' without any temporal framework, covering all the available sources to date. Being a descriptive work, it falls short of any deeper sociological or historical analysis of this large and influential body of literature. Similarly, Balakrishnan uses the category 'science literature' in a very un-problematic way without any temporal, spatial or conceptual reference. No distinction is made between 'science literature' and popular science writing. Thus, his discussion on the literary analysis of science literature in Malayalam and the study of styles of representations fails to offer any critical insights. Moreover, they fail to contextualise science in the history of science in India or regional history. Although Balakrishnan begins with a discussion on Bernal's 'Science and History' and tries to 'explore the role of science in the 'Kerala Renaissance', no attempt is made to locate this body of literature within the larger socio-cultural issues of the period.

⁴¹ Balakrishnan 2007, Namboothiri 2008, Nair, C. G. R. 2011.

The cultural dynamics of knowledge production and circulation in colonial Kerala underwent drastic transformations during the period.⁴² The popular print offered a secular medium for exchanging and disseminating ideas and a space for deliberations on socio-political matters for the local intelligentsia. It created a revolution in the circulation of useful knowledge, its purpose defined in terms of individual and social progress. The development of print was also crucial in the standardisation of language and literary practices. Science writing was simultaneously seen as a means for developing prose and an effective channel to popularise modern scientific knowledge among the masses. Thus, popular science books, textbooks and science writings in periodicals was encouraged.⁴³ Although journals devoted solely to the popularisation of science were rare in Malayalam during the period, the ample presence of popular science literature in the general-interest periodicals draws our attention.

A focus on the popular periodicals as primary sites of cultural negotiations and manifestations situates this thesis in the history of modernity in Kerala. In the history of nineteenth and twentieth-century Kerala, popular print is used as a resourceful site to understand the varied facets of modernity. Scholars have explored different genres of popular literature produced during the period from various perspectives— linguistic, economic, religious, caste and gender history- to explore the underlying dynamics of modernity as a social experience.⁴⁴ Although there is an acknowledgement of the scientific writings in

⁴² Priyadarshanan 2010 (1982), Raghavan 2008 (1985). Chapter two of this thesis presents a detailed discussion of the social history of Kerala from the mid-nineteenth to mid-twentieth century.

⁴³ Priyadarshanan 2010 (1982), Raghavan 2008 (1985), Namboothiri 2008, Pillai 2009 (1998) and Mohandas 2011.

⁴⁴ Arunima (1997, 2004, 2006a, 2006b) explores the questions of negotiation of modernity, religious identity, language, and territoriality. Menon (2006), through a study of the novels published during the period, tries to understand the experience of colonial modernity situated in the structures of caste society. Devika (2007) explores the processes of individuation and engendering at play in the late-nineteenth and early-twentieth century Malayalee society. Kumar (2016), in his study on the autobiographies written during the period, attempts to trace the intersection of the formation of subjectivities and the process of shared memory-making. Ranjith (2011) uses popular literature to trace the construction and standardisation of the festival of Onam- its myth, performance, and public images. Antony (2013) explores the evolution of the notions of modern womanhood through a reading of Malayalam women's magazines. Sreejith (2021) explores the ambivalent nature of modernity among the middle class in colonial Malabar through a reading of novels and other forms of popular literature. Kalesh (2010-2011) analyses 'dialogue' as a form of narrative in popular literature to understand the cultural negotiations

the popular periodicals,⁴⁵ attempts to situate popular science in the region's social history are rare.⁴⁶ In this thesis, I strive in that direction. The thesis examines the science literature in popular periodicals to explore the social and cultural history of popular science in Malayalam. It situates science and its popularisation in the history of modernity in Kerala.

Reading Popular Science in General Periodicals

Inspired by the cultural turn, contemporary perspectives on the history of popular science have been increasingly appreciative of the role of general periodicals in science popularisation.⁴⁷ The compilation of the SCiPer index with the summaries of articles in general periodicals published in Britain between 1800 and 1900 has drawn considerable attention to science in general periodicals.⁴⁸ Their wider circulation in the public sphere makes periodicals an influential medium for popularising science in society.⁴⁹ Exploring such periodicals help to direct our attention to articles that are seemingly non-scientific but embedded in the idea and language of science. As Shteir explains, locating popular science in a specific textual location meant only for science, in a way, reproduces the conventional understanding of science as esoteric.⁵⁰ It demands an audience who have an aptitude for science and are willing to invest their resources in the consumption of science. Whereas, reading science in

engendered by colonialism in the intellectual, social, political, and cultural realms. A similar discussion on narratives of dialogues in Malayalam popular literature can be seen in Varughese (2015).

⁴⁵Devika (2007) acknowledges the presence of science articles in the periodicals. Devika and Sukumar (2006) have noted in passing that the early magazines published in Malayalam participated in the popularisation of ideas of modern science. Kalesh (2010- 2011) observes that dialogues on science and religion were a staple of magazines like *Vidyasamgraham* and *Jnananikshepam*. Ranjith (2014) also notes science articles in periodicals. He uses periodicals as sites to explore the translation of scientific terms into Malayalam. Varughese (2017) also noted significant public engagement with science from mid-nineteenth century in Kerala.

⁴⁶Sreejith 2021.

⁴⁷ For science in periodicals, also see Noakes 2005, Broks 2006, Cantor and Shuttleworth 2004, Fyfe and Lightman 2007.

⁴⁸ Noakes 2005 p 318. The Science in the Nineteenth-Century Periodical (SciPer) Index is a project run jointly by the Department of English Literature, University of Sheffield and the Division of the History and Philosophy of Science, University of Leeds. For more, see <https://www.sciper.org/introduction.html>.

⁴⁹ Shuttleworth and Cantor 2004 p 2.

⁵⁰ Shteir 2004.

general periodicals helps to trace the cultural conversations of science more clearly.⁵¹

Underlying this perspective is the conception of popular science as a complex process involving imagination and meaning-making contextualised in the region's intellectual, political, and social history. It replaces the older models of the history of popular science that envisaged popularisation as a mere dissemination of ideas and facts from the experts to the ignorant public.⁵² Domestication, appropriation, legitimisation and resistance assumed significance in the analysis of popular science.⁵³ The new frame underlines that the reception of popular science varies across various social groups and has to be understood in its multiple representations.⁵⁴ The social identity of science popularisers and audiences became crucial questions for the history of science popularisation. Questions of religion, class, caste, gender and social contexts also assumed more significance.⁵⁵ Thus the circulation of knowledge is brought to the centre of the history of science. It blurs the distinction between production and dissemination of knowledge to arrive at a broadened understanding of science as a form of communicative action.⁵⁶ Further reflections extend the thesis of science as communication to argue that science has to be understood as a "normative activity that generates universal standards and strong values that in turn shape society at large".⁵⁷ Such positions open up the prospects of popular science as a site to explore the coproduction of science and the public.⁵⁸

This is the vantage point for this thesis. It is situated in the cultural turn in the history of science and aims to contribute to the growing number of studies on popular science by exploring popular science literature in Malayalam periodicals. Following Ralph O'Connor, I have used popular science to denote

⁵¹ Ibid.

⁵² Cooter and Pumfrey 1994.

⁵³ Cooter and Pumfrey 1994, Lightman 2000, 2007, Broks 2006, Papanelopoulou, Nieti- Galan and Perdiguero 2009.

⁵⁴ Ibid, Lightman 2000, 2007.

⁵⁵ Cooter and Pumfrey 1994, Lightman 2000, Broks 2006, Fyfe and Lightman 2007, Cantor and Shuttleworth 2004.

⁵⁶ Secord 2004, Topham 2009.

⁵⁷ Bensaude-Vincent 2009 p 361.

⁵⁸ Ibid.

“science of or for people”. In O’Connor’s conceptualisation, popular science includes three points of interest-

“(1) science designed for the audiences outside a self-appointed scientific elite (“science popularisation,” “commercial science”, ‘expository science’, “science education”), (2) what those audiences do with the popularised science, and (3) nonelite scientific practices or “ethno-sciences”.⁵⁹

He underlines that these foci of interests are only guides and variety is the feature of popular science. Meaning and practices associated with ‘science’, ‘elite’, ‘public’ and ‘non-elite scientific’ vary in time and space. One must adopt a critical attitude and be open to such historical nuances.⁶⁰

As used in this thesis, popular science covers science-related essays featured in Malayalam periodicals published between 1847 and 1957. Literature related to modern science, local sciences and other knowledge forms is included. Essays on social sciences are not covered in the study. The periodicals were predominantly general, literary, and cultural periodicals (also known as general-interest periodicals). A few devoted periodicals on health and agriculture were also used. Books, pamphlets, and other print material on scientific themes published for the general audience were occasionally used for the study. Public lectures, exhibitions, and other means of popular science like radio and television are not explored here. Popular science in Malayalam is studied as representations of the cultural and political negotiations of science and society entangled in colonialism, nationalism, regionalism, religion, traditions-modernities and local knowledges.⁶¹

⁵⁹ O’Connor 2009 p 341.

⁶⁰ With the increasing number of studies on popular science, the category of ‘popular science’ has come under scrutiny. The term is often critiqued for failing to capture the variation in the forms, aims, functions, authors, and audience and for suggesting simplistic dissemination of knowledge from the expert to the ignorant masses. Many scholars, including Secord (2004) and Topham (2009), have argued for abandoning an essentialist understanding of the term. Some others have argued for retaining the term with a focus on variety in time and space (Broks 2006, O’Connor 2009, Bensaude-Vincent 2009). See *Isis, Focus issue on Historicizing “Popular Science”*, Vol 100, No 2, (June 2009) for a discussion on the varied conceptualisations of the term.

⁶¹ The discussion on the social history of Kerala in the next chapter will explain the relevance of these cultural notions for the study.

To foreground the subtleties of imagination and meaning-making involved in such cultural conversations, the idea of social imaginaries is employed as an interpretative guide. Social imaginaries become relevant for studying popular science during the nineteenth and twentieth century in India, as any historical or sociological endeavour to understand science during the period engages with modernity in its multifarious forms.⁶² Besides, social imagination and imaginaries are also pervasive ideas in the historiography of modernity in Kerala. As the next chapter shows, cultural experiences of modernity are understood in terms of imaginations of continuity and change, of an imagined conversation between tradition and modernity. Most of these works engage with the idea of social imagination derived from Anderson's thesis of the development of collective imagination through print culture.⁶³ Some forays employing Castoriadis's notion of social imaginaries are also in place.⁶⁴

Social Imaginaries of Science

Social imaginaries is a multifaceted idea. Although it can be traced to many philosophical and political thinkers, in this thesis, I primarily draw from the works of Cornelius Castoriadis and Charles Taylor.⁶⁵ The varied notions make the concept adaptable to a variety of intellectual situations. Social imaginaries, in simplest terms, refers to the set of collectively constituted meanings that enable making sense of the social life and articulated in forms and practices that constitute the social. Social imaginaries are constantly evolving-shaping and being shaped by the social. Its cultural expressions can be located in stories, myths, legends, songs, or images, albeit they are not restricted to only the symbolic matrix. It is also embroiled in practice.⁶⁶

In other words, social imaginaries refer to the way people imagine their life- both at the individual and social levels. Thus, it defines a sense of what is legitimate and normative and what is actual.⁶⁷ Social imaginaries inform practice

⁶² Raina and Habib 2004, Prakash 1999, Sehgal, Sangwan and Mahanti 2000.

⁶³ Menon 2006, Arunima 1997, 2004, 2006a.

⁶⁴ Ranjit 2011.

⁶⁵ Castoriadis 1987, Taylor 2004.

⁶⁶ Ibid, Adam et al. 2015, Gaonkar 2002, 2015, Social Imaginaries Collective 2015.

⁶⁷ Taylor 2004.

and simultaneously gets defined by the practice. It sometimes starts as an idea in the minds of a few, which then penetrates the larger population. Thus, newer ideas can give form to newer social imaginaries. When a social imaginary transforms thus, the practices and attitudes also transform.

“It begins to define the contours of their world and can eventually come to count as the taken- for granted shape of things, too obvious to mention”.⁶⁸

Moving away from an explanation of society and social change focused on structure and function, these works highlight the process of shared meaning-making.⁶⁹ Within the framework of social imaginaries, imagination is not individual but social (this does not negate the power and possibilities of individual imagination). Although individual imagination is informed by the social, and vice versa, one cannot be reduced to the other. Thus, social imaginaries foreground imagination as a creative process rather than merely mimetic.⁷⁰ By focusing on the creative possibilities of imagination, social imaginaries critique the prime importance given to the idea of rationality in the theories of modernity. Modernity is conceived “as a field of tension co-instituted by cultural varieties of imaginaries and rationalities”.⁷¹ Also, a central theme of social imaginaries - embedded in the very use of the term in the plural - is the idea of variety and multiplicity of cultures. Various social imaginaries can co-exist at any point in time. Social imaginary is located in time and space, and every epoch has a distinct social imaginary. Thus, modernity has a characteristic social imaginary, and Taylor maintains that multiple modernities imply multiple social imaginaries.⁷²

Although science and technology do not figure as essential categories in the conceptual frames of social imaginaries, the idea can be used to develop a creative guide to explore popular science. One example is Jasanoff and Kim’s idea

⁶⁸ Ibid p 29.

⁶⁹ Castoriadis 1987, Taylor 2004.

⁷⁰ Arnason 2015.

⁷¹ Arnason 2015 p 17.

⁷² Taylor 2004.

of sociotechnical imaginaries.⁷³ Their concept is developed in conversation with social imaginaries and extends to include the material aspects. Jasanoff and Kim defined *sociotechnical imaginaries* as,

“Collectively held, institutionally stabilised, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of advances in science and technology”.⁷⁴

Jasanoff insists that sociotechnical imaginaries “are at once products of and instruments of the coproduction of science, technology, and society in modernity”.⁷⁵ She explained that sociotechnical imaginaries develop through four phases: origin, embedding, resistance, and extension. First, the idea originates in the mind of an individual, group or other institutional setting. It is embedded in society’s material and social imagination through various manoeuvres by individuals, groups, or institutional actors. When new imaginaries are formed, it implies resistance. It represents the coexistence of multiple imaginaries in a society. In the last phase of extension, ideas acquire traction through repeated performance and articulation in the material and cultural complex of social life by various agents.⁷⁶ Jasanoff argues that situating science in the notion of social imaginaries enables a more dynamic framework that includes both human and non-human agents and explores the normative and performative nuances of the coproduction of science and society.

Although Jasanoff’s concept of sociotechnical imaginaries seems to offer a good vantage point to explore popular science, there are a few reservations

⁷³ Jasanoff’s concept of sociotechnical imaginaries underlines the idea of coproduction of science and society. Conceived by Jasanoff in 2004, coproduction suggested the coevolution of science and society, each informing the other. Sociotechnical imaginaries was developed in the context of a comparative study of science policy of different countries and was first articulated as *national sociotechnical imaginaries* by Jasanoff and Kim (2009). They defined *national sociotechnical imaginaries* as “collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects”. This definition located sociotechnical imaginaries within the agenda of science policy studies and was conceptualised only as a national imaginary. In 2015 Jasanoff presented a broader idea of sociotechnical imaginaries that was not restricted to the imagination at the national and policy level and opened the idea to include groups like corporations, social movements or professional societies.

⁷⁴ Jasanoff 2015b p 322.

⁷⁵ Jasanoff 2015a p 19.

⁷⁶ Ibid.

about using this concept in this thesis. Firstly, the term ‘sociotechnical’ does not seem appropriate for the period under discussion here. Given its evolution in science policy studies and its applications in similar contexts, the concept is replete with the aroma of contemporary technoscience. This thesis is contextualised in a period when the ideas and associated vocabulary of modern science were beginning to make their way into society’s collective imagination. A clear idea or definition of technology or science was in its infancy. The history of science in India has pointed out that little distinction was made between science and technology during the period.⁷⁷ As we will see in chapter three, the Malayalam term for science (*shastram*) had much more currency in popular writings than the term for technology or technical (*saankethikam*). Thus the dynamics underlying cultural negotiations of science in the nineteenth and early twentieth-century Kerala could be better captured with reference to the term *science* than the term *technical*.

Moreover, we need a more inclusive framework to contextualise popular science in the socio-political experiences of modernity tied with colonialism, nationalism, and regionalism. The discussion on modern science and its social imaginations in colonial South Asia cannot be dissociated from the discourse on local knowledges.⁷⁸ However, *sociotechnical imaginaries* restricts the understanding of local knowledges as discourses of resistance which risks a hegemonic explanation of the development of science and society. As the cultural perspective on the history of science tells us, the interaction amongst various knowledge forms cannot be reduced to the notion of resistance alone.⁷⁹ It is a complex process of negotiation in which both entities are reimagined and reformed.

Therefore, as a more appropriate and more inclusive term that suits the objectives of this study, I have used the term ‘social imaginaries of science’. It is used to refer to the cultural symbolisation of science in society. It emphasises collective imagination and shared meaning-making involved in shaping the discourse of popular science. It embeds domestication, legitimation, and

⁷⁷ Kumar 1996, Raina and Habib 2004.

⁷⁸ Bayly 1996, Dodson 2007, Arnold 2000, Raina and Habib 2004.

⁷⁹ O’Connor 2009, Bensaude- Vincent 2009.

appropriation of science in varied cultural contexts. It situates science in the idea of social imaginaries and offers a more fluid frame to explore the coevolution and coexistence of multiple imaginaries of science. Tracing the varied social imaginaries manifested in popular science helps to explore the cultural dynamics engendering popular science in the vernacular.

Research Questions

This thesis explores the popular science literature in Malayalam periodicals published between 1847 and 1957 to understand the circulation of social imaginaries of sciences. The thesis argues that the abundance of popular science writing during the period⁸⁰ testifies to the significant influence of modern science in society.⁸¹ Exploring science in these periodicals with a more extensive range of publicity than the books help to explore the nuances of domestication, legitimation, and appropriation of science in different South Asian vernacular contexts. It also enables a study of the interpenetration of science in the imaginaries of social life. The thesis furthers the history of popular science in India by drawing attention to the history of princely states. For regional history, it opens new tracts to appreciate the social history of science popularisation. It foregrounds popular science as an important category to understand the experience of colonial modernity in Kerala.

The following questions guided the research:

- What were the social, political, and institutional contexts of production and circulation of popular science in colonial Kerala?
- Who were the major agents of production and circulation of popular science in Malayalam?
- What were the various cultural and political functions envisaged for science popularisation?

⁸⁰ Although less in volume when compared to the other branches of Malayalam literature (Pillai 2002 (1958), Menon 1967).

⁸¹ Varughese (2017) also makes this observation. He writes, “The presence of a large number of popular science magazines and books since the mid-nineteenth century suggests that the public was keen on engaging with science during the period, although a dearth of research on the subject prevents us from understanding the nature of this engagement” p 58.

- What were the major themes that surfaced in the scientific literature of the period, and what does it suggest about the nature of the science popularised?
- What were the common narrative strategies used to legitimise and domesticate science in society?
- What does popular science tell us about the circulation of science in a colonial context?
- What were the intellectual and cultural dynamics underlying the popularisation of local sciences?
- How to situate popular science in the cultural contexts of religion, caste, and gender in Kerala?

Design of the Study

Temporal Frame

The temporal frame of the study is derived from Balakrishnan's work on the development of scientific literature in Malayalam. The history of scientific literature in Malayalam is usually divided into three broad phases.⁸² In the first phase, science literature mainly comprises some rare efforts in the direction of original texts and commentaries in the areas like Ayurveda, astrology and mathematics produced during the early centuries of the second millennium. These texts were part of the knowledge corpus considered as prerogatives of certain castes and communities and were thus restricted in circulation. This shortcoming was overcome during the second phase, where science literature got a boost up with the development of printing. This stage witnessed contributions to Malayalam science literature through periodicals and other popular print forms and included translations and original works. In the third stage, science literature and science popularisation activities achieved new heights under organisations like the KSSP, Kerala Bhasha Institute and others.

⁸² Pillai 2009 (1998), Balakrishnan 2007.

According to Balakrishnan, the first phase ended in 1847.⁸³ The second stage spans from 1847 to 1957. The third stage begins in 1957 and continues to the present. The year 1847 marks the publication of the first periodical in Malayalam. *Paschimodayam*, regarded as the first science magazine in Malayalam, also came out the same year. The year 1957 is significant in the history of Kerala in more than one way. After the formation of the state of Kerala in 1956, the first communist government came into power through the general elections in February 1957. Shastra Sahitya Samiti, the first organisation with the aim of science popularisation in Kerala, was also formed in 1957. It announced the beginning of organised efforts devoted to science popularisation in the region. Though the organisation went defunct in one year, this was the source of inspiration for the Kerala Shastra Sahitya Parishad formed later in 1962. This thesis focuses on the second stage, focusing on the popular science writings in the Malayalam periodicals published between 1847- 1957.

A Note on Translation

All the translations for Malayalam provided in this thesis are my translations unless otherwise mentioned. DC Books Malayalam- English Dictionary (2012) was widely used to prepare the free translations. Nineteenth and twentieth-century Malayalam- English dictionaries were cross-referenced to understand the different connotations of the terms. Benjamin Bailey's 'A Dictionary of High and Colloquial Malayalam and English' (1846), Herman Gundert's 'A Malayalam and English Dictionary' (1872), Tobias Zacharias' 'School Dictionary English and Malayalam '(1870) and 'An English Malayalam Dictionary' (1907) were used for the purpose. Prof. N. M Indira (retired professor of Sanskrit) helped to read Sanskrit passages.

A note on the conversion of the calendar is also necessary here. The primary sources used for the study, including many government documents published during the nineteenth and early twentieth century, recorded the date according to the Malayalam calendar, also called the Kollam Era or the Malabar Era. The beginning of the Kollam Era corresponds to the year 824 AD of the

⁸³ Balakrishnan 2007.

Gregorian calendar. K. V. Sarma explains that Kollam Era is a solar calendar, and the year starts with the sun sign of *Simha-Rasi* (Leo) and ends with the *Kataka-Rasi* (Cancer). That means the formula for conversion to the Gregorian calendar is “AD date =Kollam date +824 (from August 15 to December 14) and Kollam date +825 (from December 15 to August 14)”.⁸⁴ This is further complicated because of the regional differences- in northern parts of Kerala, the calendar starts from September instead of August. Over the period, these technical details were ignored, and the general convention for conversion of date at present is to add 825 to the Kollam year.⁸⁵ In this thesis, for citation of primary sources, I have followed the formula of AD date= Kollam date +825.

Limitations of the Study

The most glaring drawback of this study is a skewed emphasis in favour of the history of Travancore. While locating the study in a linguistic framework instead of a geographical one, I aspired for a more inclusive approach that cuts across the three different provinces of Malabar, Cochin and Travancore. However, as the research progressed, it became difficult to do justice to the subtlety of historical experience in different regions. The fact that Travancore was very active in science popularisation and related activities also weighed the research towards that direction. Although I have tried to include accounts of relevant developments in the other two provinces throughout the thesis, the discussion on institutional development mainly focuses on Travancore. Another limitation of the thesis is the failure to explore the contributions of missionaries towards science popularisation. The discussion on the networks of production and circulation of popular science is limited to the role of the princely state and the local intelligentsia. While the contributions of the missionaries are noted in the thesis, in retrospect, an elaborate discussion would have added more complexity to the history of popularisation of modern science in Malayalam, especially during the nineteenth century.

⁸⁴ Sarma 1996 p 93.

⁸⁵ Menon 1967.

The Organisation of the Thesis

The next chapter presents an overview of the social- history of Kerala during the period of study. Development of the production and circulation of popular science in the region is highlighted to set a background for the thesis. A review of works on Kerala history that hint at the social imaginations of science and modernity is provided to underline the study's relevance. Chapter three focuses on the scientific literature in the Malayalam periodicals. This small chapter outlines the primary sources used for the research and explains the rationale for choosing focus areas for the following chapters. The next three chapters discuss popular science literature in three focus areas: health and medicine, agriculture, and astronomy and astral sciences. Each chapter has two main sections. The first section discusses the context and networks of circulation of popular science specific to each area. The role of the princely state and the vernacular intelligentsia is discussed in detail. The second section presents a reading of popular science literature and traces the representations of social imaginaries of science. Chapter seven draws attention to popular science literature in women magazines. It is followed by the concluding chapter that sums up the major arguments of the thesis.

CHAPTER TWO

Situating Popular Science in Kerala: 1847-1957

This chapter situates the discussion on popular science literature in Malayalam in the social history of colonial Kerala. It draws our attention to the crucial role of modern science in the moulding of regional modernities in the princely states. It also highlights some institutional agents that formed the networks of production and circulation of popular science in Malayalam.

The first part of the chapter presents an overview of the development of education, print and reading public, and the socio-political scenario of the period. The second section focuses on the princely state of Travancore and draws attention to the agents that contributed to science popularisation. The last section will discuss selected works on Kerala history that have underlined the social imaginations of science and modernity in the region. It must be noted that the focus on the institutional developments in Travancore covered in the second section shall not be construed as an absence of similar developments in Cochin or Malabar. As noted in the previous chapter, the focus on Travancore results from the limitations of my archival sources.

Social History of Kerala

Development of Modern Education

Dominant historiographical trends in Kerala history mark the mid-nineteenth century as the period of drastic transformations in people's lives initiated by British colonial and missionary interactions.¹ The introduction of

¹ Menon 1967, Jeffery 1992, Kawashima 1998, Arunima 2004, Devika 2007, Menon 2006.

modern education was a crucial determinant of the ensuing social change. Education was important not only for the interactions in the realm of ideas but also for imaginations of social mobility, hitherto unavailable to large sections of the population in the region.² In pre-colonial Kerala, formal education mainly was scriptural, and emphasis was on reading and practical education. Both Sanskrit and Malayalam were part of the curriculum. Sanskrit was accorded elite scholarly status, and only a rudimentary knowledge of Malayalam was imparted.³ Many 'lower castes' were excluded from the formal education system within the highly hegemonic and discriminatory caste-based social order.

The Christian missionaries introduced modern education in the region.⁴ They set up schools in different parts of the region, mainly aimed at proselytisation. The curriculum focussed on religious instruction.⁵ By the year 1817, under the auspices of Rani Gouri Parvathi Bai, the Travancore government introduced free education for all children in the age group of 05-10.⁶ Although the state promised to bear the cost of education 'of its people', marginalised castes were excluded. Nevertheless, this transformed the structure of education in the region, and the newly established schools gradually included secular subjects like general science, the geography of Travancore, general geography and history.⁷ The instruction in these schools was in the vernacular. Not much later, in 1834, the first school with English as the medium of instruction was established in Travancore by the London Missionary Society (LMS). The curriculum in these schools was modern and covered subjects like mathematics, physical science, natural science, general geography and British history.⁸ By the

² Arunima 2004.

³ Ganesh 2004.

⁴ The major missionary societies active during the period were the London Mission Society which concentrated largely in and around South Travancore, and the Church Mission Society (CMS), which was more active in parts of Central Travancore and Cochin. In Malabar, the Basel Evangelical Mission provided the major impetus. By 1857 the CMS had established several educational institutions, including industrial schools, schools for girls, seminaries, and grammar schools. In Cochin, the first English school was opened in 1818 at Mattanchery, and the school received financial support from the government of Cochin. In Malabar, the developments in education gained momentum comparatively later, and the first English medium school in the region was started by the Basel Mission in 1848 at Kallayi (Menon 1967).

⁵ Ganesh 2004.

⁶ Aiya 1906 Vol 2.

⁷ Ganesh 2004.

⁸ Nair, V. K. 2011.

second decade of the twentieth century, religious and community organisations had started setting up schools.⁹ At the level of higher education, CMS College Kottayam (1816), Maharajas College Thiruvananthapuram (1866), Women's College (1889), Scott Christian College (1893), Maharaja's College Ernakulam (1875), Zamorins College (1879), Victoria College (1888) and Brennen College (1890) were among the prominent institutions established during the period.¹⁰ These colleges were affiliated with the University of Madras. The first university in the region, the Travancore University, was established only in 1937.

Technical Education also developed in the region in the nineteenth century. In 1820 the first 'school of industry' was established by the missionaries at Nagercoil for printing and bookbinding.¹¹ Missionaries set up a few more schools for training in the manufacture of paper, sugar, indigo, silkworm rearing and weaving. In 1872- 73 the government established an industrial school for training in ivory carving. It was later expanded to include model drawing, practical geometry, designing, lacquer work, wood carving, pottery, porcelain, painting, photography and other similar trades.¹² Grant-in-aid was provided to the private technical institutes. In 1929 the Srimulam Shashtiabdapurthi Memorial Institute was established. It was an industrial and commercial museum and comprised an information bureau too. Raw materials available in the country and finished products from local industries were exhibited here. The information bureau provided information on sources of supply. Technical schools for girls were also started. By the 1930s, there were seventeen technical schools for girls that imparted training in skills like lace-making, embroidery and weaving.¹³ By 1940, there were seventy aided and fifty-one unaided industrial schools in the region.¹⁴ The Travancore government also encouraged scientific

⁹ Nair Service Society started the first school in 1915 and the first college in 1916.

¹⁰ Nair, V. K. 2011 notes that CMS College Kottayam was an institution for higher seminary training. The Maharajas College, which can be considered the first modern college affiliated to a university (Madras University) in the region, offered courses in sciences and social sciences. Physical sciences option covered subjects like Mathematics, Physics, Chemistry and Life Science. Subjects including History, Economics, Civics, Logic formed the social science group.

¹¹ Aiya 1906 Vol 2.

¹² Ibid p 485.

¹³ Menon 1937

¹⁴ TAR 1939- 1940.

and technical education through scholarships and prizes.¹⁵ From the beginning of the twentieth century, the government provided scholarships for higher education in Europe. Students were also sent to major technical institutes in British India.¹⁶ These students, trained abroad, played a central role in establishing scientific departments like agriculture in Travancore.¹⁷

Through missionary efforts and popular struggles by various groups, education was made accessible to girls and other caste and religious groups earlier excluded from the system.¹⁸ By the second half of the nineteenth century, education became widespread, and literacy increased among men and women. Cochin also similarly encouraged English education. Jeffrey noted that according to the 1911 census, the literacy rates in Travancore, Cochin and Malabar was much higher than the average rate for India. While the average literacy rate in India was 5.9 percent, Travancore recorded 15.0, Cochin 15.1 and Malabar 11.1 percent. By 1951 the rates had increased to 45.8 for the combined state of Travancore – Cochin and Malabar recorded 30.9 percent, while the all India average was 16.6. The female literacy rate was also higher.¹⁹

Popular Print

The region witnessed a contemporaneous emergence of print culture and the reading public. The first modern printing press was established in the early

¹⁵ Aiya (1906 Vol 2) notes, "To encourage originality of thought and research in our educated men, H. H. the Maharajah has instituted a prize of the annual value of Rs. 500 called "the Maha Rajah of Travancore's Curzon Prize", to be awarded annually, by the Syndicate of the Madras University, to a graduate of that University for the best essay on a given scientific subject" p 489.

¹⁶ Between 1901 and 1904, five students were sent to England for various courses in medicine, advanced chemistry, agriculture, geology, and mining. In 1904 government sent a student for training in textile manufacturing at the Victoria Technical Institute in Bombay (Aiya 1906 Vol 2).

¹⁷ K. Kunjan Pillai trained at Edinburg and Leipzig played an instrumental role in the development and institutionalisation of modern scientific agriculture in the region (see chapter five for more on the contributions of Kunjan Pillai).

¹⁸ I do not wish to offer a celebratory account of the advantages of English education or the missionary's contribution to social life in the region. Arunima (2004) points out that there was resistance from different communities to accept English education as it was feared to interfere with the prevalent religious and caste sensibilities. Chandramohan (1999) explains how missionaries served as an auxiliary of colonial power. Through proselytisation and modern education, missionaries ensured the sustenance and stability of the empire in Travancore. He presents a critical understanding of the missionary activities in Travancore and explores the political and commercial interests that underlie the socio-religious reform movement spearheaded by missionaries in Travancore. Ganesh (2004) discusses modern education initiated by missionaries as epistemic violence.

¹⁹ Jeffrey 1992.

1820s at Kottayam under the patronage of Benjamin Bailey, a CMS missionary. In 1824 Bailey published a collection of short stories for children translated from English.²⁰ During the 1840s, the Basel Mission established presses in Mangalore and Tellichery. The 1835 press act was a landmark in the history of print in the Indian subcontinent. It allowed Indians to set up printing presses, and almost immediately, under the auspices of Swathi Thirunal, the Travancore Government Press was established in 1835 at Thiruvananthapuram. A similar government press was established in 1845-46 in Cochin. Various other presses were established in different parts of Kerala. The Kerala Vilasam Press, established in Thiruvananthapuram in 1852, is considered the first commercial press in Kerala. By the 1860s publishing industry became competitive with St. Thomas Press selling books at half price than that sold by Vidya Vilasam Press.²¹ In 1927-28 there were 120 printing presses in the state. In 1945 under the leadership of M. P. Paul and Karoor Nilakanda Pillai, the Sahitya Pravartaka Sahakarana Sangham (SPCS) was established, giving a considerable impetus to the publishing industry. Society gave 30 percent of royalty to the writers and aimed to publish one book a day.²²

According to Kerala Sahitya Academy records, the total number of Malayalam books printed before 1850 is 42. However, the following decades witnessed an exponential increase in the number of books printed and published in Malayalam. Between 1851 and 1900, almost 1,135 books were published.²³ Around the same time, publications of periodicals also commenced. The first periodical in Malayalam, *Rajyasamacharam* (1847), was printed at the Basel

²⁰ Titled 'Cherupaithangalku Upakarartham Englishil Ninum Paribhashapeduthiya Kathakal'. Until the 1980s, the Malayalam translation of the Bible published by Bailey in 1829 was considered the first Malayalam book published in Kerala. This was corrected with the discovery of the 1824 children's book in the British Museum Library (Kizhakemuri 2004).

²¹ Ibid. St. Thomas Press was established by Paramel Ittuppu in 1862 at Cochin, and the Vidya Vilasam Press was established in 1860 by Kalahastiyappa Mudaliar.

²² Ibid. During the 1950s, several other agencies took up the role of bringing out books in Malayalam like STEPS, KSSP etc. The establishment of the Kerala State Institute of Languages 1968 gave the impetus to keep up the momentum of the flourishing publishing industry which continues even today.

²³ Ibid.

Mission press in Tellichery.²⁴ *Rajyasamacharam* was mainly aimed at proselytisation and covered accounts of missionary activities worldwide. It included letters from missionaries from different parts of the world. They were reports of their activities in different countries and described the geography, the cultural and social situation there. Most often, these reports were also presented with maps of respective regions.²⁵ In the same year, in October, the second periodical in Malayalam was launched with Fr. F. Muller as its editor. This magazine named *Paschimodayam* provided ample space for science articles from the very first issue, which is why some consider it the first science magazine in Malayalam.²⁶ Thus initiation to popular science literature in Malayalam was through the missionaries. Science in these narratives was couched in the discourse of proselytisation and mainly discussed natural history, astronomy, geography, and geology. Highlighting the scientific knowledge of natural phenomena aimed to lay bare the superstitions underlying the local ways of knowing and offered a rational image of Christianity.²⁷ *Jnananikshepam*(1848) by Rev. George Mathan and Archu Dicken Koshi and *Vidya Samgraham* (1864), published by Gevarughese Kathanar (1820-70), are other noted missionary periodicals that made significant contributions to popular science in Malayalam.²⁸

With the turn of the twentieth century, the publishing industry in Malayalam made great strides, and several periodicals came out. Raghavan notes that protestant missionaries brought out the earliest periodicals in Malayalam. They targeted the customs and rituals of Catholics and other religions. It resulted in conscious efforts on the part of other religious groups towards consolidation.²⁹ Caste-community organisations also used print as a medium for community consolidation and expression of their interests. This paved the way

²⁴ Though the name of the editor was not marked in the newspaper, from the style of the prose and language, some scholars consider Herman Gundert to be the editor of the newspaper. (Priyadarshanan 2010 (1982)). Others like Raghavan 2008 (1985) consider Father Muller (editor of *Paschimodayam*) to be the editor.

²⁵ Mohandas 1998.

²⁶ Vadavathoor 2001.

²⁷ Mohandas 2011.

²⁸ Vadavathoor 2001.

²⁹ Raghavan 2008 (1985).

for numerous publications targeting particular communities and castes.³⁰ The rationalists also brought out a magazine named *Sahodaran* (1917), which tried to propagate their ideas and spoke out against discrimination in the name of caste and religion. With the evolution of the public sphere and the rapid development of printing and publishing, other specialised publications, including magazines for women, were launched.³¹ Cultural periodicals also carried items of general interest discussing various aspects of social life and literature, including science-related articles.³² The rapid development of book trade and periodicals was a decisive factor in forming a reading public, which in turn provided the impetus to the growth and sustenance of the publishing industry. Numerous libraries set up in different parts of Kerala with the support of the state and various voluntary organisations brought visibility to the nascent reading public.³³ The process of standardisation set in by the development of print was accelerated with the increased publication of dictionaries and grammar texts from the mid-nineteenth century.³⁴ New literary genres like

³⁰ *Satyanada Kaahalam* (1876) and *Nasrani Deepika* (1887) served the Catholic Christians, *Arya Siddhanta Chandrika* (1889), *Prabhudha Kerala* and *Kerala Dharmam* were some of the magazines that served the Hindu community at large and *Kerala Deepakam* (1878), *Muslim* (1912), *Al-Irshad* and *Deepika* (1931) were some of the publications that represented the Muslims. *Nair* (1903), *Nair Samudaya Parishkari* (1916) and *Service* (1919) served the Nair community. The Ezhava community brought out *Sujana Nandini* (1891), *Vivekodayam* (1904), *Mitavaadi* (1907) and *Kerala Kaumudi* (1911). *Sri Ramavilasam* (1913) brought out by the Ganaka community, *Vedavyasan* (1913) and *Arayan* (1917) brought out by the Araya Community, *Sadhujana Paripalini* (1913) brought out by a dalit organisation, and *Unni Namboothiri* (1919) was brought out by the Namboothiri community are other notable examples. For more, see Raghavan 2008 (1985), Sam 2009 (1998).

³¹ The first women's magazine was *Keraleeya Suguna Bodhini* (1887). Other specialised periodicals were *Krishikaran*- 1909 (on agriculture), *Lakshmi Vilasam*- 1906 (on commerce) and *Dhanwantiri*- 1902 (on health and medicine).

³² *Vidyavinodini* (1889), *Rasikaranjini* (1902), *Bharathi* (1904) and *Ramanujan* (1906) are some of the early Malayalam periodicals that published essays on science and related aspects.

³³ In Travancore and Cochin, the princely state provided support for the libraries. In Malabar, the activities of the Basel Evangelical Mission provided the initial impetus for the emerging reading public. By the beginning of the twentieth century, several religious and community movements had emerged in the region. They saw education as an essential agency for social transformation and stressed the importance of reading. This resulted in the establishment of several libraries by different socio-religious organisations. Political awakening in the first quarter of the twentieth century strengthened the emerging library movement. The communist party, the student's organisations and the worker's union played a crucial part role in this process. See Nair 1989-1990.

³⁴ Some of the dictionaries and grammar texts published during the period include- 'A Dictionary of High and Colloquial Malayalam and English' (1846) by Benjamin Bailey, 'School Dictionary English and Malayalam' (1870) and 'An English Malayalam Dictionary' (1907) by Tobias Zacharias,

essays, novels and biography also evolved.³⁵ These varied processes contributed to the development and standardisation of Malayalam.³⁶

Social Change

The introduction of modern education and the growing print culture in the region was accompanied by administrative and political changes, changes in the pattern of land ownership, commercialisation of agriculture, increasing geographical mobility enabled by the development of infrastructure and increasing urbanisation. Education catalysed social and economic mobility with the appearance of new jobs in government services and teaching. However, such coveted jobs were the privilege of the 'upper caste' Hindus, and other Hindus and all other communities were excluded. The integration of the local economy with the global economy or the imperial economy offered opportunities in cash crop plantations and export-oriented small scale industries.³⁷ The traditional caste-based, artisan-guild-based economy was in transition, and the category of 'class' became more relevant than before. Jeffrey noted that a middle class started to emerge during the decade of 1911 to 1921. The new economic developments resulted in the emergence of civil society and public participation in politics.³⁸

The social structure in Kerala was highly hierarchical and rigid, with Kerala history recording some of the worst episodes of caste discrimination.³⁹

'Vyakaranam' (1839) by F. Spring, 'A Malayalam and English Dictionary' (1872), 'Malayala Bhaasha Vyakaranam' (1851) and 'Malayala Vyakarana Chodyotharam' (1860) by Herman Gundert, 'Kerala Bhasha Vyakaranam' (1876) by Vaikathu Pachumuthu, 'Malayala Vyakarana Chodyotharam'(1902) by Sreekandeswaram Padmanabha Pillai, 'Kerala Paanineeeyam' (1896), 'Shabda Shodhini' (1902), and 'Prathama Vyakarnam'(1907) by A. R. Raja Raja Varma. For more, see Hariharaputhran 2009 (1998).

³⁵ See Paniker 2006 (1977).

³⁶ It has to be noted that the standardisation of Malayalam effected through modern education, administrative and popular literature was a highly exclusionary process. Although spoken and written Malayalam was popular at least from the 15th century, different regions were marked by vernacular complexities presented by numerous dialects and other prominent languages like Arabic and Tamil. In the process of 'refining' and standardising language, the linguistic repertoire of many marginalised communities and their rich conceptual imaginations were excluded. (Kochu 2012, translated by Ansari and Shyma). Kawashima (1998) points out that in 1931, 15 percent of the population in Travancore spoke Tamil. The marginalisation of Tamil in education and administration led to political dissatisfaction from the early twentieth century and developed into a separatist movement by the 1940s. The movement culminated in the separation of the Tamil speaking districts from Kerala during the States Reorganisation in 1956.

³⁷ Jeffrey 1992.

³⁸ Ibid.

³⁹ Balakrishnan 1984, Kawashima 1998.

However, the changing socio-economic and cultural circumstances of the nineteenth and twentieth centuries offered new notions of identity and social consciousness. Various caste groups hitherto embroiled in hierarchical relations were now being mobilised and consolidated into larger communities.⁴⁰ Arunima points out that the encounter with colonialism brought about a new consciousness about one's social identity.⁴¹ While the 'lower castes' became more aware and critical of the exploitative nature of the caste system, the 'upper castes' became increasingly insecure about their superior social and economic status. This led to the political mobilisation for equal representation in the changing economic and social arenas.⁴²

The colonial legal reforms also changed norms of social and private life, affecting marriage, divorce, lineage, and other modes of social organisation.⁴³ It brought about drastic changes in the notions of individual and collective. This enabled a more gendered process of identity formation for both men and women.⁴⁴ A new sexual morality also evolved during this time.⁴⁵ By the third decade of the twentieth century, the nationalist and communist movements had started making strides. These ideologies also influenced the experience of colonial modernity in Kerala to a great extent.⁴⁶

⁴⁰ The first decade of the twentieth century witnessed the formation of organisations for community reforms in the region. Ezhavas started the Sree Narayana Dharma Paripalana Yogam (SNDP) (1903) and the Sadhujana Paripalana Sangham (1905) was started by the Dalit leader Ayyankali. Other similar organisations were Keraleeya Nair Samajam (1907), Ganaka Sabha (1913), Araya Samudaya Sabha (1917), Keraleeya Catholic Mahajana Sabha (1918) and the Namboothiri Yoga Kshema Sabha (1908).

For a detailed study of the origins of community movements in Kerala, see Mathew 1989.

⁴¹ Arunima 2004.

⁴² While the late nineteenth and twentieth centuries are characterised by modernisation and community formation of 'upper-caste' Hindus and other dominant communities like the Ezhavas, it has to be pointed out that Dalits were largely excluded from this process (Dasan 2012) or rather they followed a different trajectory. Critical Dalit scholarship points out that that idea of the 'Malayalee' and a Malayalee modernity was constructed by the othering of Dalits and excluding them. Their agency and its location in the process of formation of a modern Kerala is generally overlooked in the dominant historiography of Kerala. Dalit history was relegated into histories of their social movements, which were portrayed as stand-alone episodes in history, and their cultural identity essentialised in folklorisation (Dasan et al. 2012, Pampirikunnu 2011, Mohan 2015).

⁴³ Jeffery 1976, 1992, Arunima 2003b, Devika 2007, Velayudhan 1998.

⁴⁴ Devika 2007.

⁴⁵ Devika, 2005.

⁴⁶ Pillai 2012; Raghavan 2008 (1985).

Located on the peripheries of colonial rule, the nature of engagement with modernity in Kerala differed from other prominent areas in the subcontinent like Bengal. Nationalism took on different undertones in diverse regions.⁴⁷ Travancore and Cochin, being princely states, enjoyed relative autonomy in policymaking. Although Malabar was under direct rule, in specific aspects, changes brought about by imperial contact was less visible in Malabar compared to other presidency towns.⁴⁸ As Menon pointed out, the nation was only one among the elements of imagination in Kerala during the late nineteenth century. The major concern was with the notions of self embedded in religion and community.⁴⁹ Thus, modernity in Kerala is argued to be more amenable to explanation within linguistic, regional and community-based frames of history telling than the pervasive frame of nationalism.⁵⁰

Production and Circulation of Popular Science in Travancore

Alongside the evolution of print and the reading public, the nineteenth and twentieth century also witnessed the institutionalisation of modern science in the region. The introduction of modern medicine and the setting up of a hospital (1813) was central to this process. A modern astronomical observatory was established in Trivandrum in 1836. The observatory acquired a special place in the history of science in the region as it served as a pivotal point for the establishment of many other institutions, including the engineering and public works department, government printing press (1838), a museum (1857) and public garden (1859). Scientific management of forests (1893) started at the end of the nineteenth century. The Department of Sanitation, Vaccination and Vital Statistics was set up in 1895. Travancore Department of Agriculture was established in 1908. Various other departments like fisheries, veterinary and geology were established during the early twentieth century. The history of science in India suggests that scientific institutions played specific roles in

⁴⁷ Arunima 2004, 1997, 2003a.

⁴⁸ Arunima 2004.

⁴⁹ Menon 2006.

⁵⁰ Arunima 1997, 2006a, 2004, 2003a; Menon 2006, Mohan 2015.

developing scientific imagination and formations of colonial modernity.⁵¹ The social history of such institutions reveals underlying politics of knowledge embroiled in colonial and nationalist aspirations.⁵²

However, the dominant histories of Kerala, except on health- medicine- Ayurveda, do not pay any serious attention to these institutions or the role they played in fashioning modernity in Kerala.⁵³ A detailed study of the development of these institutions and their influence on the imaginaries of science and society will not be possible within the limitations of a PhD thesis. So I have limited the discussion to the institutionalisation of health and medicine, modern agriculture and modern astronomy, which will be covered in the respective chapters. For now, the next section will briefly discuss some other government institutions and a few voluntary associations that shaped the popular science discourse in Malayalam.

Travancore Textbook Committee

The history of popular science suggests that textbooks in the nineteenth and twentieth centuries were essential sites for the development of science and its popularisation.⁵⁴ The history of science popularisation in colonial India also highlighted the relevance of textbooks and textbook committees as sites to explore popular science.⁵⁵ By initiating the production and circulation of literature on modern science, such committees played a significant role in popularising science among the students and the general population. The relevance of the textbook committee for the development of the Malayalam language and literature, including science-related literature, have been highlighted by scholars like N Krishna Pillai, Govinda Pillai, Anil Kumar Vadavathoor and Kavumbayi Balakrishnan.⁵⁶

⁵¹ Arnold 2000, Kumar 1995.

⁵² Prakash 1999, Habib and Raina 2004.

⁵³ Nair 2012-2013, Cleetus 2018.

⁵⁴ For the relevance of textbooks for the history of science, see the *Focus section on Textbooks in the Sciences* in *Isis* (2012) Volume 103, No 1.

⁵⁵ Venkateswaran 2002, Sangwan 2000, Raina 2011.

⁵⁶ Balakrishnan 2007, Pillai 2009 (1998), Vadavathoor 2001.

Vernacular schools were started by the second half of the nineteenth century. Malayalam was also taught in English schools as a language.⁵⁷ This created a need for textbooks in vernacular, and the Travancore Textbook Committee (1866) was set up for the purpose. The prose in Malayalam was in a dismal situation at that time. In order to encourage prose literature, Ayilyam Thirunal Maharaja instituted rewards for good essays written in Malayalam. The Maharaja himself tried a hand in prose writing. However, these rudimentary efforts were not sufficient to meet the demands for vernacular textbooks, and this led to the formation of the Textbook Committee.⁵⁸ For almost a decade, the Committee was led by one Annaji Rayar and did not make many strides. In 1876 Kerala Varma was made the president of the Committee. Under Kerala Varma's leadership, the Committee published numerous titles in the vernacular and contributed to the popularisation and standardisation of the essay and prose writing in Malayalam.⁵⁹ The activities of the textbook committee gave a head start to secular publications in Malayalam.⁶⁰

Some of the titles published by the committee were 'Vijnana Manjari' (1865), 'Kanku Pusthakam' (1867), 'Sanmarga Pusthakam' (1868), 'Thiruvithankoor Charitram', 'Bhoovivaranam', 'Krishishastram', 'Dhanathatva Niroopanam' (1870), 'Sanmarga Vivaranam' (1877), 'Thiruvithamkotta Samsthana Boovivaranam', 'Aarogya Rakshopayam' (1885), 'Mahacharitha Samgraham', and 'Akbar' (1896). In 1872 Kerala Varma translated Euclid's Elements into Malayalam. Most of these titles were prepared by Kerala Varma, and this gives him a pioneering role in the history of popular science in the region.⁶¹

Apart from these efforts of the Travancore Textbook Society, the Vernacular Literature Society in Madras was commissioned to translate English texts into Malayalam.⁶² Vishakhram Thirunal Maharaja, who came to rule after Ayilyam Thirunal, also contributed to popularising science in Malayalam. He

⁵⁷ Pillai 2002 (1958).

⁵⁸ Ibid.

⁵⁹ Ibid, Nair 2008, Hemalathadevi 2008.

⁶⁰ Menon 1967.

⁶¹ Pillai 2009 (1998).

⁶² Ibid.

authored several texts on health care and education.⁶³ Govinda Pillai states that Frawn Meyer, a German pastor, was impressed by Vishakham Thirunal's efforts in science popularisation. In appreciation, he prepared a text, 'Prakriti Shastram' (1883), and presented it to the Maharaja.⁶⁴ This is considered the first textbook on physics in Malayalam and a valuable contribution to science translation.⁶⁵

Public Lecture Committee

Another institutional agent contributing to science popularisation in the region was the Public Lecture Committee. The Public Lecture Committee was constituted in 1887 "with a view to affording facilities for the instruction of the public of Trivandrum in agricultural, sanitary, historical and scientific subjects".⁶⁶ The committee was mainly responsible for conducting lectures "on subjects of practical interest to the public generally".⁶⁷ The lectures were conducted at town halls, libraries, schools, colleges, agricultural/ industrial exhibitions, and other such fares. The sessions of Sree Moolam Popular Assembly also served as venues for these lectures.⁶⁸ Lectures conducted in mofussil towns were followed by interactive sessions with the speakers where the audience

⁶³ Pillai 2002 (1958).

⁶⁴ Pillai 2009 (1998).

⁶⁵ Ibid.

⁶⁶ Travancore Government Gazette 1910, XLVIII (22) p 729.

⁶⁷ Ibid.

In the beginning, the committee consisted of faculty members from the Maharajas College, Director of Vernacular Education, the Settlement Dewan Peshkar, the Diwan Peshkar of Trivandrum division, the Huzur Deputy Peshkar, two European missionaries and two high court lawyers. Kerala Varma Valiya Koyi Thampuran was appointed the first president of the committee. Later the committee was reconstituted with a president and an honorary secretary. A. R Raja Raja Varma, K. V. Ranga Swamy Iyengar (Prof of History at Maharajas College), Vaidyalingam Pillai and N. Krishnaswamy Ayer (Prof of Chemistry at Maharajas College) served as honorary secretaries over the years. The principal of the Maharajas College was appointed the ex officio president of the committee. Other members consisted of the professors at the Maharajas College, the Darbar Physician, and the executive engineer of Trivandrum. The Sanitary Commissioner and the Director of Agriculture were the ex-officio members. In 1921 Director of Public Instruction was designated the honorary president, and the Registrar of the Co-operative Societies was the honorary secretary. After the reorganisation in 1921, the committee consisted of the Darbar Physician, the Conservator of Forests, the Sanitary Commissioner, Director of Agriculture and Fisheries, Director of Industries, the Secretary of Government in charge of publicity, two professors at the Maharajas College and four non-official members (Report of Administration of Travancore (TAR) various issues from 1888 to 1922).

⁶⁸ TAR 1921-1922.

acquired greater clarity about the topic at hand. Members of various government institutions like the agricultural department, fisheries department, doctors from government hospitals and college and school teachers were invited for delivering lectures.⁶⁹ The schedule of the lectures was prepared and published in advance in government gazettes and local newspapers. A range of topics was covered, including health and hygiene, natural sciences, history, language, and literature. Lectures were delivered in English, Malayalam or occasionally in Tamil.⁷⁰ Care was taken to prepare lectures in simple language, often delivered with magic lantern slides and practical demonstrations. The copies of the lectures were printed and distributed free of cost. Around 15-20 lectures were held annually, and from the committee's reports, it seems that these lectures were fairly popular. The report of the Public Lecture Committee for 1911 records that 21 lectures were conducted during the year, and the total number of people who attended the lecture was 11,150. The report observes that a large section of this audience was from an agricultural and industrial background.⁷¹

The Public Lecture Committee was thoroughly reorganised in 1914 and later by the end of 1921. The following excerpt from the order of reconstitution of the committee gives a vivid image of the role envisaged for the committee.

“The activities of the Committee should be primarily directed toward the diffusion of practical knowledge among the masses by means of popular lectures. These lectures should embrace such subjects as (1) hygiene; (2) sanitation; (3) prevention and treatment of epidemic diseases; (4) child welfare; (5) agriculture; (6) co-operation; and (7) industries and other subjects conducive to the moral and material advancement of the people and calculated to widen their information and outlook. The heads of the various departments dealing with the branches of knowledge detailed above should decide on the subjects on which it would be of public benefit to arrange for popular lectures, to get lectures on those subjects prepared through such of their subordinates as are pre-eminently competent to deal with them, and to fix the localities where lectures

⁶⁹ See Appendix.

⁷⁰ TAR 1888-89.

⁷¹ Travancore Government Gazette 1912, L (3).

might be usefully delivered. The lectures should be prepared in the vernacular, and the treatment of the subjects should be simple and popular, technicality of matter and abstruseness of expression being as far as possible avoided. Every endeavour should be put forth to make the lectures as useful and attractive as possible".⁷²

Less than a year after the aims were laid down, as above, the Public Lecture Committee was dissolved in August 1922 due to financial constraints.⁷³ Nevertheless, the above quotation suggests that there was a clear idea of the function and form of science popularisation in Malayalam social imaginaries by the second half of the twentieth century. We see the idea of the expert and the masses were already guiding science popularisation efforts, and the emphasis was laid on the 'material and moral advancement of people'.

The Committee's contributions remain obscure as the few available works on the history of popular science in Kerala are written from the perspectives of literary history and the history of journalism. Hence this overview of the formation and functions of the Travancore Public Lecture Committee aims to further the understanding of the nature and scope of science popularisation in the princely state. It suggests that science popularisation in the region cannot be reduced to a subset of the history of modern Malayalam literature or journalism.⁷⁴ A list of lectures delivered by the committee is provided in the appendix of this thesis. It will help to understand the range of topics covered by the Public Lecture Committee and identify the personalities who were associated with the committee. As we shall see in the following chapters, many of these vernacular intellectuals also authored numerous popular science essays in the periodicals.

⁷² Travancore Government Gazette 1921, LIX (48) p 579.

⁷³ Travancore Government Gazette 1922, LX (34).

⁷⁴ Vadavathoor 2001 and Balakrishnan 2007 do not mention the public lecture committee in their study of popular science in Kerala.

Publication of Oriental Manuscripts

In 1908 the Travancore government instituted a department for collecting, preserving, and publishing Sanskrit texts in the palace library and private collections. Inspired by the Bibliotheca Indica, the Benares and the Bombay Sanskrit Series, the department published texts as the 'Trivandrum Sanskrit Series'. T. Ganapati Shastri was the curator and editor.⁷⁵ Texts published under the Trivandrum Sanskrit Series include literary texts and other fields like grammar, drama, philosophy, medicine, architecture and astrology.⁷⁶

In 1924 a separate department for Malayalam manuscripts was formed.⁷⁷ The Malayalam department published texts as two series. The Sri Mulam Malayalam Series and the Sri Vanchi Sethi Lakshmi Series. The former covered the literary texts, and the latter focused on texts related to astronomy, astrology and Ayurveda. Apart from these published works, the department collected preserved thousands of manuscripts and transcripts. They were housed at the Oriental Manuscript library established in 1936.⁷⁸ Later, the Malayalam section was merged back with the Sanskrit department for financial reasons. The combined department was called the Department for the Publication of Oriental Manuscripts. From 1933 the publications of manuscripts related to health and medicine were brought under the Principal of the Ayurveda College.⁷⁹ The Ayurvedic texts published by the department contributed to the codification and dissemination of local knowledge that was crucial to the movement for standardisation and modernisation of local medical traditions during the twentieth century.⁸⁰

⁷⁵ Sastri 1925.

⁷⁶ K. V. Sarma (1972) has noted the significance of the Trivandrum Sanskrit Series to the history of astronomy in Kerala.

⁷⁷ TAR 1928-29.

⁷⁸ Ibid.

⁷⁹ TAR 1938-39.

⁸⁰ See chapter four for more on this.

The Role of Local Intelligentsia

Other than the institutional agents discussed above, the late nineteenth century and the twentieth century also witnessed the development of organised efforts from the local intelligentsia. The formation of voluntary associations to popularise language, literature and science was a common feature of the nineteenth and twentieth-century colonial India.⁸¹ As mentioned in the first chapter, organised efforts for science popularisation in the nineteenth and twentieth-century Kerala were rare and were mainly in health and medicine. Much of the impetus for science popularisation in other areas came from literary and educational organisations.

We have already noted that by the 1860s, vernacular intellectuals were active in publishing. It led to the publication of numerous cultural and literary periodicals in Malayalam. Around the same time, different literary and cultural associations were formed to modernise and popularise the Malayalam language and literature. They viewed science writing as a means for developing Malayalam prose and popularising modern scientific knowledge among the masses. Thus popular science books, textbooks and science writings in periodicals were encouraged.⁸²

One of the first literary associations in Malayalam was the Vidyavilasini Sabha, formed in 1881.⁸³ The Sabha was formed by Raja Ramarayar, the Director of the Vernacular Education in Travancore. In order to encourage vernacular education and literature, Ramarayar brought out the periodical *Vidyavilasini* in 1881. The Vidyavilasini Sabha was formed to maintain the publication of the periodical. Ramarayar was designated the president, and B. A. Neelakanda Iyyer was named the secretary. Kerala Varma Valiya Koil Thampuran, Vishakham Thirunal Maharaja, Diwan Ramayyankar and Sarvadhyaakar P. Govinda Pillai supported the Sabha. Although the periodical survived only for two years, Vidyavilasini Sabha and the periodical *Vidyavilasini* played a pioneering role in developing the Malayalam language and literature. *Vidyavilasini* is considered

⁸¹ Habib and Raina 2004, Sangwan 2000, Singh 2015, Mishra 2015.

⁸² Priyadarshanan 2010 (1982), Vadavathoor 2001, Namboothiri 2008.

⁸³ Priyadarshanan 2010 (1982).

the first literary periodical in Malayalam. Modern literary genres in Malayalam like biographies, short stories and essays were first published in *Vidyavilasini*. The first historical work on Malayalam literature *Malayala Bhaasha Charitram* (1883), was serialised in the periodical. Translation of *Abhijana Shakuntalam* by Kerala Varma is another notable contribution of the periodical. *Vidyavilasini* also published popular science literature. The introductory editorial lists animal history, geography, agricultural sciences, health, biology, technology and chemical sciences, among the topics covered in the periodical. Three out of the seven articles in the periodical's first issue were related to science. These essays published anonymously were 'Air', 'Water' and 'The Rhinoceros' (titles given in English in the periodical).⁸⁴ Priyadarshanan, Namboothiri and Vadavathoor have also noted the contributions of *Vidyavilasini* to science popularisation in Malayalam.⁸⁵ Vadavathoor highlights Vishakham Thirunal's translation of the essay on astronomy from the English Encyclopaedia as a notable example of popular science writings in *Vidyavilasini*.⁸⁶

Another important literary association of the period was the Bhaashaposhini Sabha, formed in 1891 through the efforts of Kandathil Varughese Mappila.⁸⁷ The deliberations at the annual meetings of the Bhaashaposhini Sabha tells us that the development and standardisation of the Malayalam language was a major focus area of the association.⁸⁸ Essay competitions, remuneration for writers, support for printing and publishing books, and publishing a periodical as a space for young authors were conceived as measures to encourage authors to write in Malayalam. The first meeting of the Sabha noted the necessity for more science books in Malayalam. The modalities

⁸⁴ Other essays in the first issue were 'The Vidyavilasini', 'The Malayalam Language', 'A Stone Cutter', and 'Education'. For more on the contents in the first issue, see Priyadarshanan 2010 (1982).

⁸⁵ Priyadarshanan 2010 (1982), Namboothiri 2008, Vadavathoor 2001.

⁸⁶ Vadavathoor 2001.

⁸⁷ Hemalathadevi 2008. The Sabha was commenced as an association of the poets and literary figures who published in Mappila's periodical Malayalam Manorama started in. But the name of the association was changed to *Bhaashaposhini* from Kavisamajam in the first annual meeting of the association.

⁸⁸ Ibid, Balakrishnan 2007.

of translation of science from English to Malayalam was a significant concern of the Sabha and was discussed in its annual meetings.⁸⁹

Bhaashaposhini Sabha started the periodical *Bhaashaposhini* in 1892. Similar to *Vidyavilasini*, *Bhaashaposhini* also gave ample space to scientific literature. A catalogue of the essays published in the periodical between 1892 and 1938 shows that the periodical covered areas like agriculture, health and medicine, physical and chemical sciences, geology, geography, zoology, biology and astronomy.⁹⁰ Balakrishnan has noted that the 'Popular Science Series' in English was followed as a model for science writings in the periodical.⁹¹ Apart from numerous essays on such diverse areas, *Bhaashaposhini* laid down the foundations for science writing in Malayalam by publishing glossaries of scientific and technical terms. *Bhaashaposhini* stopped publishing in 1938 and was later revived in 1977, and continues even today as a major literary magazine in Malayalam.

There were many other similar literary associations like Kochi Sahitya Samajam (1913), Samastha Kerala Sahitya Samajam (1922) and Samastha Kerala Sahitya Parishat (1927), to name a few. The first two were short-lived, but the last one - Samastha Kerala Sahitya Parishat made significant contributions to the Malayalam language. Almost all the eminent literary personalities of the period were associated with it.⁹² Sahitya Parishat enriched the Malayalam language and literature by supporting creative writing in Malayalam and encouraged authors to produce more science texts, technical glossaries, histories of Malayalam language and literature, dictionaries and encyclopaedias.⁹³ Although not all of these aims were materialised, it tells us that science writing in the vernacular was a crucial concern among the local intelligentsia. It places the discourse of science writing in the background of linguistic development and politics in the region.

⁸⁹ Balakrishnan 2007.

⁹⁰ Priyadarshanan 2002

⁹¹ Balakrishnan 2007.

⁹² Pillai 2002 (1958).

⁹³ Ibid.

Besides the contributions in the periodicals, the local intelligentsia also contributed to Malayalam popular science by publishing numerous popular science books and textbooks. Both modern science and traditional local knowledge forms are featured in popular literature. Uppot Kannan's (1861) *Yogamrutham* is one of the early works traced in the modern history of science literature in the region. This is an interpretation of the original work *Yogamrutham*.⁹⁴ *Balabhooshanam* by Vaikathu Pachumuthu, published in 1866, is also an important work. Vaikathu Pachumuthathu (1814-85) was the palace physician at Travancore and author of the first modern history of Travancore. *Balabhooshanam* was written for children and dealt with geography and geology.⁹⁵

P Govinda Pillai draws attention to a *Laghusashstra Padavali* (General Science Textbook Series) started from Thrissur by Krishnan Pandala and T. K. Krishna Menon.⁹⁶ Krishnan Pandala's book on chemistry, '*Rasathantram*' (1893), was the first book in the series, followed by M. Udayavarma Raja's translation of Huxley's '*Introductory Primer*'. T. K. Krishna Menon produced a geographical text, '*Bhuprakriti Sastram*'. Some of the science-related texts published during the late nineteenth century and the first half of the twentieth century were M. Raja Raja Varma's '*Bhooprakriti Shastram*' (translation of Professor Geikie's *Primer of Physical Geography*), '*Aarogyachintami- Balachiktsakramam*' (medicine) by Vallathol Narayana Menon, Swadeshabhmani Ramakrishna Pillai's '*Krishishastram*' (agriculture), O. M. Cherian's '*Bhuvivarana Siddhanta Samgraham*' (geography and geology), Murkoth Kumaran's '*Kakan*' (zoology), '*Parakan Vayyathe Poya Pakshikal*' (zoology) and '*Jyothishastram*' (astronomy), P. G. Nadar's '*Arogya Jeevitha Shastram*' (health), I. C. Chacko's '*Krishivishayangal*' (agriculture), '*Jyothishastram*' (astronomy) by K. Sukumaran, '*Krishi Padapustakam*' (agriculture) by O. Raman Menon,

⁹⁴ The original author or the period of publication of this work is unknown. Some scholars consider that the book was written by a Namboothiri from Perinjaloore near Thaliparambu in Malabar Joseph 2009.

⁹⁵ Balakrishnan 2007.

⁹⁶ Pillai 2009 (1998) notes that the series continued until 1913, but we don't know the rest of the details of it.

'Bhooprakriti Shastram' (geography) by S. Subramanya Sastri and 'Benjamin Franklin' (biography) by K. Govindan Thambi.⁹⁷

While many of these texts were produced as textbooks for schools and colleges, the authors were aware of the need, nature and function of science popularisation in society. They strived to reduce the 'stiffness of language' and aimed to write in 'an easy and natural form of Malayalam, as is spoken in everyday life'.⁹⁸ Translations of Sanskrit texts to Malayalam also followed similar lines. P. S. Varrier of Kottakkal Arya Vaidyashala, in his preface to 'Arogyachintamani' (1904) written by Vallathol Narayana Menon (a renowned poet in Malayalam and the founder of the Kerala Kalamandalam), highlighted the need for translation of Sanskrit texts and science writing in Malayalam. He lauded 'Arogyachintamani' for its lucid narration and commentary, making the text accessible to anyone without a knowledge of Sanskrit.⁹⁹ The vernacular intelligentsia's conception of science popularisation can be best summed up in the following words cited from A. R. Raja Raja Verma's preface to M. Ekambaranathan's book 'Shareerashastram' (1917) (title in English- 'Elementary Physiology including Personal Hygiene and First Aid in Accidents').¹⁰⁰

Introducing the book, A. R. wrote that although Malayalam printing and publishing is developing rapidly, many of the books published are 'dull and useless' fictional works. He wrote, (cited from the text, not my translation)

"what we wish for in their place is a series of books on scientific subjects written on popular lines similar to the present work. In English and other modern languages of the West, there is a host of elementary works calculated to popularise and disseminate among the masses a knowledge of science in all its main branches. What a day would it be for our country when we come to have such works in our language too! In fact such works would serve two very useful purposes. In the first place,

⁹⁷ For more, see Namboothiri 2008, Pillai 2009 (1998), Balakrishnan 2007, Chandanapally 2009.

⁹⁸ Ekambaranathan 1917 p vi.

⁹⁹ Varrier 1904.

¹⁰⁰ A. R. Raja Raja Varma was a Sanskrit and Malayalam scholar renowned for his crucial role in the renaissance of the Malayalam language and literature.

they may be prescribed as textbooks in our vernacular schools and secondly they would serve to carry the seeds of popular culture to the humblest homes.....”.

“.....The task of diffusing useful scientific knowledge among the masses should be undertaken by our graduates who may have a special study of one or more branches of science. In fact this is a task they are eminently fitted to undertake and it is a duty that they owe to their less cultured brethren that they should impose upon themselves such a responsibility”.¹⁰¹

Interestingly, other than the short-lived public lecture committee, there were no devoted institutions for science popularisation in Malayalam until the mid-twentieth century. The absence of institutions on the lines of the Indian Association for the Cultivation of Science in Calcutta (1876), Benaras Institute (1864), Behar Scientific Society (1868) or Aligarh Scientific Society (1864) sets the history of popular science apart in Kerala. Perhaps this absence was one of the factors that deflected attention from the history of science and popular science in the region.

In other words, the networks of production and circulation of popular science in Malayalam during the nineteenth and twentieth century were diverse and loose at their best. These networks can be traced to government institutions like the textbook committee, public lecture committee or the department of publication of oriental manuscripts¹⁰². It extended to literary associations like the Bhaashaposhini Sabha, Vidyavilasini Sabha and other voluntary contributions. As the above discussion shows, in colonial Kerala, the princely state played an important role in the production and circulation of popular science. It was complemented by the vernacular intelligentsia, who actively utilised the possibilities of popular print for science popularisation. The overlap of the members in the government institutions and the voluntary associations suggests an overlap of the aspirations of different agents that drove science

¹⁰¹ Ekambaranathan 1917 p ii- iii.

¹⁰² This is true for other vernacular contexts like Hindi, where the institutionalisation of science was sub-optimal. See Mishra 2015.

popularisation in the region. This point will be further elucidated in the following chapters, which will situate the networks of production and circulation of popular science for medicine, agriculture, and astronomy.

In his study of the development of scientific literature in Malayalam, Balakrishnan discusses four factors that contributed to popular science writings in Malayalam.¹⁰³ He considers individual contributions, the role of the periodicals, formal and non-formal agents. The first two factors, as one can see, are self-explanatory. He discusses the Travancore Textbook Committee and the University of Travancore among the formal agents. Among the non-formal agents, he discusses only the Bhaashaposhini Sabha from the first half of the twentieth century. The discussion in the preceding pages builds on Balakrishnan's observations. It extends the understanding of the development of popular science in the region by bringing in more details and situates less studied agents like the Public Lecture Committee, Department of Publication of Oriental Manuscripts and non-formal agents like Vidyavilasini Sabha. I have not included Travancore University in the discussion. As Balakrishnan points out, besides publishing a few books and glossaries, the University did not make any significant contributions to the development of scientific literature in Malayalam. The University assumed a more significant role only in the second half of the twentieth century. Before ending this section, it must be pointed out that the discussion on the institutional development of science here and in the following chapters is based chiefly on government documents, including administration reports, manuals and gazettes, and a few secondary works. Hence the chapter more or less follows the state narrative about the history of these institutions. As an area that has not received much attention so far, more focused archival work and historical examination are needed to present a more critical account of the functioning of each of these institutions.

Social Imaginations of Science and Modernity in Kerala

¹⁰³ Balakrishnan 2007.

A much-highlighted factor of the experience of modernity was the evolution of new notions of the self and the social, embroiled in the ambiguities of modernity and tradition.¹⁰⁴ These ambiguities were articulated and negotiated through the mediation of religion and, sometimes, science. Although science and its history have not been a part of the main referential frames of history writing in Kerala, scholars like Dilip Menon, Udaya Kumar, Osella and Osella, and others have hinted at the importance of science in the social imagination of the region during the colonial period.¹⁰⁵ This section provides a discussion of these works. It focuses on the instances of mediation of science in the social imagination. The discussion situates this thesis in the historiography of modernity in Kerala.

One of the most important texts that inform the history of modernity and the public sphere in the region is the Malayalam novel 'Indulekha', published in 1889. Written by O. Chandu Menon, 'Indulekha' is considered the first modern novel in Malayalam. In his introduction to the first edition of 'Indulekha', Menon recalls a conversation with a friend who told him that "if this book is about the English body of knowledge and techniques known as 'science', it is okay then. Otherwise presently, there is no need for books on anything else in Malayalam".¹⁰⁶ While Menon was surprised by his friend's reaction, for us, the friends' comments suggest that there was already an audience for popular science literature by the end of the nineteenth century.¹⁰⁷ A reading of chapter eighteen of the novel brings out the significance of modern science more clearly. The chapter is famed for its discussion on tradition and modernity and articulating the underlying ambiguity of identities engendered by modernity.¹⁰⁸ Entitled 'A Conversation', the entire chapter is set as a lengthy discussion on English education, nationalism, modernity, science and religion.¹⁰⁹ The

¹⁰⁴ Arunima 2003a, 2004, Menon 2006, Kumar 2016, Devika 2007, Sreejith 2021.

¹⁰⁵ Menon 2006, Kumar 2016, Osella and Osella 2004.

¹⁰⁶ Menon 2015 (1889) p 10.

¹⁰⁷ Menon 2015 (1889) writes that he was surprised at the reaction of his friends. He then tries to establish the relevance of his novel by alluding to the development of new aesthetic sensibilities.

¹⁰⁸ Varughese 2015, Kalesh 2010- 2011, Arunima 2004.

¹⁰⁹ The conversation is between three important characters in the novel- Madhavan, a moderate congressman, his father, a bigoted Hindu and his cousin, an anti-congress atheist.

discussion on religion and atheism takes the form of a dialogue between the Hindu Shastras and English science. The arguments for atheism are substantiated through the works of Bradlaugh, Wallace, Darwin, Spencer and Huxley. Milton and Shakespeare are also invoked. Arunima points out that these names mentioned in the chapter lead us to the sources and kinds of ideas in circulation during the period. Exploring such sources enables us to understand the varied channels of influences on Malayalam modernity.¹¹⁰ Kalesh, who has studied the novel in detail, argues that Chandu Menon crafted chapter eighteen to appeal to the audience who, like his science reading friend, were representatives of the nascent public sphere of the region.¹¹¹ In this context, science was used as a resource that enabled participation in social debates. Habib and Raina points out that the use of scientific rationality to legitimise social discussion was a characteristic function of science in colonial India.¹¹² Although the idea of modernity articulated in the chapter has been explored extensively, the importance of modern science in the discussion has not received much attention. This thesis does not delve deep into the discussion on science in 'Indulekha'. However, the novel does suggest the possibilities for tracing the myriad manifestations of science in the negotiation of modernity in the region.

A similar discussion of modernity and its mediation through the idioms of science can be seen in the short story 'Dwaraka' (1893), written by Vengayil Kunjiraman Nayanar.¹¹³ 'Dwaraka' is symbolic of the social imaginations engendered by modern science in Kerala. A summary of the story will help highlight this point further.

“In the story, Nayanar is on board a steamship accompanying an eminent English scientist, Martin James, and involved in the laying of an

¹¹⁰ Arunima 2004, p 198.

¹¹¹ Kalesh, 2010-2011.

On the other hand, it is also interesting to see that Menon does not mention the term science while summarising the novel for Dumergue. He describes his 18th chapter as a discussion on atheism and the congress. See Menon's letter to Dumergue, published as an appendix in *Indulekha* (2015 edition). J. W. F. Dumergue was the acting District Collector of Malabar. He translated *Indulekha* into English.

¹¹² Habib and Raina 1989.

¹¹³ C G Ramachandran Nair, a popular writer of science in Malayalam, considers 'Dwaraka' among the science fiction literature in Malayalam. (Nair, C. G. R. 2011).

underwater cable between Aden and Bombay. While off the coast of Bombay, near Elephanta Island, the cable snags on some underwater rocks and snaps in two. Nayanar is disconsolate and begins to brood on the fact that all their work has been in vain. However, Martin James introduces him to an underwater jacket invented by “a distinguished scientist from the New World- America”. The Jacket allows the wearer to go underwater, pulled down by its own weight and a special helmet allows easy breathing while expelling the exhaled air. They decide to dive down 2,000 feet to the bottom of the Arabian Sea and free the cable from the rocks. That evening, sitting out on the deck smoking cigars, Martin turns to Nayanar and mentions the possibility that Dwaraka, the famed city of Krishna, could very well have sunk just off the coast where they were anchored. He states that both western scholarship and Indian texts like the Mahabharata and Sisupalavadham suggest this. That night, with Nayanar’s mind full of thoughts of Dwaraka, the two of them don their scientifically advanced jackets and descend to the depths of the sea. While marvelling at the many-coloured coral, shells and stones, they suddenly come across a piece of granite with an inscription in the ‘Nagar’ script. A few paces away, they lose their footing and fall through a tunnel into a huge, hemispherical hall. The floors are an intricate mosaic of coral decorated with creepers, flowers and birds; there are rows of jewelled pillars, golden thrones and every sign of magnificence. When they descend into the lower hall, with a floor of polished black stone, they come across an exquisite golden pot covered with jewels and fearsome figures. As Nayanar reaches out to touch the pot, it instantly disintegrates into dust. Even as it powders away, the floor begins to sink, swirling smoke fills the room, and two terrible demons come and collar Nayanar who screams in terror. He suddenly discovers that he has been dreaming, while listening to an urbane friend tell him stories of ships and scientific discoveries in Europe”.¹¹⁴

Dileep Menon contextualised ‘Dwaraka’ in the discussion on modernity in colonial Kerala and observes how the story engages with the ambiguous nature

¹¹⁴ Summary quoted from Menon 2006 Chapter- ‘Caste and Colonial Modernity: Reading Saraswativijayam’ pp 118-119.

of modernity.¹¹⁵ He explained that the reinvention of tradition in the story is mediated through modern science and the authority of a western scientist. Further, the elusiveness of the golden pot and the dream's setting suggests the inability to reinvent a tradition within the framework of modernity as it is only through modernity that the imagination of tradition is made possible. The story and the pertinent observations made by Menon suggests that modern science was embroiled in an ambiguous relationship with tradition. The reinvention of tradition through the mediation of modern science was an essential feature of the debate between local knowledge and modern science, especially in fields like medicine and astronomy.¹¹⁶ As Menon rightly points out, modern science has acquired the authority of legitimisation of knowledge and society. By placing science at the vantage point, we can further explore this ambiguous link. It will offer a more reflective frame to understand the cultural experience of modernity, one that contextualises science in the region's history.

As the discussion in the first section of this chapter suggests, the experience of colonial modernity was negotiated differently by different communities. While the 'upper castes' articulation of modernity and science involved attempts to combine modernity and tradition,¹¹⁷ the experience of modernity for 'lower castes' like Ezhavas and Dalits were located in a different frame of critique. For the 'lower castes', modernity was more liberating than tradition.¹¹⁸ Modernity and its conceptual resources enabled a critique of tradition that offered new ways of imagining social life. It underlined the zealous acceptance of modern education and modern science and technology among the 'lower castes'. For instance, the community reform movements among the Ezhavas encouraged the pursuit of modern agriculture and industry. The first major agricultural and industrial exhibition (1905 at Kollam) in the region was organised as part of the second annual meeting of Sree Narayana Dharma

¹¹⁵ Ibid.

¹¹⁶ See chapter four and six of this thesis.

¹¹⁷ The characters in the texts discussed above- 'Indulekha' and 'Dwaraka' - belong to the 'upper castes' in the social hierarchy of Kerala.

¹¹⁸ Mohan 2015, Menon 2006.

Paripalana Yogam (SNDP).¹¹⁹ Similar exhibitions were organised by the community in different parts of Kerala. They were “intended to be both a celebration of their achievements as well as an inspiration to other communities”.¹²⁰

Discussing the socio-religious reforms of Sree Naryana Guru among the Ezhavas, Chandramohan has observed that Narayana Guru considered ‘caste discrimination as irrational and unscientific’.¹²¹ Osella and Osella have also pointed out that Jati or caste was increasingly interpreted in scientific terms as a biological entity in the twentieth century.¹²² They explained that this has to be understood in the context of contemporary developments in England, where the race was classified scientifically. They see Narayana Guru’s slogan of one caste, one religion, one god for humankind,¹²³ as a “bold, scientific insistence upon empirical equality”.¹²⁴ In their analysis of various narratives on culture and modernity, Osella and Osella gives an account of an interaction between Gandhi and Narayana Guru. In order to defend *Chaturvarnya* (caste system), Gandhi points out the various shapes and colours of the leaves of a mango tree to Narayana Guru, who in response collects mango leaves of different sizes and colours and cuts open to reveal the same sap inside them. He demonstrates to Gandhi that even though the leaves are seemingly different, in essence, they all are one. Osella and Osella argue that such articulations of the idea of equality in

¹¹⁹ SNDP was formed in 1903 as an association working towards the collective economic and social mobility of the Ezhava community. Narayana Guru was the spiritual leader of the Yogam. Dr Palpu and Kumaran Asan were other prominent figures associated with the formation of the Yogam.

¹²⁰ Menon 2014 p 289. He makes this observation in his discussion on the mobility of Thiyyas (a sub-caste of Ezhavas) in North Kerala. Quote refers to an Agricultural and Industrial Exhibition organised in 1908 at Kannur.

¹²¹ Chandramohan 1987 p 63.

¹²² Osella and Osella 2004.

¹²³ “One caste, one religion, one god for humankind,
Of the same blood and form, there is no difference;
Animals of the same caste alone procreate;

Viewed thus all humanity belongs to one caste” (Osella and Osella 2004 p 46).

¹²⁴ Ibid.

empirical-scientific terms make it more appealing and amenable to modern rationality.¹²⁵ In their words,

“These arguments are quintessentially modern in their appeal to an essential inner essence, to an empiricism which eschews appearance for positive examination of reality, and to the triumphal authority of experimental proof”.¹²⁶

Udaya Kumar’s analysis of Dr Palpu’s writings also hints at the importance of science in the imagination of modernity among the Ezhavas.¹²⁷ Kumar points out that Dr, Palpu’s background in modern medicine and bacteriology influenced his understanding of the modern to a great extent.¹²⁸ He tried to explain many traditional practices from the framework of modern science. Dr Palpu followed a similar approach in his history writing also. He tried to interpret episodes of mythology and legend in naturalist terms that stressed empiricism in understanding nature. Kumar gives several examples of such attempts by Dr Paplu. One example is Paplu’s ‘scientific’ version of the myth of Mahabali related to the festival of Onam.¹²⁹ The legendary Vamana avatar of Vishnu was reinvented in Palpu’s account as a Brahmin dwarf who could conjure up elephantiasis at his wish. Udaya Kumar writes-

“The reference to elephantiasis stands out. Vamana’s transformation into a gigantic, cosmos filling divine form is stripped of its mythological

¹²⁵ It is interesting to remember here that around the same time, in the neighbouring Madras presidency, Periyar was building the self-respect movement based on the rhetoric of rationality of modern science. See Babu 2010.

¹²⁶ Osella and Osella 2004 p 47.

¹²⁷ Kumar 2014.

¹²⁸ Dr Palpu was a trained physician and a renowned social reformer. He played an important role in the consolidation of the Ezhava community during the twentieth century.

¹²⁹ The popular myth recounts the story of a benevolent king Mahabali under whom the region attained heights of prosperity and happiness. The growing popularity of the Mahabali made the Devas jealous and apprehensive, who then approached Lord Vishnu for a way to restrict the king. At this, Vishnu took the avatar (the fifth one out of ten) of a dwarf- Vamana, who approached the generous king for alms and asked for three footsteps of land. The king granted the wish, but the Dwarf took a gigantic form and measured the entire territory with two steps. The Rajah, keen on keeping his word, offered his head to place Vamana’s third footstep, and Vamana pushed Mahabali to the abyss. But before leaving, Mahabali requested to visit his kingdom and people at least once a year. According to this myth, Onam is celebrated to mark the day when Mahabali visits his land and people.

aura and revealed to be a magic trick. The illusion produced by magic is identified with the seemingly scientific description of a disease common in many parts of the Kerala coast".¹³⁰

Udaya Kumar explores the sources of this hermeneutics in Palpu's historical writings. He argues that Dr Palpu was using science "more as a resource for an alternative imaginary".¹³¹ In his words,

"Palpu's speculative etymologies and his eccentric translations of mythical elements into a modern scientific-sounding idiom are symptoms of his search for some form of grounding for his claims within a modern evidential paradigm".¹³²

These works tell us that the idea of science informed the social and individual practices in nineteenth and twentieth-century Kerala. The idea of cleanliness was an essential part of the repertoire of modern social practices among various castes like the Ezhavas.¹³³ Sanal Mohan writes that cleanliness, hygiene and sanitation were important tropes that characterised the missionary discourse on the Dalits.¹³⁴ This discourse of cleanliness was later appropriated by social reformers like Poykayil Yohannan, who urged the people to follow modern cleanliness practices. Yohannan instructed his followers in the use of toilets, ways to wash body and clothes and insisted on the significance of wearing clean white clothes. This discourse delves on personal hygiene and extends to their living conditions and food habits. These ideas were embedded in a Victorian understanding of health and hygiene mediated by modern science. The representations of similar debates in the discourse on modern womanhood also assume significance in the contextualisation of science in the social imaginary of modernity. Devika has pointed out that during the early twentieth century, the

¹³⁰ Kumar (2014) argues that the exaggeration of the size of the elephantoid foot, which does not correspond to any scientific evidence, pushed Palpu's account into the same frames of narration that he was trying to counter (p 23).

¹³¹ Ibid p 24.

¹³² Kumar 2014 p 30.

¹³³ Bose 2015.

¹³⁴ Mohan 2015 p 55.

idea of hygiene was used to stress the importance of a healthy body and construct the ideas of an aesthetic female body in Kerala.¹³⁵

Besides these cultural negotiations, the significance of modern science in the history of Kerala can also be traced at an intellectual level. Colonialism precipitated a confrontation of local knowledges with modern science that led to reorganising the structure and practice of local knowledge. This process in medicine and health care has received considerable attention in the history of Kerala.¹³⁶ The standardisation and systematisation of local medical knowledge and practices into Ayurveda imply various strands of the debates on modernity and tradition discussed above. Ayurveda as a coherent body of knowledge was formed during the twentieth century through a complex process of reinvention of tradition, in dialogue with modern bioscience. The reorganisation of traditional knowledge in the framework of modern scientificity also meant that the knowledge claims of a large section of the society were either negated or appropriated. On the other hand, the new intellectual sensibilities modelled during colonialism also gave agency for some of the castes hitherto excluded from the discourse on formal knowledge and learning.¹³⁷ As these references suggest, modern science intricately implicated the experience of modernity and its social imaginaries in Kerala during the nineteenth and twentieth centuries. Exploring these social imaginaries helps us delineate the relationship between science and modernity in colonial contexts. It further situates modern science and its popularisation as a vital vantage point to understand the history of Kerala's modernity.

Conclusion

The primary aim of the chapter was to set a background for the following chapters. In order to make sense of the variegated nature of popular science, it

¹³⁵ Devika, 2007 See chapter six- *Women and the Female Body*.

¹³⁶ Panikkar 1992, Cleetus, 2007, 2014, 2018, Girija 2016, 2017a, 2017b.

¹³⁷ For more on this, see chapter four of this thesis.

is important to situate it in the socio-political history of the vernacular. As we will see in the rest of the chapters, this context enabled the production and circulation of popular science and shaped the content and nature of the science. By the twentieth century, the princely states of Mysore, Travancore, Cochin and Baroda had acquired the status of 'model states. In these regions, the state took an active role in introducing and popularising modern education, administration, science, and technology. The discussion in the chapter highlights the contributions of the princely state of Travancore. From the mid-nineteenth century, the state of Travancore actively encouraged modern scientific administration, science education and science popularisation. The vernacular intelligentsia also contributed to the popularisation of science through popular print. The history of the development of various institutions and agents engaged in the popularisation of science offers a better vantage point to understand the functions envisaged for popular science. The chapter tries to foreground modern science and its popularisation as an integral part of the imagination and experience of modernity in colonial Kerala. The chapter argues that the history of popular science in the region has to be situated in the networks of production and circulation of popular science forged by the princely state and the local intelligentsia.

CHAPTER THREE

Popular Science in Malayalam Periodicals-

An Overview

The previous chapter situated the development of popular science in Malayalam in the social history of Kerala during the nineteenth and twentieth centuries. The influential role of popular print was discussed. This chapter furthers that discussion by focusing on the science literature in Malayalam popular periodicals. Preliminary insights gathered from the archival sources are presented, and a framework for discussion in the following chapters is laid down. The first part of the chapter presents a brief note on the archival work explaining the sources used for the study and the parameters that guided the collection, organisation, and analysis of the sources. It is followed by an overview of the popular science writings featured in the nineteenth and twentieth century Malayalam periodicals. The section identifies the major themes discussed in the following four chapters. The chapter foregrounds Malayalam periodicals as a crucial site to understand the cultural conversations of science in colonial Kerala society.

A Note on Archival Work

As science writings in Malayalam periodicals of the nineteenth and twentieth century are rarely explored, not many frames of reference were available to guide the collection and organisation of sources. Hence, I began (in

the Sciper Index fashion¹) by skimming the available issues of Malayalam periodicals for science-related articles. Appan Thampuran Memorial Library in Thrissur, Kerala, served as the primary resource for the archival work. Periodicals covered were published from various places in Travancore, Cochin and Malabar, and a few from outside the region. The publishers included missionaries, enthusiastic individuals, voluntary associations, caste, and community organisations. I could trace science-related literature in around sixty periodicals, resulting in a rich collection of more than 1200 articles on science in Malayalam from the mid-nineteenth to the mid-twentieth century.²

As the history of science and popular science suggests, the discourse of science during the nineteenth century was embedded in the discourse of modernisation and nationalism.³ Research on the vernacularisation of science in colonial India also underlines that popular science during the colonial period was intricately connected to the notions of anti-colonialism and national development, couched in the discourse on modernity and tradition.⁴ Any exploration of the cultural history of science during the period has to consider these categories as a vantage point. Accordingly, the title of the articles and contents were scanned for terms related to science, knowledge, modernity, tradition and progress.

Cognate terms that belonged to the domain of local knowledges were also used as guides. The development of print provided a platform for the circulation and popularisation of local knowledges that were hitherto guarded possessions of various castes and communities. Numerous articles belonging to the areas like local medicine, astral sciences, architecture, geology, and chemical sciences appeared in the popular periodicals. There were magazines exclusively devoted to local knowledge forms like Ayurveda.⁵ Including references to local knowledges in the frame of analysis directed attention to this important body of

¹ Cantor, Shuttleworth and Topham 2003.

² For some periodicals, only a couple of issues were available. The majority of the periodicals explored for the study were in dilapidated conditions. Sometimes the cover pages were missing, oftentimes entire sections and some issues were wrongly bound with other periodicals. Most of them were too fragile to flip through.

³ Fyfe 2016.

⁴ Raina and Habib 2004, Sehgal, Sangwan and Mahanti 2000, Singh 2021, Panikkar 1992.

⁵ *Ayurvedic Gazette* 1932.

literature. As Daum, O'Connor, Broks and others suggest, we can explore the changing conceptions of science and its others by including marginalised knowledge forms in the ambit of popular science.⁶ The popular literature on local knowledge also expands our understanding of “...how and why societies at given periods have promoted the idea of public participation in knowledge and have defined certain practices of knowledge as popular”.⁷ Further, it helps to understand the circulation of modern science and the cultural and political negotiations it engendered in the popular imagination. It assumes significance in India, as the region already had a rich history of science and technology before the cultural impact of modern science.⁸ It helps to nuance the understanding of the cultural authority of science in India, which is drawn from both the local and western sources.⁹

The terms listed above were not used as criteria but only as hints to identify science-related literature. Other seemingly non-science articles of general interest were read cursorily whenever possible. It helped to locate numerous articles that would have been missed if judged only by the title. As Shuttleworth and Cantor point out, “...science often informed and infiltrated articles ostensibly devoted to other topics”.¹⁰ For instance, a seemingly non-scientific article titled ‘Nam Dharikunna Vasthram’ (The Clothes We Wear) would begin with discussing the human body and temperature.¹¹ It explained that an increase or decrease in body temperature might lead to diseases of various kinds, and when it fluctuates beyond a limit, it becomes fatal. The significance of proper clothing through various seasons to maintain the body temperature is then laid out. The rest of the article explains different kinds of fabrics, different colours that reflect and absorb light and heat, etc. Several articles followed the same pattern of familiarising the reading public with scientific matters impinging daily life.

⁶ Daum 2009, O'Connor 2009, Broks 2006.

⁷ Daum 2009 p 324.

⁸ Arnold 2000.

⁹ Ibid p 2.

¹⁰ Shuttleworth and Cantor 2004 p 2.

¹¹ S. Subramania Ayyan (1901) Nam Dharikunna Vastram, *Bhaashaposhini*, 5(8).

The study of popular science as a varied, contested site of knowledge-making and circulation alerts us to the questions of religions, race, class, caste, and gender. One of the initial questions for this thesis was to explore the connections, if any, between the readership of science literature and the nature of the periodicals. As discussed in chapter two, periodicals targeted segments of the population belonging to different religions, different orders within the same religion, different castes, and other identifiable social groups. However, within the limitations of the PhD thesis, a comparative analysis of different denominational publications could not be carried out as intended. Similarly, due to the limitations in the availability of archival sources, the influence of the rationalist movement and the emerging communist movement on the popular discourse of science could not be explored. Nevertheless, the substantial presence of science-related literature in women's magazines offered possibilities to explore the question of placement of popular science from a different angle. In this thesis, I have tried to explore the gendered impact of science popularisation by reading the science writings featured in Malayalam women's magazines. Women's magazines during the nineteenth and twentieth century were an integral part of the process of construction of the identity of modern women.¹² Science literature in these periodicals serves to contextualise science in this process and offers a gendered perspective for the cultural history of science.¹³ As the Sciper project observed, biographies of scientists were a regular part of the popular science literature in the periodicals.¹⁴ In the context of India, Raina has pointed out that biographies of 'technological heroes' developed as a distinct genre in the nineteenth century, and it played a crucial role in situating technology in culture and society.¹⁵ Following these suggestions, biographical literature on scientists and inventors was noted down.

This thesis only focuses on popular science literature in prose form. Although not very common, science in Malayalam periodicals was also presented

¹² Bagchi 1993, Shukla 1991, Orsini 1999, Sen 2004, Devika 2007.

¹³ Cooter and Pumfrey 1994, Shuttleworth, Dawson and Noakes 2001, Shteir 2004.

¹⁴ Cantor, Shuttleworth and Topham 2003.

¹⁵ Raina 2001.

in verses.¹⁶ These poems offered instruction in easily memorable stanzas. Before the development of print culture, local knowledge in the vernaculars was stored and transmitted orally in poems, songs, and proverbs. It is interesting to observe interlocutors of modern science taking recourse to such methods for the popularising of knowledge. Further, cultural perspectives on the history of popular science suggest that to explore the interpenetration of science in social and cultural life, one needs to look at the entire content of the periodicals, including fiction and ads.¹⁷ Due to the limitations in time and space, fiction, advertisements, and articles dealing with contemporary political affairs were left out. Numerous essays, especially on medicine and astronomy, featured images and illustrations. They were noted down only to highlight the narrative styles. This thesis does not attempt an elaborate discussion on the use and functions of images in popular science.

The facts or validity of the knowledge presented in the articles was not a major concern while reading the literature. The aim was to explore the image of science put forward and the functions envisaged for popular science. The reading of the literature was grounded in the understanding that science in the region, much like in many other parts of the Indian sub-continent, cannot be reduced to the frames of mere resistance or acceptance. Science and its popularisation must be comprehended in terms of its domestication, legitimation, and appropriation in the local social imaginaries.¹⁸ I have tried to contextualise the discourse of popular science in the region's history and the broader history of science and science popularisation in India. Narrative styles and rhetorics employed were studied. The popular science narratives help to understand the process of domestication of science in society. The rhetoric used to justify the place and function of science in society hints at the strategies underlying the negotiation of science both as a promise and threat- as a harbinger of progress and rationality yet threatening as a western cultural import.¹⁹

¹⁶ K. N. Kochappi Vaidyar (1913) Maracheeni Krishi, *Krishi Vyavasaya Darpanam*, 1(6); Anonymous (1913) Inji Sherbet, *Krishi Vyavasaya Darpanam*, 1(11-12).

¹⁷ Shuttleworth and Cantor 2004 p 4.

¹⁸ Habib and Raina 2004.

¹⁹ Raina and Habib 1996.

While reading the articles, I also noted down the names of scientists and references to texts in these articles. It opens the possibilities to explore the circulation of knowledge. It tells us of which science reached out to the public, was available to the interlocutors and the kind of science that was deemed suitable for popularisation.²⁰ Use of English terms in the literature- written in English or transliterated- was noted down. The use of Sanskrit was also observed. While English offered a source of legitimacy for modern science, the authority of local knowledge forms was derived through Sanskrit.²¹ It hints at the politics of language involved in the process of vernacularisation of science. Further, attention to such narrative strategies helps to explore the strategies of persuasion and legitimation of science in social imaginaries. It helps us explore the nuances of the establishment and negotiation of the cultural authority of science in society.

Science in Malayalam Periodicals - Preliminary Observations

The majority of the periodicals studied in this thesis covered topics of general interest. A few specialised ones like *Dhanwanthiri* and *Krishi Vyavasaya Darpanam* were also referred to. General-interest periodicals placed science alongside other topics, including politics, fiction, and various social, cultural, and economic themes. The introductory editorials tell us that science popularisation was an essential part of the agenda of many of these magazines. Early issues of *Bhaashaposhini* (published by the Bhaashaposhini Sabha discussed in the previous chapter) came with a tagline - *vidyashastraadhi vishayangale prathipadikunna maasikapusthakam*-translated as 'a monthly that presents knowledge and science-related themes'.²² The professed aim of the magazine was the development of the Malayalam language and literature. From the first issue onwards, *Bhaashaposhini* had articles related to science.

Many periodicals listed science as an important topic covered in them. It includes *Ramanujan* (1907), *Dakshina Deepam* (1912), *Kairali* (1916),

²⁰ Shuttleworth, Dawson and Noakes 2001, Cantor, Shuttleworth and Topham 2003.

²¹ Dodson 2005.

²² Vol 1 no 4. Later, by 1932 we do not see this tagline.

Jayabharatham (1948), and women's magazines like *Sumangala* (1916). There was an acknowledgement of the growing importance and role of scientific literature. The first editorial of the *Dakshina Deepam* suggested that people who have acquired knowledge of sciences should share their treasure in small essays for the common reader. The magazine announced prizes for science-related articles that cover novel themes and ideas. *Kairali* reminded prospective contributors to be careful not to use heavy technical terms. The editors of *Kairali* and *Dakshina Deepam* insisted that essays should be written in simple language because the periodical is meant for common people, the majority of whom only have basic literacy. *Jayabharatham*, a bimonthly started in 1948, declared its aim as 'the moral and cultural progress of people through arts and science'.

Several periodicals had separate columns for agriculture, health, and science, whereas some covered all under a single heading of science/ knowledge. For instance, *Kerala Kesari* (1915) featured separate sections called *shastram* (science), *krishikaryam* (agricultural affairs) and *vaidyam* (medicine). *Kairali* featured a regular item, *vijnanamandalam* (the realm of science), and in the later years, science was covered in a feature named *prathidwani* (echo). *Vidyabhivardhini* (1920) featured regular items under the heading of *shastrapankti* (science series), *jyothishapankti* (astrology series), *aarogyapankti* (health series) and *karshikapankti* (agriculture series). *Arunodayam* (1927) had a permanent item called *vijnana saudam* (abode of science) which was a compilation of articles from other publications; articles often list *Popular Science* as the source. *Vijnana Sagaram* (1931) had a regular feature called *vijnana kurippukkal* (science notes). *Deepam* (1930), too, had articles on *aarogyapankti* (health series) and *prakriti vijnanam* (natural science). *Sumangala* and *Mahila* (1921) were women's magazines that gave great importance to modern science in their pages. *Sumangala* had a permanent item called *shastra vrithangal* (science affairs) that presented small snippets about scientific facts and discoveries. *Mahila* carried *aarogyapankti* (health series). *Mangalodayam* (1908) covered brief extracts of scientific news under various sections like *shastra vedi* (science forum) and *shastra shakalangal* (science extracts). By the mid-1940s, *Mangalodayam* had a feature called *popular science*

series (the title of the series was presented in English). Some other periodicals covered news about recent scientific discoveries and related events in general sections, like *varthakal* (news) in *Deepam* and *lokalokam* (world affairs) in *Jayabharatham*. It has to be noted that the insights from the history of popular science in periodicals tell us that a uniform agenda cannot be assumed for the entire lifetime of the periodicals.²³ The changes in the ideological orientations of the editors or publishers would be reflected in the content and nature of the discussion on science.²⁴ But the dilapidated and fragmentary nature of the sources used for this study precluded any analysis of the changing trends.

As the discussion of the pre-textual material shows, many periodicals put forward an idea of the popularisation of science. However, I could not trace many terms directly corresponding to science popularisation or popular science in the periodical literature under discussion. In a book review published in *Bhaashaposhini* in 1906, A R Raja Raja Varma mentioned that the book belongs to 'what is called popular science in English' and translated popular science as *sarvajaneena shastra vishayangal*.²⁵ Later in 1930, another writer, V P Raman Menon, used *shastrathatva vitharanam* for science popularisation.²⁶ These terms were not traced in the literature other than these two instances. The present-day usage of *samanya shastram* to denote popular science was also not traceable in the literature studied.²⁷

Nonetheless, the aims of the popularisation of science were laid down in several essays. Dissemination of science in the vernacular was envisaged as the duty of the English educated interlocutors towards 'their less fortunate brothers'.²⁸ The progress made by the West was credited to the advancements in science and its popularisation through numerous newspapers and magazines. Science popularisation among the masses was suggested to achieve the same for

²³ Shuttleworth and Cantor 2004 makes this observation regarding Victorian periodicals.

²⁴ In their study Dawn magazine, Raina and Habib (1996) observe shifts in ideological orientation to science during the life span of the magazine from 1897-1913.

²⁵ Review of the 'Bhoovirana Siddhanta Sangraham' (on geography) by O M Cherian (1906), in *Rasikaranjini*, 1906, 4(4).

²⁶ V. P. Raman Menon (1930) *Shastravum Sahityavum*, *Kairali*.

²⁷ Balakrishnan (2007) refers to popular science books as *samanya shastra pushtakangal*.

²⁸ A. R. Raja Raja Varma (1906) 'Bhoovirana Siddhanta Sangraham - Oru Niroopanam', *Rasikaranjini*, 4(4).

India.²⁹ It was envisioned that science popularisation would lead to the development of scientific attitude reflected in all aspects of individual and social life.³⁰ The critique of the existing system of education that uses English as the medium of instruction in the sciences also justified the need for science popularisation in the vernacular. The nature of exam-oriented science education was also scrutinised. Popular science writing in the vernacular was a promising endeavour to develop the students' critical faculties of observation and analysis. Writing and reading science in the vernacular was encouraged as the first step in developing scientific thinking.³¹ As the research on popular science in other vernacular contexts points out, this justification for science popularisation in vernacular emanates from a critical understanding of the cognitive, cultural and political implications of modern education.³² When articulated within this critique, vernacular popular science echoes the movement towards anti-colonialism and nationalism.

A preliminary analysis shows that over one hundred eighty articles had the term *shastram* (science) or science in their title. The articles ranged from discussions on the meaning and nature of modern science and science education to various specialisations of science. Some of the early titles include 'Science Allengil Naveena Shahstram' (Science or the New Shastram), 'Science' (title in English), 'Shastriya Vidyabhyasam' (science education), '*Krishishastram*', 'Jyothishastram', and 'Bhooprakritishastram'.³³ However, it is important to consider that the term *shastram* had different connotations and was used broadly to refer to knowledge and learning, including scriptural learning. Thus, some of the titles that included the term *shastram* discussed Vedanta.³⁴ Such essays also offered a commentary on modern science. For instance, one of the

²⁹ M. Sheshagiri Prabhu (1915) *Shastram, Mangalodayam*, 7(3).

³⁰ Ibid.

³¹ M. Sheshagiri Prabhu (1915) *Shastram, Mangalodayam*, 7(3).

³² Raina 2000, Habib 2000, Sangwan 2000.

³³ Anonymous (1899) Science Allengil Naveena Shastram, *Chandrika*, 1(2); S. Subramanian (1901) Science, *Bhaashaposhini*, 5(6); I. C. Chacko (1908) Shastriya Vidyabhyasam, *Bhaashaposhini*, 12(5-6); P. Shankara Pillai (1901) Krishi Shastram, *Bhaashaposhini*, 5(2); A. V. Krishna Iyer (1889) Jyothishastram, *Vidyavinodini*, 6(7); Shukran (1889) Bhooprakriti Shastram, *Vidyavinodini*, 5(2).

³⁴ M. N. Vasudevan Bhattathiripad (1938) *Shastravum Sahityavum, Kairali*, 22(6).

essays reasoned that the term *shastram* is used to denote scriptures as they define the rituals for attaining the four *purusharthas* of *dharmam*, *artham*, *kaamam* and *moksham*.³⁵ According to the article, modern science deals with the first three, and hence *shastram* could be aptly used to denote it too. It was suggested that the terms ‘ancient science’ (*pracheena shastram*) and ‘new science’ (*naveena shastram*) be used to distinguish between western and local sciences.

On the other hand, only twenty articles had the term *sankethika* (technology)- in their title. Many of these were serial articles, and if we count only the original titles, the number comes down to five. All these titles were published after 1900, and all but one were titles of glossaries of technical terms.³⁶ The other article was on technical education.³⁷ As pointed out in chapter one, during the period of study, the distinction between science and technology was not very marked in society. However, later in the twentieth century, we see popular literature addressing this distinction. An article titled ‘Yudhavum Scienceum’, featured in *Kairali* in 1941, distinguished science and its application.³⁸ The essay discussed the advancements in science and technology after the First World War. It uses the term *shilpakaranmaar* (sculptor) to refer to the inventors who use scientific principles to make new instruments. The article highlights the importance of science for the *shilpakaranmaar*. It laments that society celebrates the inventors because the inventions become popular, but the scientific principle behind it or the scientist who discovered is not included in the credit. It gives the example of differential attention accorded to Marconi and Maxwell in popular writings. Marconi is made into a hero for the invention of the telegraph, but Maxwell, who discovered the properties of radio waves, is generally left out from the discussion. The essay urges society to give equal importance and credit to both scientists and the *shilpakaranmaar*.

³⁵ M. Sheshagiri Prabhu (1915) *Shastram*, *Mangalodayam*, 7(3).

³⁶ Pailo Paul (1908) English Malayalam Sankethika Samjakal, *Bhaashaposhini*, (serialised); I. C. Chacko (1913) Sankethika Samjakkal, *Vijnana Ratnakaram*, (serialised).

³⁷ A. C. Kuriakose (1913) Sankethika Vidyabhyasam, *Vijnana Ratnakaram*, 1(9).

³⁸ Vijnana Daasan (1941) Yudhavum Sciencum, *Kairali*, 26(1-2).

Major Themes

After a preliminary reading, the literature was organised into different categories based on the major themes. The categories that emerged were agriculture, health and medicine, astronomy and astral sciences, chemical and physical sciences, biological sciences, mathematics, geography and geology, and biographies. It is important to mention that this categorisation of themes is contemporary and may not correspond to the actor's categories. Nor were these airtight compartments. Some articles, for instance, those on biology or chemistry, can be easily included in agriculture as well. In such cases, the title of the article, its content, and the magazine that published it was considered. Nevertheless, the categories were only meant to render the information comprehensible and are entirely based on the researcher's judgment (and misjudgment).

In the literature used for the study, articles on health and medicine were the most numerous, followed by agriculture. These two areas had specialised periodicals by the early twentieth century. Discussion on astronomy and astral sciences figured in almost similar numbers. For brevity, the present study only focusses on these three themes - health and medicine, agricultural sciences and astronomy and astral sciences - as these were the most represented in the sources used for the study. Each of these areas is discussed in the following chapters. Literature on other areas has been set aside for future study. Nonetheless, it is worthwhile to overview other themes, as they help to foreground the significant presence of popular science in the Malayalam periodicals.

After medicine, agriculture and astronomy, there were ample articles on the physical and chemical sciences. They explained the physical or chemical properties of items of everyday life.³⁹ Essays on technology were also included under this heading. Numerous articles referred to electricity, its uses and

³⁹ P. Kunjiraman Nair (1889) Sharkara, Thennu, Theneecha, *Vidyavinodini*, 12(4); Vaani Daasan (1900) Karimum Panjasarayum, *Bhaashaposhini*, 4(3); S. Subramania Ayyan (1899) Jalam, *Bhaashaposhini*, 3(2).

function.⁴⁰ Other common themes were elements, light, temperature, sound, telegraph, printing, and aeroplanes.⁴¹ We see articles on weaponry, the atomic bomb, and the hydrogen bomb during World War years.⁴² A few articles discussed the traditional, local knowledge related to chemistry.⁴³

Articles categorised as biological sciences cover literature that introduced the anatomy, physiology and habitat of various plants and animals. These articles discussed both local and foreign flora and fauna. Some of the oft-repeated titles were on mosquitoes, houseflies, crows and flowers and plants.⁴⁴ I have also included articles that discuss theories of biological evolution in this category.⁴⁵ Articles clubbed under the heading of geography and geological sciences attempted to explain the earth and its environment. Articles about various geographical features like mountains, rivers, sea, desserts and the polar regions formed this group.⁴⁶ Other popular topics were the earth's shape, earthquakes, tides, oceans, volcanoes, seasons, rain, and snow.⁴⁷ In geology, also we see discussions on local knowledges.⁴⁸ Articles on mathematics were less numerous than other branches of knowledge, and most of them were

⁴⁰ P. Subramania Iyer (1889) Vidyuchakti Prayogangal, *Vidyavinodini*, 6(2); T. N. T (1897) Vaidyutha Shakti, *Bhaashaposhini*, 1(1); Anonymous (1903) Vidyutchakti, *Rasikaranjini*, 1(8).

⁴¹ Pailo Paul (1897) Velichathinte Gathivegam, *Bhaashaposhini*, 1(10); Sri Vaishagha Dasan (1897) Achadi Yantram, *Bhaashaposhini*, 1(2); C. S. Gopala Panikkar (1905) Akasha Gamanam, *Rasikaranjini*, 3(11); S. Subramanian (1901) Ushmavu, *Bhaashaposhini*, 5(12); Anonymous (1904) Radium, *Bhaashaposhini*, 8(3); S. Vellu Pillai (1915) Aeroplane, *Kerala Kesari*, 1(7); Anonymous (1928) Kambiyilla Kambi Kaatunna Ascharyangal, *Arunodayam*, 1(9).

⁴² M. C. Namboothitirpad (1946) Atomic Bomb, *Mangalodayam*, 21(5); M. Baalarama Menon (1950) Atom Bombil Ninnum Hydrogen Bombilekku, *Kairali*; C. R. Narayanan (1950) Atom Bombinte Bhoothabhavikal, *Mangalodayam*, 25(1); K. I. T (1916) Noothana Yudhopakaranangal, *Bhaashaposhini*, 20(9-10).

⁴³ Chirayankeezhu P. Govinda Pillai (1910) Pracheena Bharathathile Rasathantra Vijnanam, *Mangalodayam*, 2(4); R. Krishna Warriar (1923) Pracheena Hindukkalum Rasathantravum, *Bhaashaposhini*, 27(2).

⁴⁴ V. J. (1900) Kothuku, *Bhaashaposhini*, 4(8); O. M. Cherian (1898) Prani Shastram; *Bhaashaposhini*, 1(12); E. R. N (1903) Chilanthi, *Bhaashaposhini*, 7(10); K. Sukumaran (1919) Eecha, *Bhaashaposhini*, 23(7).

⁴⁵ V. U. Govinda Menon (1931) Naveenanagarikathvam- Charles Darwin, Vijnana Sagaram, 1.

⁴⁶ A. B. C. D (1911) Uthara Shaitiyameghala, *Bhaashaposhini*, 15(1); Krishnadas (1912) Siberia, *Bhaashaposhini*, 16(1-2); Immaty Mathew Joseph (1930) Chavu Kadal, *Keralam*, 1(6).

⁴⁷ S. Subramanian (1900) Bhooprakriti Shastram, *Bhaashaposhini*, 4(9); Anonymous (1889) Bhoomiyude Aakriti, *Vidyavinodini*, 3(2); Anonymous (1889) Manj, *Vidyavinodini*, 4(3); P. T. Varughese (1918) Agni Parvathangal, *Mangalodayam*, 10(12); Anonymous (1931) Rithukkal, *Keralam*, 2(1); C. Govinda Menon (1889) Bhoomi: Mazha, *Vidyavinodini*, 6(10).

⁴⁸ Chirayankeezhu P. Govinda Pillai (1916) Aaryapurathananmarude Bhoomishastra Jnanam, *Bhaashaposhini*, 20(7-8); T. Sudhakaran (1937) Bharateeyarude Bhookambha Parijnanam, *Prabhuddha Bharatham*, 2(3).

mathematical puzzles and tricks.⁴⁹ A few articles discussed the situation of mathematics education, and some discussed the mathematical knowledge of ancient Indians.⁵⁰

Biographical notes on scientists and inventors were common in Malayalam. The persona of the innovators and scientists was highlighted, along with a history of their pioneering contribution. Some famous names were Charles Darwin, Benjamin Franklin, Thomas Alva Edison, P. C. Ray, and Jagdish Chandra Bose.⁵¹ Most of the articles presented a narrative of hard work and struggles. These articles served to familiarise these names in the social imaginaries. It presented science as an activity characterised by geniuses and their qualities like curiosity and perseverance.

Apart from these thematic categories, science can also be traced in discursive articles discussing religion or war. *Bhaashaposhini*, *Kairali*, *Mangalodayam*, *Lakshmibai* and *Prabuddha Bharatham* were major periodicals that featured such polemical articles. There was an appreciation of the role of science in countering superstitions through a systematic explanation of natural phenomena. However, any impact on the 'core' of religion was denied.⁵² Essays on science and religion generally put forward a discourse of natural theology.⁵³ They explained that science unravelled the secrets of the natural world while religion explained the spiritual realm. Both extended the understanding of life from different perspectives, and thus any antagonism between the two was ruled out.⁵⁴ By the late 1920s, especially after World War, popular science literature

⁴⁹ Anonymous (1904) Oru Ganana Leela, *Rasikaranjini*, 2(1); Anonymous (1921) Nattubhasha Prathamika Pareeksha Kanakku, *Bhaashaposhini*, 2(7).

⁵⁰ S. Subramania Iyer (1898) Manakanakku, *Bhaashaposhini*, 2(2) S. K. Achari (1950) Leelavathi, *Vidyabhivardini*, 5(3); Achuthathu Vasudevan Moosath (1927) Poorvikanmaarum Kanakkum Shastravum, *Kairali*, 11(8).

⁵¹ S. K. Balakrishnan (1939) Sir P C Ray Athava Bharathathile Vijnanashastranidhi, *Vivekavaani*, 3(6); V. M. Govinda Menon (1931) Benjamin Franklin, *Kairali*, 15(11); L. V. Ramaswami Iyer (1923) Jagdishchandra Darshnan, (Translated into Malayalam by Anujan Achan), *Kairali*, 7(9); Anonymous (1951) Charles Darwin, *Dharma Prakaasham*, 1(2); V. M. Govinda Menon (1931) Thomas Alva Edison, *Kairali*, 15(7).

⁵² M. Sundaresha Menon Thathamangalam (1931) Adhunika Vijnana Shastravum Matha Tatvavum, *Kairali*, 16(1).

⁵³ K. P. Peter Calicut (1909) Prakriti Shastram, *Kerala Chintamani*, 5(12); Mahopadhyay P. V. Krishnan Nair (1944) Shastrakarante Karthavyam, *Kairali*, 28(12).

⁵⁴ V. P. Raman Menon (1929) Shastravum Mathavum, *Kairali*, 13(12); Mulloth V. Narayana Menon (1937) Shastragathi Evidekku, *Kairali*, 21(12); N. Bhaskaran (1938) Mathavum Shastravum, *Prabuddha Bharatham*, 2(6).

increasingly discussed the limitation of science.⁵⁵ The destruction caused by the war was highlighted as a threat and limitation of science.⁵⁶ Some articles used the critique of war to suggest the superiority of Indian science. An essay 'Shastrathinte Kshetram' (Temple of Science) described the research undertaken at the Bose Institute of Science in Calcutta (established by J. C. Bose in 1917) and remarked-

“West uses science to kill thousands of people in a fraction of a second. In the East, science is used to establish the Unity of Life. While one is destructive, the other is constructive. See the difference in cultures”.⁵⁷

By the 1940s, we also see representations of socialist ideas in the discussion. Science from this perspective was explained as a dangerous tool in the hands of the capitalists who used it to their benefit, leaving the larger population in misery. The discussion mainly focussed on biological sciences. It was argued that the way out from the nexus of capitalism and science was to hand over the custody of science and its institutions to people. The Soviet Union was cited as a glorious example.⁵⁸

Discussion on science is also featured in the book reviews and technical glossaries published in these periodicals. For instance, in the 1915 August issue, *Mitavadi* introduced a book on the theory of evolution titled 'Parinamavaadam' by one Pareri Kunji Chandu.⁵⁹ The article claims that this is the first book on the topic in Malayalam. A. R. Raja Raja Varma's review of 'Bhoovirarana Siddhanta Sangraham' and the idea of popular science was already discussed above. He was also very active in preparing and publishing dictionaries and glossaries. As early as 1889, he announced in *Vidyavinodini* his plans to prepare a technical dictionary in Malayalam for the benefit of writers engaged in science writing and translation. In 1908 *Bhaashaposhini* serialised a glossary called the 'English Malayalam Sankethika Samjakal' (English Malayalam Technical Nouns) prepared by Pailo Paul. A similar 'Sankethika Shabda Pankti' (Technical Terms

⁵⁵ N. Bhaskaran (1938) Mathavum Shastravum, *Prabhuddha Bharatham*, 2(6).

⁵⁶ M. Sundaresha Menon (1939) Arivum Adbhuthangalum, *Rajarshi*, 5.

⁵⁷ R. V. (1933) Shastrathinte Kshetram, *Kairali*, 18(4) p 156.

⁵⁸ Parameswaran (1942) Jeeva Shastravum Manushya Samudayavum, *Kairali*, 26(7).

⁵⁹ Anonymous (1915) Parinama Vaadam, *Mitavadi*, 3(8).

Series) was published in Keralam during 1930-31. Discussion on the need for writing science in Malayalam, the functions of vernacularisation and modes of translation was a commonplace discussion in the periodical literature.⁶⁰ Besides, the lack of Malayalam terms, numerous translations for the same English term and lack of uniformity or any set principle for translation of scientific terms were the primary concerns these glossaries sought to address. Those who insisted that science should be written in a language easily accessible to the common man criticised the over-dependence on Sanskrit in forming Malayalam words. Readers who required Malayalam translations of English terms were encouraged to write to the editors of the periodicals.⁶¹ Those who were already engaged in translations were asked to contribute to the preparation of the glossaries.⁶² The significance of the study of translation as an integral part of the domestication of science in any vernacular context have been pointed out by scholars of the history of science in India.⁶³ But due to the limitations in time, in this thesis, I have not delved into a discussion on translation or lexicography in Malayalam popular science.⁶⁴

Another interesting observation that emerged in the preliminary reading was the popular science writings addressed to children. In the introduction of

⁶⁰ P. K. Kunji Krishna Pillai (1920) Saankethika Padangal Tharjama Cheyenda Aavashyam Undo, *Mangalodayam*, 12(9-12).

⁶¹ A. R. Raja Raja Varma (1889) Saankethika Shabdha Nighandu, *Vidyavinodini*, 10(7).

⁶² Many glossaries and dictionaries were published during the early twentieth century. Some interlocutors favoured the use of more Sanskrit terms in translation, while others argued for minimal use of Sanskrit to make it more accessible to people. Many guidelines were circulated for writing science in Malayalam. Despite that, there were no uniform rules or standards for translation. Problems created by different translations for the same term provided by different authors were discussed in the popular literature (Anonymous (1930) Saankethika Shabda Nirmanam, *Keralam*, 1(1)).

This continued until the late 1960s, when Kerala State Institute of Languages took up the problem of science translations. Several workshops and seminars were conducted for formulations of guidelines for science translation into Malayalam. Following this, several glossaries were published, like the science glossary (1969), humanities glossary (1969), agriculture glossary (1969) and engineering glossary (1969). For more on the contributions of the Bhasha Institute towards science translation, see Vasukuttan 1991.

⁶³ Raina 2011, Dodson 2005, Singh 2021.

⁶⁴ P. Ranjith (2014) directs attention to the translation of scientific terms in Malayalam periodicals. Ranjith observes that the early reliance on Tamil for translation (especially Bible translations) gave way to dependency on Sanskrit in the twentieth century. He speculates that the reference to Sanskrit was an influence of Kerala Varma Valiya Koyi Thampuran, who was a great Sanskrit scholar and played a pivotal role in the development and working of the Travancore textbook committee. Also see Balakrishnan 2007 and Vadavathoor 2001.

this thesis, I mentioned that under the patronage of KSSP, science literature for children has evolved into a recognizable genre in Malayalam.⁶⁵ We do not know of any science magazines meant for children published during the period of the study. However, it is essential to recall that one of the earliest popular science books in Malayalam, 'Balabhooshanam', was written for children.

In some periodicals referred for this study, we see science featured in the sections for children. For instance, *Kairali* and *Deepam* featured popular science in a children's section called *balanganam* (children's arena) and *balapankti* (series for children), respectively. Though these were not devoted science columns, they presented small write-ups that addressed curiosities like what happens when matter is destroyed? How far can we heat water? Why doesn't the earth have its own light like the sun? Is iron colder than wood? Why do mountains at a distance appear to be blue?⁶⁶ Biographies of scientists and stories about them often appeared in these sections.⁶⁷ They highlighted the virtues of hard work, self-confidence, positive attitude, and perseverance as essential factors of any successful endeavour. Discussion on science and religion is also featured in such essays. However, I did not pay much attention to children's literature in my archival work. The insights from the available literature suggest that periodicals during the period serve as resourceful sites to explore the engendering of the social imaginaries of science and the imaginaries of childhood in the society, which, as we will see in chapter seven, is intricately related to the imaginaries of national progress among others. Studies on Victorian periodicals suggests that children's magazines were crucial sites of science popularisation from the mid-nineteenth century.⁶⁸ Exploring children's magazines in Malayalam may offer a novel vantage point to understand the social imaginaries of science and its influence on the imaginaries of childhood.

⁶⁵ For more on children's literature in Malayalam, see Narayanan 2009 (1998).

⁶⁶ Vijnana Bhiksha (1923) *Balanganam*, *Kairali*, vol 7-8 (various issues).

⁶⁷ Anonymous (1930) *Balapankti*, *Deepam*, vol 1-2 (various issues).

⁶⁸ Dixon 2001

Popular Science Writers

In his discussion on popular science writing in India, Raina identifies a 'chronology of adaptation and cultural redefinition of science in India'.⁶⁹ According to him, there were three different phases between 1850 and 1920. Each stage is distinguished by the agents of popularisation, nature of scientific discourse and aims of popularisation. In the first phase, agents of popularisation were mostly autodidacts, rooted in local epistemological traditions who imbibed modern science and its values through education. During this stage, science, popularisation was mainly based on the translation of English texts books into vernacular. During the second phase, agents of science popularisation are scientists- social reformers who tried to critically examine traditional knowledge systems and society in the light of modern science. Revivalism and nationalist concerns marked this phase. Popular science discourse was embroiled in the dichotomies of tradition and modernity, religion and science, and nationalism and internationalism during the first and second phases. The first Indian Science Congress held in 1914 is considered initiation to the third stage of adaptation of science among the Indian intelligentsia. In this stage, cultural dialogues of science take a backstage and popularisation was mainly directed at the emerging scientific community. Thus with each stage of institutionalisation of science new set of authors appear. Nonetheless, the autodidacts never really disappeared. Although the timeline may not be applicable for this study due to the regional specificities, the sources used for the study underline the primacy of autodidacts in vernacular science writings.

Based on the primary sources used for this study, we can see that, in general, numerous articles were written anonymously and with pseudonyms, as was the common practice during the nineteenth century and early twentieth century. Some of the elusive pseudonyms were *oru sthree* (a woman), *oru jyotsan*

⁶⁹ Raina 2000.

(an astrologer), *oru midwife* (a midwife) and *oru pracheenan* (an ancient man).⁷⁰ Some were signed with only initials. Anonymity, pseudonyms, and initials restricted the attempts to trace the science writers' profiles or plot a network of interlocutors. Hence the discussion on authors in this thesis is minimal.

Among the authors who could be identified, many were autodidacts. They wrote science in the vernacular with varied aims, including development and standardisation of language and social development through science. Some had training in science; others were literary scholars. A few authors were associated with various government departments like agriculture, health, and geology. K. V. Sankaran Nair, Krishnan Pandala, Chirayankeezhu P. Govinda Pilla, R. Krishnan Warriar, K. Sukumaran, O. M. Cherian, Pailo Paul, S. Subramanian, I. C. Chacko, N. Shankara Pilla, K. M. Mathulla Mapila, V. P. Raman Menon, Dr A. R. Poduval, A. R. Raja Raja Varma, Punnassery Nambi Neelakanda Sarma and N. Kunjan Pillai were some of the more prolific authors. For instance, S. Subramanian was active during the late nineteenth century and early twentieth century. Most of his articles appeared in *Bhaashaposhini*, and he wrote on a variety of topics in natural history, geography, and geology. Kunjan Pillai (the Director of the Department of Agriculture) wrote about agriculture in periodicals like *Bhaashaposhini* and *Vijnana Ratnakaram*. I. C. Chacko (a geologist) contributed to the popularisation of geology and the development of mineral-based industries in Travancore. He also actively participated in the discourse on translating modern science into Malayalam. He published in different periodicals from 1908 to 1932. Joseph Mundassery and Murkoth Kumaran penned numerous articles related to the biological sciences. Women authors also made their mark, most often in health and medicine. Some of the names are V. Narayaniyamma, Thekke Ambadiyil Meenakshiyamma and B. Kalyaniyamma. As already pointed out, by the 1940s, science popularisation was acquiring a more specific form in Malayalam. Many authors, including M. C. Namboothiripad, M. P. Parameswaran and P. T. Bhaskara Panikkar, who later led the popular science movement in Malayalam literature, became more active in this period.

⁷⁰ Oru Jyothsyan (1890) Aadityan, *Chandrika*, 1(7); Oru Pracheenan (1889) Jyothishastram, *Vidyavinodini*, 4(3); Oru Midwife (1921) Garbhinikalodu, *Mahila*, 1(5); Oru Sthree (1906) Balaparicharanam, *Sharada*, 2(9).

To sum up, this chapter provides an overview of the popular science literature published in Malayalam periodicals during the mid-nineteenth and mid-twentieth centuries. The chapter gives a glimpse of the nature and content of the popular science writings in these periodicals. It foregrounded popular science as a significant presence in the emerging public sphere. Based on the available sources, the focus of the thesis is narrowed down to four themes- health and medicine, agricultural sciences, astronomy and astral sciences, and popular science in women magazines. A detailed examination of the literature under each of these themes is presented in the following chapters.

CHAPTER FOUR

Health and Medicine

Introduction

Over the past four decades, the history of medicine has become perhaps the most explored area in the history of science in India. The introduction of modern medicine and the cultural encounters that ensued have been explored extensively. Public health concerns were a major driving force behind the institutionalisation of modern medicine in the subcontinent.¹ Its beginning is traced to the imperial motives of military, commerce, and administration. Medical knowledge was one of the essential tools of governmentality of the British Empire. As such, the state provided great encouragement for modern medicine in the subcontinent.² The institutionalisation and popularisation of modern medicine also benefitted from the Christian missionaries who used medicine to further their evangelical and civilisational mission.³ By the late nineteenth century, the local intelligentsia also actively participated in medicine and public health discourse. Scientific and cultural understandings of health and disease were conflated in the larger discussions on nationalism, enmeshed in ideas of eugenics and domesticity.⁴ For some castes and communities, the popularisation of medicine offered an opportunity for social mobility.⁵

¹ Arnold 1993, Kumar 1997, Pati and Harrison 2009.

² Ibid.

³ Kawashima 1988, Arnold 1993.

⁴ Arnold 1993, Hodges 2008, Pati and Harrison 2009, Sharma 2012, Prasad 2015.

⁵ Cleetus 2007, Bala 2009, Ramanna 2006.

A concurrent process of institutionalisation and modernisation of indigenous medical knowledge marked the nineteenth and the twentieth-century public sphere in India.⁶ The presumed competition presented by the growing popularisation of modern medicine initiated a process of systematisation and modernisation of local medical practices and reinvention of indigenous knowledge into 'Ayurveda' during the twentieth century.⁷ The revitalisation and reinvention of indigenous medicine embodied an anti-colonial discourse and has to be understood as part of the more extensive process of cultural awakening and nationalist aspirations during the late nineteenth and early twentieth century.⁸ Such cultural interactions between different systems of medicine were taking place in Punjab, Bengal, Benares, Bombay, Mysore, colonial Kerala and many other parts of the subcontinent.⁹

The development of popular literature on health and medicine was a concomitant of these cultural-political negotiations amongst various medical traditions. From the mid-nineteenth century, interlocutors of both modern and indigenous medical traditions used the print as an avenue for representation and reinforcement of cultural, historical, and scientific claims. In other words, popular print enabled the production and circulation of modern imaginaries of health and medicine in colonial India. Literature on medicine has been a major source for the history of medicine in India, especially for the studies in vernacular contexts.¹⁰ Such works explored the cultural negotiations among different systems of medicine and threw light on imaginaries of health, disease, hygiene, domesticity, and sexuality.¹¹

⁶ As Cleetus (2007) writes- "The term 'indigenous medicine' in the colonial context was defined in various ways. It oscillated between the large compendium of health care practices followed locally, regionally, and in caste and ethnic minority specific contexts and the dominant health care tradition that traced its lineage from the *Samhita* texts. Under colonialism the latter form of knowledge was deemed to indicate the entire corpus of indigenous medical knowledge under the name of Ayurveda" p 148.

⁷ For more on the reinvention of Ayurveda in India in the twentieth century, see Langford 2002 and Hardiman 2009. For the construction of modern Ayurveda in Kerala, see Panikkar 1992, Cleetus 2007, 2014, 2018, and Girija 2016, 2017a, 2017b.

⁸ Panikkar 1992, Habib and Raina 2005, Sivaramakrishnan 2006.

⁹ Alavi 2005, Sivaramakrishnan 2006, Ramanna 2006, Mukharji 2009, Sharma 2012, Das 2012, Attewell 2014, Panikkar 1992.

¹⁰ Panikkar 1992, Sivaramakrishnan 2006, Girija 2016, 2017a, 2017b Sharma, 2012, Prasad 2015.

¹¹ Sharma 2012, Girija 2017a, 2017b, Prasad 2015, Gupta 2001.

The discussion on popular science literature in this chapter is situated in the background of these cultural and political processes. Section one contextualises the development of the popular discourse on health and medicine in regional history. The history of the institutionalisation of modern and indigenous medical practice and education is discussed briefly. The role of the princely state and the local intelligentsia is highlighted. In the second section, popular literature on health and medicine is discussed. Major questions explored are: What were the major themes that were popularised? How were these related to the cultural and political negotiations in the realm of medical knowledge and practice? How was the body, health and disease represented in popular literature? Domestication, legitimation and appropriation of modern science in the discourse of health is highlighted.

Development of Popular Discourse on Health and Medicine

The Institutionalisation of Modern Medicine

Modern medicine was introduced in Travancore in 1811. Initially, access to modern medicine was the privilege of the royal family, but gradually it reached the wider population. Within a few years, in 1817, a small dispensary that offered free treatment and medicine was set up at Trivandrum. By 1837 the dispensary expanded and started offering in-patient treatment.¹² Modern medicine expanded steadily in the region, and by 1885 there were 26 medical institutions in the state, including private institutions.¹³ From 1895 onwards, private medical institutions were awarded grant-in-aid.¹⁴ By the turn of the century, the London Missionary Society, the Christian Missionary Society and Salvation Army were discernible players in health care in Travancore.¹⁵ Public demand for more

¹² Satheesh 2008.

¹³ TAR 1886- 1887.

¹⁴ Pillai 1940 Vol 3.

¹⁵ For more on the contributions of these missionaries towards healthcare in Travancore, see Kawashima 1998.

hospitals and dispensaries was also building up.¹⁶ By 1928 the total number of government institutions rose to 82 (31 hospitals and 51 dispensaries).¹⁷

A medical school was established in 1869. It was later closed for lack of trained teachers and equipment and replaced with training for compounders in 1890. In 1887, the Victoria Medical School and Hospital for Women were opened in Quilon.¹⁸ The hospital provided midwifery training. In the absence of a medical college in the region, the Travancore government encouraged medical education by providing stipends and scholarships to students attending the Madras Medical College and the Medical School for Women at Vellore.¹⁹ The first medical college in the region was established only in 1951.

Although the state of Travancore lagged in professional medical education, public health and associated pedagogic programs made great strides. Vaccination was introduced in Travancore in 1817. A department of vaccination was started in 1866. Velu Pillai writes that the establishment of the vaccination department 'crystallised the public health institution in the state'.²⁰ The mass vaccination programme started by the department was among the first instance of the cultural encounter of modern medicine for the local populations and was received with much apprehension. The state put in place various measures to increase public trust in the vaccination program. The Royal Family got vaccinated first and set the example. The Royal Proclamation of August 1878 made vaccination compulsory for all those in public service, for students in government and government-aided schools, registered lawyers, patients admitted to government health institutions and prisoners.²¹ Vaccinators were trained to treat minor diseases to increase their trustworthiness and reception among the public.²² Suggestions were made for small payments to encourage

¹⁶ Kawashima 1998.

¹⁷TAR 1927- 28.

¹⁸ Aiya 1906 Vol 2.

¹⁹ TAR 1927-28.

²⁰ Pillai 1940 Vol 3 p 758. The department began functioning with a superintendent of vaccination. A head vaccinator and 27 vaccinators assisted the superintendent. Aiya (1906 Vol 2) records that Dr Pulney Andy (trained in Europe) was appointed as the superintendent of vaccinator. He played a vital role in the expansion of the department and the popularisation of vaccination in the region.

²¹ Aiya 1906 Vol 2.

²² Satheesh 2008.

people who took the vaccination. The vaccination drive was relatively more successful among the marginalised castes and the Christians, mainly through the collaborative efforts of the missionaries.²³ Brahmins and Muslims were among those who resisted most. The government tried to overcome such hindrances by training vaccinators from the respective communities. In a similar vein, women vaccinators were appointed.²⁴

In 1895 the vaccination department was incorporated into a more extensive department responsible for vital statistics and sanitation.²⁵ The department's responsibilities included collecting vital statistics, checking and maintenance of sanitation, research and reporting on public health, organisation of vaccination drives and the service of a mobile dispensary for rural areas. The sanitary and vaccination departments worked in tandem with an increasing number of modern medical institutions and indigenous *vaidyashalas* established with state grants.

The public health policy underwent drastic changes after the First World War. In Velu Pillai's words: "In the post-war readjustment of values, Public Health came to be recognised as the nation's greatest defence".²⁶ Consequently, in 1928, the Travancore government initiated a revamp of the public health system collaborating with the Rockefeller Foundation. A representative from the Foundation was appointed as the Honorary Adviser for public health.²⁷ Based on Dr W. P. Jacocks (the Honorary Adviser) recommendations, several new public health initiatives were implemented.²⁸ Emphasis was laid on public health education and the collection of epidemiological and vital statistics. Survey and treatment of diseases like hookworm and mosquito control drives were given much attention. A Health Unit at Neyyatinkara was set up with financial aid from

²³ Kawashima 1998. However, as Kawashima pointed out, marginalised castes were, to a large extent, discriminated and excluded from general health care and medical aid provided by the government. Satheesh 2008 has also observed the same. Even in the early twentieth century, when such excluded castes gained access to in-patient services, they were treated in separate sheds, usually in abysmal conditions.

²⁴ Basu 2015.

²⁵ Aiya 1906 Vol 2.

²⁶ Pillai 1940 Vol 3 p 761-762.

²⁷ Rockefeller Foundation also contributed towards public health in other parts of India during the twentieth century, including Madras, Mysore and Burma (Kawashima 1998).

²⁸ Pillai 1940 Vol 3.

the Foundation. The Rockefeller Foundation also awarded national and international fellowships for health department officers for higher training in public health.²⁹ In 1933 the Sanitary Department merged with the Public Health Department.³⁰ The new Public Health Department paid great attention to the sanitation of rural areas, markets, fairs, and festivals. Research and control of filariasis, malaria, smallpox, cholera, plague and typhoid were among the department's priorities.³¹

Public health education gained momentum after the reorganisation of the department. The department set out with an aim to....

“enlist the cooperation of the public in the successful conduct of the various activities of the department and to arouse in public a sense of their responsibility in the matter of preservation and promotion of public health”.³²

Magic lantern shows, lectures, and pamphlets were used for public health education. Aparna Nair points out that the department brought out a public health bulletin and distributed it free of cost.³³ Educational films on various diseases, rural sanitation, personal hygiene, maternity, and child welfare were also popular mediums of health education.³⁴ In 1937 a 'health propaganda van' was introduced in Travancore. The van was equipped with a gramophone, a microphone, amplifiers, and loudspeakers. The van toured different parts of the state. It was used to deliver lectures and play musical records related to health and hygiene. Health leagues and committees were formed to further the popularisation measures. Health exhibitions, health week and baby shows were also organised. Travancore administrative report records that in 1935-37 alone, 28 exhibitions and health leagues were organised.³⁵ Kawashima points out that

²⁹ Ibid.

³⁰ Ibid. A Public Health Laboratory was established by revamping the Bacteriological Laboratory that was earlier under the Medical Department. Other focal areas of the department included bacteriological and pathological sections, research, medical entomology, chemical examination, and a public analyst responsible for food adulteration regulations. The vaccine depot and the Hookworm laboratory was also brought under the public health laboratory.

³¹ Ibid.

³² TAR 1938-39 p 178.

³³ Nair 2012-2013.

³⁴ Pillai 1940 Vol 3.

³⁵ TAR 1937-38.

in 1938-39, 1044 lectures and talks were conducted by the public health department, and nearly 145,000 people attended them.³⁶

In Travancore, a hospital for women and children was already opened in 1896-97. However, with the growing importance of public health as a necessary condition for the nation's health and progress, maternity care and childcare were given greater importance.³⁷ Decreasing maternal mortality and infant mortality rates were among the primary objectives.³⁸ Medical inspections in schools were also made mandatory. Health education for students was imparted through activities like games, drama, processions, and essay competitions. Habit scorecards were maintained to develop and keep track of 'hygienic ways of living'.³⁹ Vacation courses on health education were organised for teachers. The various means of institutionalisation and popularisation initiated by the public health department in Travancore paved the way for embedding modern medical sciences in social imaginaries. We will now turn to the concurrent development taking place in local medicine.

Modernisation of Indigenous Medicine

While advocating modern medicine, the Travancore state also supported indigenous practices. However, state support for indigenous medicine was extended much later compared to the support for modern medicine. Kawashima has argued that Travancore, being a Hindu state, was obliged to support indigenous medicine, which was projected as a Hindu system by the end of the nineteenth century. The support for local medicine was also meant to pacify the 'upper castes', who were not very happy about the state's support of missionaries.⁴⁰

Velu Pillai states that the support of indigenous medicine by the Travancore government started in 1876 with the appointment of a Sirkar

³⁶ Kawashima 1998.

³⁷ Nair 2012-2013.

³⁸ Pillai 1940 Vol 3.

³⁹ Ibid p 811.

⁴⁰ Kawashima 1998.

Ayurveda Vaidyan (Government Ayurveda Practitioner).⁴¹ Later, an Ayurveda *padashala* (school) was established at Trivandrum in 1890. The school offered a four-year programme culminating in an examination – ‘the *Vaidya* test’.⁴² A grant in aid scheme for private *vaidyashalas* was instituted in 1896. Initially, 28 *vaidyashalas* were brought under the system.⁴³ By 1927-28, 118 *vaidyashalas*, including an Unani *vaidyashala*, received the grant-in-aid.⁴⁴ By 1942 the number rose to 150.⁴⁵

In 1908, the Ayurveda School and the grant in aid *vaidyashalas* were brought under the control of a superintendent. The curriculum at the school was reorganised in 1917. The course was extended to a total period of five years. In the new arrangement, instead of the ‘*vaidya* test,’ students appeared for the Lower Medical Certificate Examination and a Higher Medical Certificate Examination. The former was held at the end of the fourth year and the latter after the fifth year. ⁴⁶ In 1918 the Department of Ayurveda was formed. The existing title of ‘Superintendent of Native Vaidyashalas’ of Travancore was changed to the ‘Director of Ayurveda’. The *vaidyashalas* under the department came to be known as ‘Ayurveda Vaidyashalas’. Under Director Kolatheri Sankara Menon, the curriculum of the *padashala* was revised on a “...up-to-date and scientific basis to suit modern requirements”.⁴⁷ Part of this revision was the appointment of a lecturer in modern physiology, anatomy, and hygiene. An Ayurveda hospital, a dispensary and a pharmacy were established. A botanical garden was also attached to the *padashala*. As Cleetus pointed out, the change in nomenclature from ‘Native’ to ‘Ayurveda’ Vaidyashala is a seminal moment in the history of modernisation and institutionalisation of Ayurveda in the region. It suggests the reinforcement at the institutional level of a complex process of systematisation and appropriation of various indigenous medical traditions into the larger identity of Ayurveda.⁴⁸ We will discuss the nuances of this process and

⁴¹ Pillai 1940 Vol 4, p 229.

⁴² Ibid.

⁴³ Aiyar 1906 Vol 2.

⁴⁴ TAR 1927- 1928.

⁴⁵ Pillai 1940 Vol 4.

⁴⁶ Ibid.

⁴⁷ Ibid p 229.

⁴⁸ Cleetus 2018.

its representations in Malayalam popular literature in the second section of this chapter.

Later in 1921, the *padashala* was raised to an Ayurvedic college. The college was open to women students also.⁴⁹ The lower and higher medical certificate exams were abolished. The course of study was designed as a diploma course- Vaidya Shastri exam -equivalent to high school termination and Vaidya Kalanidhi- equivalent to collegiate education. Anyone with a Vaidya Kalanidhi diploma and two years of experience after that could pursue the degree of Ayurveda Acharya. Ayurveda Acharya was the highest degree conferred based on an original thesis on Ayurveda. There was also the Visha Vaidya Visharada exam that examined students in their knowledge of the specialised area of *vishavaidyam* (treatment of poisons).⁵⁰

The grant in aid system brought the local *vaidyashalas* under a modern institutional framework. Modern administrative procedures like registration of patients and regular inspection became the norm for grant eligibility. Thus, state support led to control, systematisation and institutionalisation of varied traditions of medical practices.⁵¹ By 1927- 28 K. Sankara Menon, Director of the Department of Ayurveda, testified in the annual report that,

“The activities of the department have transplanted the centres of instruction in Ayurveda from the homes of reputed Ayurvedic vaidyas to special well organised institutions with up-to-date equipment and methods of teaching. The successful candidates emerging from the Ayurveda College and the aided Ayurveda High Schools are fast supplanting the innumerable self-trained Ayurveda practitioners in the State”.⁵²

It has to be noted that the discussions on the regulation of medical practice through law-making had started in 1881 and culminated in the Bombay Medical Registration Act (The Indian Medical Act) of 1912.⁵³ The Act, by stipulating the

⁴⁹ TAR 1927- 28 reports that out of the 145 students at the Ayurveda College, 11 were women p 164.

⁵⁰ Ibid.

⁵¹ Cleetus 2018.

⁵² TAR 1927- 28 p 163.

⁵³ Kumar 1997.

registration of medical practitioners, practically delegitimised and excluded indigenous practices. Attempts to bring the indigenous medical practices under a certification system instituted at different levels of expertise must be understood as part of the response to the Act.⁵⁴ The local intelligentsia also participated in this process of systematisation by submitting petitions to the state and by setting up institutions that furthered the prospects of standardisation. In the following sub-section, we will look at the role of the local intelligentsia.

Role of Local Intelligentsia

The local intelligentsia also played a significant role in reorganising local medical practice and education. Cleetus' study of the official and social deliberations behind the institutionalisation of Ayurveda in Travancore shows that the princely state's alignment with the social aspirations of the emerging social elite drove the modernisation of indigenous medicine to a large extent.⁵⁵ By the mid-nineteenth century, many local ruling elites in Travancore had started disseminating Sanskrit medical texts among non- Brahmin communities like Ezhavas.⁵⁶ Although it entailed the hegemonisation and marginalisation of their local healing practices, Ezhavas embraced a text-based Ayurveda (with 'upper-caste' Hindu genealogies). They acquired modern training in Ayurveda and started Ayurvedic schools and journals, which contributed to the reconstruction of Ayurveda during the first half of the twentieth century. Ezhavas also adopted modern biomedicine with the same zeal as a means for social mobility.⁵⁷

In the absence of state support, the vernacular intelligentsia was more active in the Malabar area. The establishment of Kottakkal Arya Vaidyashala in 1902 by P. S. Varrier is considered a landmark in the history of the modernisation

⁵⁴ Kumar 1997, Habib and Raina 2005, Panikkar 1992.

⁵⁵ Cleetus 2018.

⁵⁶ Cleetus 2007.

⁵⁷ Ibid.

of indigenous medicine.⁵⁸ P. S. Varrier spearheaded the movement in Malabar and played an important role in unifying the movement for revitalisation across three administrative units of Malabar, Cochin and Travancore.⁵⁹ Varrier established a pharmacy- the Kottakkal Arya Vaidyashala to help invigorate local practices.⁶⁰ By starting the Vaidyashala Varrier revamped the manufacture and marketing of local drugs and standardised dosage, which were crucial to the process of systematisation of indigenous medical practice.⁶¹

Soon after the establishment of Kottakkal, Arya Vaidyashala Varrier initiated the formation of Arya Vaidya Samajam. The first meeting of Arya Vaidya Samajam was held at Kottakkal in 1903. Samajam attempted to bring in a certification system for indigenous medical practitioners and conducted examinations for the students and practitioners.⁶² Two different examinations - Madhyama and the more advanced, Uthamma were conducted. Those who passed the Madhyama and the Uttamma exam were certified as Upavaidyan and Vaidyan, respectively. This exam was later abolished when Arya Vaidya Padashala was established and started conducting the Arya Vaidya examination. From 1908, the annual meetings of the Samajam included an exhibition of various herbs and medicines. Following Varrier's efforts, an Ayurveda padashala was established in Kozhikode in 1917. The padashala aimed to bring the western and indigenous systems together by training students in local practices and modern anatomy and physiology. Padashala offered a five-year course, including

⁵⁸ Panikkar (1992) has studied P. S. Varrier's Kottakkal initiative as a model of the revitalisation of indigenous medicine. He explained that the revitalisation process progressed along three central axis- the retrieval and standardisation of indigenous knowledge, institutionalisation of training and practice and the mass manufacture and marketing of drugs.

⁵⁹ Varrier 1929, Panikkar 1992.

⁶⁰ Panikkar (1992) points out that through the establishment of Arya Vaidyashala and undertaking the mass manufacture of indigenous medicine, Varrier was joining the reformers in other parts of the subcontinent. N. N. Sen and Company (1884), C. K. Sen and Company (1898) in Bengal and Shakti Aushadhalaya in Dacca (1901) had already started a similar institutional process before the Arya Vaidyashala.

⁶¹ In the existing practices, *Vaidyan* prescribed the medicine, but the medicine has to be prepared by the patient or caregivers. The herbs and plants needed for the preparation could either be bought from certain local stores or had to be procured from nature. After the ingredients were procured, the patient had to prepare the medicine through strict adherence to lengthy procedures. Any mistake in the preparation or proportion of ingredients led to the ineffectiveness of the medicine. The dosage of medicines was not standardised. Medicine and their doses depended on the condition of each patient. (Krishnankutty 2001).

⁶² Varrier 1929.

one year of practical training at the Arya Vaidyashala hospital at Kottakkal. The Arya Vaidya examination was conducted at the end of five years.⁶³ Following Varrier's model, many *vaidyashalas* were established in different parts of Kerala, and other collectives like the Keraleeya Ayurveda Samajam (1913) were also formed.⁶⁴

The institutionalisation of modern medicine and Ayurveda led to the production and circulation of numerous Sanskrit and vernacular texts on medicine. As Panikkar has pointed out, retrieval, systematisation, and dissemination were essential to revitalising indigenous medicine during the period of colonial rule.⁶⁵ Classical texts on Ayurveda, catalogues of medicines and compilations of drug formulations, were printed and widely circulated.⁶⁶ It extended the reach of medical knowledge that was hitherto part of the repertoire and privilege of different castes.⁶⁷ Many Sanskrit and modern medical texts were translated into Malayalam, mainly for use in the *padashala*.⁶⁸ New texts combining the elements of both traditions were also produced.⁶⁹ The inclusion of the history of Arya Vaidyam in the syllabus for the Arya Vaidya Samajam exams led to the creation of the first Malayalam history of Ayurveda, the 'Arya Vaidya Charitram' (1906) by P. V. Krishna Varrier.⁷⁰

⁶³ Ibid. The *padashala* started with 42 students. Other than the admission fee of five rupees, the education was free of cost. P. P. Kammaran Nambiar and P. K. Ravunni Menon were appointed as teachers. In 1918 a physician trained in modern medicine, Dr E. Rama Varrier, was appointed to teach anatomy and physiology.

⁶⁴ Soon after the establishment of the Kottakkal Arya Vaidyashala, Vellanassery Vasudevan Moosath established the Arogya Chintamani Vaidyashala at Kuttor in 1903 (Varrier 1929).

⁶⁵ Panikkar 1992.

⁶⁶ P. S. Varrier compiled and published a catalogue of Ayurvedic medicine with their uses, doses and indications- 'Chikitsasamgraham' (1907). In 1910, his 'Oushadha Nirmana Kramam' explained the procedures for the formulation of various medications. In 1906 Thayyil Kumaran Krishnan brought out a dictionary of Ayurvedic medicine.

⁶⁷ Panikkar 1992, Cleetus 2007, Krishnankutty 2001.

⁶⁸ In his study of the history of indigenous health care in Medieval Kerala, Dileepkumar (2010-2011) pointed out that between the 13th and 17th century AD, a process of vernacularisation of scientific knowledge was already underway in the region. Several texts were translated and interpreted from Sanskrit into the vernacular during this period. However, they were restricted in circulation. From the mid-nineteenth century, the development of print enabled popularisation and wider circulation of translated texts.

⁶⁹ 'Ashtangashareeram' (1925) by P. S. Varrier.

⁷⁰ The history of Arya Vaidyam was an important part of the syllabus for the annual Uthamma exams conducted by Arya Vaidya Samajam. However, a lack of texts on the subject, in Sanskrit or Malayalam, was a big hurdle, and it necessitated the publication of 'Arya Vaidya Charitram' (1906) by P. V. Krishna Varrier. Krishna Varrier modelled his history of Arya Vaidyam on Bhagvat

As mentioned in chapter three, the Travancore Book Committee and the Department for Publication of Oriental manuscripts brought out several texts on healthcare and medicine. Health was one of the major focus areas of the Public Lecture Committee. The lectures delivered by the doctors, sanitary officers and often by autodidacts covered a range of topics, including anatomy and physiology, health, disease, hygiene, and nutrition. Titles of some of the English lectures were 'Familiar Facts in Physiology' (1890) by E. Poonen, 'The Brain' (1890) by H. J. Marston, 'Personal Hygiene' (1898) by N. Soobromony Aiyer, 'Milk in Relation to Public Health' (1915) by Dr K. Raman Thampi, and 'Epidemics and Their Prevention' (1921) by C. Jacob John.⁷¹

While there is no denial of the articulations of traditionalists and revivalist strands in the discourse on indigenous medicine,⁷² we can see that the institutionalisation and popularisation of science and medicine in the region entailed a process of domestication of modern science. It proceeded through a careful selection, cultural neutralisation, negotiation and legitimisation of theory and practice of medicine.⁷³ A process in which the princely state's and local intelligentsia's aspirations for social change were conjoined, albeit bound by the colonial context. Situating the reading of popular literature in this synthetic framework helps us avoid the pitfalls of linear readings of history that understand the evolution of science and medicine in the region as epistemic and cultural hegemonisation by the missionaries or the state.⁷⁴

Reading Popular Literature on Health and Medicine

Almost one-third of the archival sources referred to for this study was on health and medicine. It is not surprising as the earliest instances of organised

Sinh Jee's 'A Short History of Aryan Medical Science', which inspired an orientalist view of the history of medicine in India (Varrier 1906). Girija (2016) argues that Krishna Varrier, through his history, reinforced the foundations of a Hindu Arya Vaidyam in Kerala.

⁷¹ For more, see Appendix.

⁷² Panikkar 1992.

⁷³ Raina and Habib 2004, 2005.

⁷⁴ Ganesh 2004, Nair 2012-2013.

efforts for science popularisation in Malayalam were in this area. *Dhanwanthiri*, which commenced publication in 1903, was the first periodical on medicine in Malayalam. On its cover, it was described as *Malayalathile Eeka Vaidyamaasika*-The only Vaidya Monthly in Malayalam'. P. S. Varrier brought out *Dhanwanthiri* from Kottakkal as part of the organised efforts to revitalise and popularise indigenous medicine. *Dhanwanthiri* played a vital role in standardising and systematising indigenous healing practices in the region in its twenty-three-year lifespan.⁷⁵ It covered various topics, from ideas of health and disease to discussion on various traditions of medicine and played an essential part in the vernacularisation of medical knowledge in the region. It called for a synthesis of different traditions and carried literature on homoeopathy, allopathy, and Siddha traditions. Histories of indigenous medicine in Kerala have explored the periodical extensively to understand its role in the modernisation of Ayurveda. They have highlighted various facets of the popularisation of medical knowledge.⁷⁶ Hence, I have not focussed on *Dhanwanthiri* as a major source for this chapter. Moreover, in this chapter, literature on health and medicine is explored to identify the social imaginaries of science and modernity. From a cultural perspective of the history of popular science, such conversations of science are more visible in the literature in general periodicals.

Vadavathoor's survey of health and medicine periodicals published in the first half of the twentieth century includes *Vaidya Deepika* (1915), *Arogyam* (1925), *Vaidyamanjari* (1925), *Ayurvedic Gazette* (1932) and *Arogyadeepam* (1933).⁷⁷ Among these, *Arogyam* was brought out for popularising Naturopathy, and *Arogyadeepam* covered literature on health and hygiene. As the name suggests, *Ayurvedic Gazette* focused on Ayurvedic medicine and healthcare and declared itself as 'the only monthly journal on the Hindu system of medicine in Kerala'.⁷⁸ In my archival work, I could not locate these periodicals mentioned by Vadavathoor. Nevertheless, the presence of these magazines in the public sphere

⁷⁵ See Girija 2017b for a detailed discussion of the discourse on standardisation in *Dhanwanthiri*.

⁷⁶ Panikkar 1992, Girija 2017b. Girija has also explored the modernisation of the Ayurveda debate in periodicals like *Yogakshemam*, *Vivekodayam* and *Malayala Manorama*.

⁷⁷ Vadavathoor 2001.

⁷⁸ Quoted in Vadavathoor 2001 p 139.

suggests that healthcare and medicine were a significant part of the social imaginaries in the region by the second decade of the twentieth century.

Literature related to health and medicine appeared in many general interest periodicals from the late nineteenth century. Many popular periodicals like *Vidyabhivardhini*, *Deepam* and *Mahila* had a regular feature called *arogyapankti* (health series) that covered articles on health and medicine. *Kerala Kesari* also had a regular feature called *Vaidyam* (medical practices). *Bhaashaposhini*, *Mangalodayam*, *Vidyavinodini*, *Kairali*, *Keralam*, and many other periodicals featured articles on various themes about health and medicine. Popular women magazines like *Lakshmibai*, *Sarada*, *Sumangala* and *Mahila* also presented numerous articles related to the topic.

Among the authors who could be identified, many were autodidacts, some were associated with the health department in various capacities, and others were leading figures in the mobilisation of indigenous medicine. For instance, Seevulli Narayana Namboothiri, also known as *Vaidyan Thirumeni*, was a well-known Ayurvedic practitioner. He collaborated with P. S. Varrier and Arya Vaidya Samajam.⁷⁹ 'Garbha Samrakshaneeyam' and 'Balaparicharam', written by Seevulli Narayanan Namboothiri, were serialised in *Lakshmibai* during 1906-1907. *Vidyavinodini* also published excerpts from 'Garbha Samrakshaneeyam'. Compared to other areas, women authors were more visible in the literature on health and medicine.

Major Themes

In the literature on health and medicine in Malayalam periodicals, the dialogue between different traditions of medicine was a predominant theme. In this, the major thrust was on Ayurveda and modern medicine. Other traditions like Homeopathy were occasionally featured.⁸⁰ In general, essays on Ayurveda and modern medicine were more polemical and manifested the cultural

⁷⁹ Varrier 1929.

⁸⁰ A. J. Varkey (1904) Homeopathy, *Bhaashaposhini*, 8(4); C. P. Madhavan Nair (1920) Prakriti Chikitsa Kramam, *Vidyabhivardhini*, 12(6).

negotiations more explicitly. Nuances of the debate on modernisation and development of medicine can be traced in several titles like 'Vaidyam' (Indigenous Medical Practice), 'Ayurveddojeevanam' (Revival of Ayurveda), 'Ayurvedavum Shastrakriyayum' (Ayurveda and Surgery), and 'Keralavum Ayurvedavum' (Ayurveda and Kerala).⁸¹ Such essays can be traced across different periodicals throughout the study. Among the sources used for this study, the earliest one can be traced as early as 1889, and the latest one appeared in 1952.⁸²

Because of the large proportion of articles on the theme, the literature on negotiations between modern medicine and indigenous medical practices is covered separately. There were numerous essays on childcare, women's health and reproduction. A majority of these were in women's magazines and will be discussed in chapter seven. Nonetheless, it is crucial to highlight that general periodicals like *Bhaashaposhini*, *Vidyavinodini*, *Deepam* and *Kairali* also actively participated in the maternal and child health discourse.

Modern Medicine and Local Medical Practices

Like *Dhanwanthiri*, the discussions on modern medicine and indigenous medical practices were also visible in the pages of general-interest periodicals.⁸³ The dominant trope of discussion was the decline and regeneration of indigenous medical knowledge. A golden age of progress of medical knowledge was traced back to antiquity. As Panikkar points out, Orientalist history was used as a resource for legitimising the claims of an antique, glorious past.⁸⁴ Orientalist scholars like T. A. Wise were frequently quoted to emphasise the authority of the

⁸¹Ananthapurathu Moothakoyil Thampuram (1897) Vaidyam, *Bhaashaposhini*, 1(1); Kochi Rama Varma Valiya Thampuram (1917) Ayurveddojeevanam, *Mangalodayam*, 9(11); J. Chakoru Konikkara (1930) Ayurvedavum Shastrakriyayum, *Keralam*, 1(5); Paravoor K. Gopala Pillai (1932) Keralavum Ayurvedavum, *Keralam*, 2(9).

⁸² Palliyil Govinda Menon (1889) Ashtangahrudayam Enna Ayurvedam, *Vidyavinodini*, 9(1); P. Chittezhham (1952) Kshaya Rogathe Sambandhicha Bharateeya Vijnanangal, *Vidyabhivardini*, 7(9).

⁸³ Panikkar 1992, Girija 2017a, 2017b present a study of discourses on modern medicine and local medical traditions in *Dhanwanthiri*.

⁸⁴ Panikkar 1992.

claims made.⁸⁵ The literature insisted on the divine origins of Ayurveda and argued that the origins of Greek texts could be traced to ancient Indian texts.⁸⁶ The decline of the system was attributed to the loss of classical texts and their commentaries.⁸⁷ The traditional teaching and practice of medicine based on caste and family lineage, the absence of communication networks among the practitioners and the lack of zeal for the advancement of the system were considered significant drawbacks.⁸⁸ It was argued that the practitioners' lack of command over Sanskrit contributed to the declining status of indigenous medical practice in the modern period. Although there was an acknowledgement of the beneficial role of popular print in the circulation of knowledge, some interlocutors lamented that vernacular translations published with commercial interests did not always convey the essence of meaning in the original texts. Thus, these translated texts were seen as channels for quackery that brought disrepute to indigenous medical practices.⁸⁹

The course of action to remedy the decline was debatable. For a section of the intelligentsia, a revival of indigenous knowledge based on the classical texts seemed more appropriate. They called for a revival of the rigorous training system and couched their arguments in rhetoric based on the context-dependence of knowledge.⁹⁰ Such revivalist arguments were hinged on environmental determinism and indigeneity.⁹¹ Berger has pointed out that the idea of 'local medicine for the local body' was a common trope in the popular writings on medicine in the United Provinces during the twentieth century.⁹² In the Malayalam popular literature, it was argued that every system of medical

⁸⁵ Paravoor K. Gopala Pillai (1933) Ayurveda Swaroopam, *Keralam*, 3(11-12) and 4(1). T. A. Wise, author of 'A Commentary on the Hindu System of Medicines' (1845), highlighted the scientific nature of Ayurveda. He traced a glorious past for Indian medicine and a decline of status in the present from an orientalist frame. For an overview of Wise and other Orientalists' work on the history of medicine, see Arnold 1993, chapter one- *Occidental Therapeutics and Oriental Bodies*.

⁸⁶ Paravoor K. Gopala Pillai (1933) Ayurveda Swaroopam, *Keralam*, 3(11-12) and 4(1); K. E. Madhava Menon (1924) Thridoshangal, *Samabhavini*, 2(4).

⁸⁷ Paravoor K. Gopala Pillai (1933) Ayurveda Swaroopam, *Keralam*, 3(11-12) and 4(1).

⁸⁸ Ibid.

⁸⁹ Ananthapurathu Moothakoyil Thampuram (1897) Vaidyam, *Bhaashaposhini*, 1(1).

⁹⁰ M. D. (1918) Nattuvaidyathinte Punarudharanam, *Kerala Kesari*, 3(2-4).

⁹¹ Following Zimmermann, Arnold (1993) has pointed out that environmental determinism was an important frame of reference in Hindu medical practices.

⁹² Berger 2013.

knowledge is developed according to the local environmental conditions, climate, gastronomic culture, geography, and local ways of life.⁹³ English medicine is developed based on the European socio-ecological environment and is more equipped to deal with health and disease conditions in that environment. Such knowledge may not be helpful and may even produce adverse effects when applied in a different geographical and ecological context. *Nattuvaidyam* (native medical practices) was presented as the best-suited system for local conditions.

Arya Vaidya Samajam and Keraleeya Ayurveda Samajam were critiqued for adopting Western methods of teaching and examination from a similar notion of inappropriateness.⁹⁴ They were ridiculed as part of the general tendency to imitate westerners. It was warned that any attempts to follow the English model to revive existing practices would only yield unwanted results. It was argued that Ayurveda is an evolving tradition; however, necessary changes should be based on the regional conditions and examination of classical texts and not copied from the west. Panikkar draws attention to similar rhetoric in the deliberations of Arya Vaidya Samajam. He argued that by framing the effectiveness and suitability of indigenous medicine in this manner, the interlocutors were projecting indigeneity as a 'strength of the indigenous system'.⁹⁵ Langford has also made similar observations. According to him, indigeneity in such articulations is not contrasted with inauthenticity but inappropriateness of European medicine.⁹⁶

Thus, a section of the local intelligentsia argued for a revivalist approach based on classical texts and shunning the modern paradigm. On the other hand, there were attempts at revitalising indigenous practices by incorporating modern elements from modern science. In this framework, the necessity of collective action for the modernisation of knowledge was highlighted.⁹⁷ The use of popular print to popularise knowledge and as a space for interaction among the practitioners and interlocutors was highly advised. Advocates of the revitalisation movement also sought the patronage of regional rulers and elites

⁹³ M. D. (1918) *Nattuvaidyathinte Punarudharanam*, *Kerala Kesari*, 3(2-4).

⁹⁴ *Ibid.*

⁹⁵ Panikkar 1992 p 180.

⁹⁶ Langford 2002 p 79.

⁹⁷ Ananthapurathu Moothakoyil Thampuram (1897) *Vaidyam*, *Bhaashaposhini*, 1(1).

to enable the institutionalisation and modernisation of indigenous medicine in the region. The inclusion of elements from modern science into the Ayurvedic curriculum was highly appreciated. Some suggested that students should have an opportunity to learn both the traditions in colleges. Such revivalist arguments can be seen as late as 1952.⁹⁸

Several essays on anatomy, surgery, germ theory, aetiology, diagnosis, and hygiene tried to highlight the advancements in both theory and practice of classical Ayurveda.⁹⁹ Relevant excerpts from texts of Sushruta and Vagbhatta were quoted. Such articles explained the modern medical understanding of the subject at hand and then discussed the corresponding explanations in Indian traditions, speculating about the causes that arrested further development. Discussion on anatomy in 'Nattu Vaidyathinte Punarudharanam' (Revival of Indigenous Medicine) in *Kerala Kesari* offers an instance of this reasoning. The author writes,

"We also know anatomy. However, our anatomical knowledge is not like the details collected during the land survey. The west needs such surveys because surgery is a common procedure in modern medicine. The Indian system suggests surgery only as a last resort and hence is very rare. Anatomical knowledge needed for such rare procedures is well developed in Indian systems. However, we believe that most of the ailments can be treated by medicine. Many conditions for which modern science prescribes surgery can be treated with medicine in Ayurveda".¹⁰⁰

By offering a contextual explanation for the development and use of the knowledge, they presented a tradition that has the potential for progress given the right conditions, thereby negating the colonial argument of obsolescence of indigenous medicine.¹⁰¹

⁹⁸ Dr Kamala Ramayyar (1952) Ayurveda Allopathy- Misra Padanam, *Vidyabhivardini*, 7(7).

⁹⁹ J. Chakoru Konikkara (1930) Ayurvedavum Shastrakriyayum, *Keralam*, 1(5); R. (1933) Ayurvedavum Rogabeejangalum, *Kairali*, 18(3); S. K. Kharrier Ullala (1915) Kushta Rogam, *Kerala Kesari*, 1(7); Anonymous (1919) Pallutheppu, *Kerala Kesari*, 4(3-4).

¹⁰⁰ M. D. (1918) Nattuvaidyathinte Punarudharanam, *Kerala Kesari*, 3(2-4) p 172.

¹⁰¹ Prakash 1999, Panikkar 1992.

Negotiating Identities

The revitalisation of Ayurveda in Kerala is understood as part of the larger anti-colonial consciousness and cultural awakening in the late nineteenth and twentieth century in India.¹⁰² It is also interlinked with the development of the idea of a unified Kerala comprising the regions of Malabar, Cochin and Travancore.¹⁰³ The signature of these cultural negotiations can be traced in popular literature too and are complicated by references to religion and geography.

As already discussed, there were attempts to trace the genealogy of medical knowledge to classical Hindu texts, a process that imagined a collective national Hindu past for the nation.¹⁰⁴ As Cleetus puts it,

“... though Travancore was a regional entity, modernisation of Ayurveda reflected the state’s attempt to become part of a nationalist identity that located itself within a larger Hindu cosmology, in which social status, identity and political power were classically defined”.¹⁰⁵

The larger narrative imagined a nation and located the indigenous within it. Dialogue between different traditions of medicine was then imagined as the debate between different civilisations: Aryan/ Hindu/ Indian vs the west. ‘Nattu Vaidyathinte Punarudharanam’ in *Kerala Kesari* explained that Ayurveda originated in *Aryavartham* (denoting Indo-Gangetic Plain) and later spread to other places like Kerala incorporating changes specific to regional conditions.¹⁰⁶ In another essay, Paravoor K. Govinda Pillai suggested that *Keraleeya Ayurvedam* was a composite body of knowledge that evolved from the intersection of three systems- the Arya Vaidyam, Dravida Vaidyam and Unani Vaidyam.¹⁰⁷ Dravida Vaidyam here was explained as the medical practices of the people who

¹⁰² Habib and Raina 2005, Sivaramakrishnan 2006, Panikkar 1992.

¹⁰³ Panikkar 1992.

¹⁰⁴ Ananthapurathu Moothakoyil Thampuran (1897) Vaidyam, *Bhaashaposhini*, 1(1); Kerala Varma Thampuran (1931) Keralathile Vishachikitsa, *Keralam*, 2(7).

¹⁰⁵ Cleetus 2018 p 101.

¹⁰⁶ M. D. (1918) Nattuvaidyathinte Punarudharanam, *Kerala Kesari*, 3(2-4).

In this narrative, the term *nattuvaidyam* was used to denote Ayurveda in Kerala instead of its composite reference for a variety of indigenous practices.

¹⁰⁷ Paravoor K. Gopala Pillai (1932) Keralavum Ayurvedavum, *Keralam*, 2(9).

inhabited the region before the inflow of Aryan migration. The author further argues that this makes Ayurveda in Kerala more advanced than in other places.

However, not everyone favoured such syncretic history. Authors like Ananthapurathu Moothakoyil Thampuran saw traditions like Unani and Siddha as corrupting influences on the authentic tradition.¹⁰⁸ Another author who signed in initials as M. D argued that although *keraleeya nattuvaidyam* (indigenous medical practices of Kerala) was influenced by English medicine, it offers the most original form of Ayurveda available as it escaped the Mughal invasion.¹⁰⁹ The article speculated that during the Mughal rule, Unani medicine was advocated at the cost of Ayurveda, which eventually led to the stagnation of Ayurveda in north India. Ayurveda that sustained the Mughal rule was understood as a compound body of knowledge with infiltration from Unani medicine.

There were concurrent attempts to establish the uniqueness of the Ayurvedic tradition in Kerala and to establish the region as the locus of its identity. Treatment procedures like *pizhichil*, *dhara* and treatments for jaundice, burns and scalds and mental illnesses were highlighted as unique to Kerala. Similarly, advanced paediatrics and specialisation in *Vishavaidyam* (related to toxicology) and *Netra Vaidyam* (related to the treatment of eyes) was underlined as achievements specific to Kerala Ayurveda.¹¹⁰

Another trope that was evoked to establish the uniqueness of the Ayurvedic tradition in Kerala was the Ashtavaidya heritage. According to the folk tales, Ashtavaidyas are a group of eight Namboothiri families along the Kerala coast, whom sage Parasurama entrusted to practice medicine according to the eight divisions of Ayurveda.¹¹¹ Each family developed their traditions and specialisations. A few outside students were accepted as disciples, but generally,

¹⁰⁸Ananthapurathu Moothakoyil Thampuran (1897) *Vaidyam*, *Bhaashaposhini*, 1(1).

¹⁰⁹ M. D. (1918) *Nattuvaidyathinte Punarudharanam*, *Kerala Kesari*, 3(2-4).

¹¹⁰ Ibid; Kerala Varma Thampuran (1931) *Keralathile Vishachikitsa*, *Keralam*, 2(7); Kochi Rama Varma Valiya Thampuran (1917) *Ayurvedodjeevanam*, *Mangalodayam*, 9(11); Paravoor K. Gopala Pillai (1932) *Keralavum Ayurvedavum*, *Keralam*, 2(9-10).

¹¹¹ Aiya 1906 Vol 3. Some folk narratives count eighteen families who were designated as Ashtavaidyans. Later works state that Ashtavaidyas include several families along the coast of the Nila River. For more on the Ashtavaidya tradition of Kerala, see Leela 2008, Menon and Spudich. 2010, Yadugiri 2010.

the knowledge was part of the families' legacy. It ensured a very close-knit network for the transmission of knowledge. For some interlocutors during the twentieth century, this feature of the Ashtavaidya tradition was significant for preserving knowledge and protecting it from quacks.¹¹² Around the same period, from 1922, Kottarathil Shankunni's biographies of Ashtavidyas was serialised in *Bhaashaposhini*.¹¹³

During the twentieth century, the discourse around indigenous medicine was a site of contestations and negotiations of regional and ethnic identities in different parts of the subcontinent. Sivaramakrishnan drew attention to similar negotiations of identity in British colonial Punjab, and Weiss has explored the process in colonial Madras.¹¹⁴ In Madras, Tamil exceptionalism was articulated by claiming a distinct Siddha heritage in the vernacular resisting appropriation into the Sanskritic traditions. In Punjab, the language (Punjabi) was the central axis of contestation of regional, ethnic identity (Sikh) within the larger Hindi-Hindu national identity. In Kerala, there was an increasing understanding of the need to popularise knowledge in the vernacular. However, in medicine, claims for a distinct identity were articulated in terms of the uniqueness of the geographical region and its practices. We see here a complicated process of contextualising the regional identity within the nation through the discourse of medicine. There are several nested arguments involved in the process. First is identifying the history of Ayurveda with the history of the Hindu- Indian nation. Secondly, there is an imagination of a unified regional identity (comprising Malabar, Cochin and Travancore) and denoted by the use of the term 'Kerala' or 'Keraleeya'. Thirdly, this unified sub-nation is situated within the larger nation, yet it does not necessarily dissolve into the mainstream (North Indian) national identity. Lastly, a distinct regional identity is evoked that relates to its geography (South India- aloof from the Mughal rule) and culture (unique medical practices and tradition).

¹¹² M. D. (1918) Nattuvaidyathinte Punarudharanam, *Kerala Kesari*, 3(2-4).

¹¹³ Kottarathil Shankunni (1922) Ashtavaidyanmaar, *Bhaashaposhini*, several issues in volumes 26 through 28. This was part of his larger work *Aithiyamala* in eight volumes (1900- 1934).

¹¹⁴ Sivaramakrishnan 2006, Weiss 2008.

Another discourse related to the negotiation of national and regional identities needs exposition here. Before the standardisation of Ayurveda, varied therapeutic practices were prevalent in different parts of Kerala. In the Travancore State Manual of 1906, Nagam Aiyya recorded Ashtangahridayam, Chintamani and Unani as prevalent healing traditions in Travancore.¹¹⁵ He explained that Ashtangahridayam therapeutic practices are based on the text Ashtangahridayam by Vagbhatta and were the most popular treatment systems throughout North Travancore, Cochin and Malabar. Cleetus and Girija list that a variety of healing practices existed in the region.¹¹⁶ It includes *vishavaidyam* (related to toxicology), *kalarivaidyam*, and *marmanivaidyam* (bone setting and vital spot massaging treatment related to the martial art of Kalari), *siddhavaidyam* (Siddha tradition), *ottamoolivaidyam* (single medicine treatments), and *netravaidyam* (treatment for eyes, ears, and noses). Although some of these were part of larger Ayurvedic practices, Girija explains that each area developed a specialisation with many unique practices related to different family traditions.¹¹⁷ Before the institutionalisation of Ayurveda, these varieties of practices were generally referred to as *nattuvaidyam*, which roughly translates as native medical practices. However, as mentioned earlier, during the twentieth century, through codification and institutionalisation, such varied traditions of knowledge and practices were appropriated into the larger singular identity of Ayurveda and imputed a common classical Sanskrit heritage.¹¹⁸

The discussion on *Vishavaidyam* (treatment of poison) is a case in point. Kerala Varma Thampuran's essay on *Vishachikitsa* (treatment of poison) laid out the practice as a unique tradition of Kerala while highlighting its genealogy in the classical Ayurveda.¹¹⁹ He argued that it is part of the eight branches of Ayurveda, and diagnosis and treatment are based on the *tridosha* theory (humoral theory based on three fundamental humours: *Vata*, *Pitta*, *Kapha*). He listed seven primary texts on *vishavaidyam* and speculated that popular texts like 'Jyotsnika'

¹¹⁵ Aiya 1906 Vol 2.

¹¹⁶ Cleetus 2007, Girija 2017a, 2017b.

¹¹⁷ Girija 2017a, Girija 2017b.

¹¹⁸ Ibid.

¹¹⁹ Kerala Varma Thampuran (1931) Keralathile Vishachikitsa, *Keralam*, 2(7).

were derived from these core texts.¹²⁰ Certain traditions of *vishavaidyam* that were based on mystic rituals and spells (*manthras*) were disparaged as *manthrikakriya* (based on magic/ sorcery) and excluded from the category of *vishachikitsa* (treatment of poison). Langford has pointed out that this process of purging magical from rational knowledge was almost absent in the Ayurveda before the twentieth century.¹²¹ Cleetus explains that the attempt to eliminate the ritual and spiritual elements from medical practice was an essential strategy of redefining indigenous medical practices according to modern sensibilities.¹²² It positioned local medical knowledge in a secular framework.

Nevertheless, as Cleetus points out in a later work, such cosmological conceptions of healing and wellbeing continue to coexist with secular, rational knowledge.¹²³ Many treatment procedures in *vishavaidya* still involve rituals and mantras. In fact, Kerala Varma Thampuran's critique discussed above was targeted at Pambumekkatumana, in Thrissur, which offers treatment for snakebites and certain other conditions that are considered to be caused by the wrath of serpents. The treatment mainly includes spells, certain rituals and offerings to the serpent god performed by a Namboothiri family.¹²⁴ The popularity of Pambumekkatumana as a destination for snake poison treatment and serpent worship in Kerala even today underlines the coexistence of multiple imaginaries of health and medicine.

The diversity in medical practice in the 19th and early twentieth century Kerala was underlined by the practice of medicine by different castes and communities. Along with the 'upper castes', many other castes like Ezhavas, Mannan and Kaniyan and other communities like Syrian Christians and Muslims also practised medicine in the region.¹²⁵ Their corpus of knowledge consisted of textual knowledge (Sanskrit and vernacular) and non-codified practices stored and transmitted orally.¹²⁶ However, in the process of systematisation, such

¹²⁰ Ibid. The seven texts he lists are 'Narayaneeyam', 'Uddesham', 'Ulpalam', 'Meghala', 'Ashtanga Hridayam', 'Kalanjanam', 'Lakshanamrutam'.

¹²¹ Langford 2002.

¹²² Cleetus 2007.

¹²³ Cleetus 2018.

¹²⁴ See <http://www.pambummekkatumana.com/>

¹²⁵ Aiya 1906 Vol 2, Panikkar 1992, Cleetus 2007, 2014, Girija 2016, 2017a, 2017b.

¹²⁶ Girija 2017b.

practices were marginalised as folk medicine or were rejected as quackery.¹²⁷ Ananthpurathu Moothakoyil Thampuran’s discussion of the healing practices of the Kaniyan caste reflects this marginalising perspective. In his words,

“...many from the Kaniyan caste practice medicine today. Although there are shreds of evidence that this caste may have acquired knowledge of astrology from a well-known Brahmin astrologer, there is no evidence to support that people of that caste have learned medicine at any point. The practice of medicine by these and other castes have caused a decline in the status of the knowledge”.¹²⁸

As we can see, the imagination of a classical, Sanskrit and Brahmanical lineage as a condition for the status of knowledge underlines this insistence on the evidence for origin and dissemination of knowledge. It has to be noted that Ananthpurathu Moothakoyil Thampuran belonged to the ruling elites who had started to disseminate Sanskrit text-based medical knowledge among caste like the Ezhavas in the mid-nineteenth century. The higher social (caste) status of such elite members of the intelligentsia enabled them to act as intellectual gatekeepers by defining who belonged and was excluded from the realm of knowledge.¹²⁹ We have already discussed that Ezhavas as a community were receptive to the Sanskrit traditions and utilised this knowledge as a source of social mobility. Strong community mobilisation movements among the Ezhavas helped them to advance knowledge claims. However, other not so dominant castes like Kaniyas were marginalised.

The modernisation of indigenous medicine in Kerala and the institutionalisation and appropriation of knowledge it entailed has been explored in detail by scholars like Panikkar, Cleetus, and Girija.¹³⁰ In the discussion above, I have only attempted to highlight the related debate in popular periodicals. Exploring this literature in general periodicals helps us locate the debate on the modernisation of medicine in a more popular, non-specialist public sphere. In popular literature, we see glimpses of complex social

¹²⁷ Girija 2017b presents a nuanced understanding of this process.

¹²⁸ Ananthpurathu Moothakoyil Thampuran (1897) *Vaidyam, Bhaashaposhini*, 1(1), p 5.

¹²⁹ Cleetus 2007.

¹³⁰ Panikkar 1992, Cleetus 2007, 2014, 2018, Girija 2016, 2017a, 2017b.

imaginaries of health and medicine, embroiled in the parallel discourses of scientificity, tradition, nationalism, regionalism, and caste. It helps to produce a more nuanced account of the social imaginaries of health and medicine in society. The following section further explores these social imaginaries related to notions of health and disease.

Imaginaries of Health and Disease

The literature on health primarily discussed maintaining a healthy body and lifestyle. Health was understood variously as an absence of disease and a state of equilibrium of mind and body.¹³¹ Ideas of health were articulated within a holistic perspective understood as a function of several factors like diet, exercise, breathing and body postures, fresh air and light, hygiene, sleep, and personal habits.¹³² Expressions of the health of a body were assessed based on productivity. Within such a mechanical-economic model, the human body was variously compared to a burning lamp, clock, or steam engine.¹³³ These narratives underlined the image of a productive, hardworking body. They stated that just like a clock needs to be wound regularly, and the steam engine needs coal, the human body needs food to continue working.¹³⁴ For some authors, the burning lamp was only helpful to denote a living body, but for an active, productive body, the steam engine was found to be the more appropriate analogy. They explained the process of food consumption and digestion with reference to fuel combustion and energy transformation in steam engines.¹³⁵ In these narratives, health and disease were explained in terms of the functions of organs. Sickness was explained as a result of the exhaustion or disease of various

¹³¹ K. N. M. (1907) Vaidyashastram, *Rasikaranjini*, 5(3); Anonymous (1889) Aarogyaraksha, *Vidyavinodini*, 1(1); K. Kochunni Menon (1915) Shareerasugha Samrakshanam, *Kerala Kesari*, 1(5-6).

¹³² Dr K. Raman Thambi (1909) Aaharam, *Sharada*, 4(3); S. Subramania Ayyan (1898) Arogathayum Manushya Shareeravum, *Bhaashaposhini*, 2(5).

¹³³ S. Subramania Ayyan (1898) Arogathayum Manushya Shareeravum, *Bhaashaposhini*, 2(5); *Bhaashaposhini*, 4(3); N. R. K. (n.d) Aharam, *Bhaashaposhini*.

¹³⁴ S. Subramania Ayyan (1897) Shareera Saukhyam, *Bhaashaposhini*, 1(7); N. R. K. (n.d) Aharam *Bhaashaposhini*.

¹³⁵ N. R. K. (n.d) Aharam *Bhaashaposhini*. The same argument can also be seen in K C Mammen Mappila (n.d) Bhakshanam, *Bhaashaposhini*, 3(9).

parts of the body, drawing analogies to the clock where a fault in any one hand leads to the breakdown of the entire system. A diseased or sick body was compared to a rusted clock.¹³⁶ We see that in these narratives, the idea of health based on the modern understanding of physiology takes prominence. The indigenous knowledge of health and disease based on the humoral composition of the body was already contested as the *tridosha* theory failed to fit in the evidential frameworks of modern medicine.¹³⁷

One can read the representations of a body politic and a political economy based on technological and industrial developments in these analogies of the clock and steam engine. Sigsworth, Worboys and Worboys had explained that the idea of food as fuel for the body or as the building material for the body was a common imaginary in nineteenth-century England.¹³⁸ Those imaginaries were related to the prominence of industrial technology during the period. They have pointed out that such mechanical-industrial imaginaries were dominant in the public health discourse about the working class. In Malayalam, the dynamics of caste- class were more explicit in the literature on health and exercise, and we will discuss them in the following subsection. Before that, we will have an overview of the popular discussion on diseases.

Diseases were explained as an absence or lack of balance among different factors of health.¹³⁹ Lack of food and nutrition, impure drinking water, lack of personal hygiene and poor dressing habits, exposure to elements, and low immunity were identified as significant causes of disease.¹⁴⁰ Stress and lifestyle changes brought about by westernisation were listed as significant causes of maladies.¹⁴¹ In general popular science, writings aimed to create awareness about the causes and symptoms of various diseases, their treatments, and

¹³⁶ S. Subramania Ayyan (1898) Arogathayum Manushya Shareeravum, *Bhaashaposhini*, 2(5); S. Subramania Ayyan (1900) Vyayamam, *Bhaashaposhini*, 4(3).

¹³⁷ Cleetus 2007.

¹³⁸ Sigsworth, Worboys and Worboys 1994.

¹³⁹ Anonymus (1963) Bharateeyarude Bhakshanakuravum Balaheenathayum, *Prabuddha Bharatham*, 1(1).

¹⁴⁰ Ibid; Dr A. R. Poduval (1944) Bhakshanavum Poshanavum, *Mangalodayam*, 19(6); C. D. D. (1889) Aarogya Raksha Margam, *Vidyavinodini*, 5(3-7).

¹⁴¹ K. Kochunni Menon (1915) Shareerasugha Samrakshanam, *Kerala Kesari*, 1(5) and (6); J. Marcel (1949) Aadhiyum Vyadhiyum, *Jayabharatham*, 1(4); Prof. Dr Goswami (1951) Indiakarude Anarogyahethukkalum Nivarana Margangalum, *Pulari*, 3(1).

provided instructions for the caregiver.¹⁴² Scientific awareness was deemed necessary for maintaining health and preventing diseases. Superstitious healing practices were strongly critiqued. The dominance of a fatalist attitude - the idea that disease is the result of one's karma and thus unavoidable were criticised as one of the major hindrances towards preventing and treating diseases.¹⁴³

Leprosy, tuberculosis, smallpox, cholera and filariasis were the common diseases discussed in the popular literature.¹⁴⁴ Fever, typhoid, plague, pneumonia, diabetes, and cardiovascular diseases were also covered.¹⁴⁵ Many of these diseases created havoc in the region during the twentieth century, and it underlines the relevance of popular science literature addressing them. In the history of public health, Nagam Aiyya in 1906 and Velu Pillai, almost half a century later (in 1940), have listed many of these diseases as common ailments in Travancore.¹⁴⁶ We have already seen that some of these diseases have received special attention under the Rockefeller Foundation's public health initiative.

Many of these didactic essays were often laced with comments on the politics of knowledge. They framed the discussion on diseases and treatment as conversations between different traditions of medicine. They argued that by observing the individuals' emotional and affective changes, Ayurveda helps diagnose diseases like tuberculosis and leprosy early. Thus, Ayurveda assumes a superior position in treating such diseases.¹⁴⁷ Related dialogues were also visible

¹⁴² Pandalam Krishna Warriar (1903) Vasoori, *Bhaashaposhini*, 7(8); Kushta Rogam (1915), *Kerala Kesari*, 1(4).

¹⁴³ S. Subramania Ayyan (1898) Arogathayum Manushya Shareeravum, *Bhaashaposhini*, 2(5).

¹⁴⁴ Anonymous (1915) Kushta Rogam, *Kerala Kesari*, 1(4); A. R. Poduval (1934) Vishoochika, Nadappudeenam. Thalethatti, Cholera, *Bhaashaposhini*, 38(3-4); Ayurvedanweshakan (1931) Manthu Allengil Perunkaal, *Deepam*, 2(2); K. C. Veeraraayan Raja (1910) Vasoori Keeri Vayykal, *Mangalodayam*, 2(6); Anonymous (1916) Kshyaya Rogam, *Mitavadi*, 4(1).

¹⁴⁵ Pramehavum Naalikeravum (1930) *Deepam*, 1(5); Rogari (1918) Jwara Chikitsa, *Kerala Kesari*, 3(6-7); T. K. Krishna Menon (1889) Plague, *Vidyavinodini*, 10(1); G. (1897) Pnuemoniyayum Naatuvaidyanmarum, *Bhaashaposhini*, 1(9); P. V. Panicker (1932) Hridrogam, *Bhaashaposhini*, 36(1).

¹⁴⁶ Pillai 1940 Vol 3.

¹⁴⁷ Dr R. P. Chittezhham (1952) Ayurveda Pankti Kshaya Rogathe Sambandhicha Bharateeya Vijnanangal, *Vidyabhivardini*, 7(9) -7(10); S. K. Kharrrier Ullala (1915) Kushta Rogam, *Kerala Kesari*, 1(7).

in essays on *vishavaidyam* (treatment of snake poison) that discussed first aid and treatment for snake bites.¹⁴⁸

Factors Affecting Health and Disease

As mentioned earlier, ideas of health were articulated within a holistic perspective of wellbeing, understood as a function of several factors. Food, exercise, proper breathing and maintaining body postures, fresh air and light, hygiene, sleep, and habits were considered significant factors affecting health¹⁴⁹. A combination of these factors was suggested as vital for mental and physical wellbeing and increasing longevity of life.¹⁵⁰ One telling example is a long-serialised article that appeared in *Vidyavinodini* in 1889- *Aarogya Raksha Margam* (Ways to Preserve Health).¹⁵¹ The author lists eight factors that affect health- air, water, sleep, food, personal hygiene, exercise, home, and environment. Each of these constituents is explained in detail. For instance, the segment on air explains the chemical composition of air, the importance of different components of air for life, the need for fresh air for good health and the diseases caused for want of it, the factors that affect air quality and how to ensure circulation of fresh air in the house. Mental health was also discussed extensively. Sleep was put forward as the indispensable factor of mental health.¹⁵² Literature about sleep stressed the need for rest and rejuvenation of mind and body. Physiology of sleep, desirable duration, bodily and environmental conditions to attain a good night's sleep were explained.¹⁵³ Other oft-repeated themes were the relationship between mind and body, location of

¹⁴⁸ Edamarathu V. Sebastian Vidwan (1930) *Vishavidya*, *Keralam*, 1(2); Kerala Varma Thampuran (1931) *Keralathile Vishachikitsa*, *Keralam*, 2(7).

¹⁴⁹ Dr K. Raman Thambi (1909) *Aaharam*, *Sharada*, 4(3); Anonymous (1889) *Aarogyaraksha*, *Vidyavinodini*, 1(1); S. Subramania Ayyan (1898) *Arogathayum Manushya Shareeravum*, *Bhaashaposhini*, 2(5).

¹⁵⁰ R. Easwara Pillai (1924) *Aaharavum Aayussum*, *Lakshmibai*, 20(1); T. V. Rayara Kuruppu (1934) *Dheerghayussinulla Margangal*, *Bhaashaposhini*, 38(7-8).

¹⁵¹ C. D. D. (1889) *Aarogya Raksha Margam*, *Vidyavinodini*, 5(3-7).

¹⁵² S. Subramania Ayyan (1897) *Shareera Saukhyam*, *Bhaashaposhini*, 1(7); C. D. D. (1889) *Aarogya Raksha Margam*, *Vidyavinodini*, 5(3-7).

¹⁵³ Edanthadavil Ombatham Kooru (1905) *Sughaswapna Margam*, *Rasikaranjini*, 3(1); C. D. D. (1889) *Aarogya Raksha Margam*, *Vidyavinodini*, 5(3-7); A. P. Krishnan Nair (1915) *Nidra*, *Mangalodayam*, 8(2).

the mind, explanation of dreams, mesmerism and hypnotism.¹⁵⁴ I have not elaborated on these topics in this chapter. The discussion has to be contextualised in the colonial history of psychology, psychoanalysis and Ayurvedic psychiatry- an area that requires extensive research and may lead to an unnecessary diversion from the argument of this chapter. Some other factors of health that were discussed more frequently are elaborated below.

Exercise

Several essays foregrounded the necessity of exercise for a healthy body explaining its positive effects on blood circulation, digestion, and emotional wellbeing.¹⁵⁵ Exercises were suggested according to one's occupation and lifestyle. People whose daily activities involved much mental work, like judges and lawyers, were encouraged to do physical exercise. Working-class people already engaged in physical work as part of their occupation were prescribed reading for intellectual and moral upliftment.¹⁵⁶ For women, domestic chores were prescribed as the best workout.¹⁵⁷ These essays offer insights into several interrelated layers of social imaginaries embedded in the discourse of health and disease.

In these discussions, the working-class body (male and female) was projected as an ideal. It was argued that the 'moderate' intake of food and 'optimum utilisation of energy' through physical labour shaped and toned these bodies akin to 'images in anatomical textbooks'.¹⁵⁸ Regular physical exertion was also related to fewer illnesses and, for women, ensured healthier pregnancy and

¹⁵⁴ K. I. V. (1903) Mesmarashastram, *Bhaashaposhini* 9(11); P. R. Narayana Iyyer (1915) Manasa Shakti, *Kerala Kesari* 1(3); A. D. Harisharma (1915) Manassu, *Kerala Kesari* 1(7); P. N. Moosath (1933) Manashastram, *Keralam*, several issues vol 3 and vol 4; P. K. Narayanan Unnithan (1921) Manassu, *Keraleeya Yuvajana Mithram* 5(3-12); K. Paramu Pillai (1912) Hypnotism, *Dakshina Deepam*, 1(3).

¹⁵⁵ S. Subramania Ayyan (1900) Vyayamam, *Bhaashaposhini*, 4(3); Anonymous (1905) Vyayamam, *Sharada*, 1(4); Kuzhithara C. M. Ayyappan Pillai (1904) Vyayamam, *Rasikaranjini*, 2(12); Koyyathu Kochunni Menon (1914) Vyavamavum Athinte Phalangalum, *Mangalodayam*, 6(1).

¹⁵⁶ S. Subramania Ayyan (1900) Vyayamam, *Bhaashaposhini*, 4(3).

¹⁵⁷ Sharada (n. d) Veetuvela, *Sharada*; P. K. Panikkar (1916) Sthreekalum Aarogya Rakshayam, *Sumangala*, 1(9-10).

¹⁵⁸ Dr A. R. Poduval (1944) Bhakshanavum Poshanavum, *Mangalodayam*, 19(6).

delivery.¹⁵⁹ Thus people were advised to regulate food intake and engage in physical activity to achieve the bodily features of the working class. Recalling Sigsworth, *Worboys and Worboys*' observation above alerts us to read usages like 'optimum utilisation of energy' as mechanical imaginaries associated with the working class.¹⁶⁰ Interestingly, the working-class body is only viewed as a productive mechanical body, and any association with caste-based purity and pollution is erased. By projecting the working-class body as the epitome of health, such essays individualised and secularised these caste bodies. In other words, the discourse of health crossed the boundaries of caste disabilities to bring the working class into the medical-scientific discourse. Through such mechanical imaginaries, these narratives set aside the socio-political questions related to caste and health, including poverty, nutrition and living conditions.

The social history of Kerala has noted that most of the periodicals published in Malayalam during the nineteenth and early twentieth century were catering to an emerging educated middle class who were negotiating a new modern identity.¹⁶¹ As discussed earlier in the thesis, it was a period of large-scale social change- caste and community mobilisations, new modes of economic production, family organisation, and new lifestyles were taking shape. This nascent middle class was taunted for its uncritical imitation of the west, especially in dress and food habits. They were ridiculed for adopting 'western' means of leisure like reading novels and participating in sports and games while labelling any other form of physical work as 'low status.'¹⁶² The representations of the working-class body as a health ideal embody this critique of westernisation. Such critique of westernisation in the discussion on health and exercise acquires more subtle hues in the context of gender and domesticity, as we will see in chapter seven.

Hygiene and Sanitation

Hygiene and sanitation were other important aspects of health highlighted in the literature. The history of the discourse of hygiene in India has

¹⁵⁹ P. K. Panikkar (1916) *Sthreekalum Aarogya Rakshayum, Sumangala*, 1(9-10).

¹⁶⁰ Sigsworth, *Worboys and Worboys* 1994.

¹⁶¹ Devika 2007.

¹⁶² S. Subramania Ayyan (1900) *Vyayamam, Bhaashaposhini*, 4(3).

highlighted that it defined the ideas of home and the nation during the twentieth century.¹⁶³ Personal hygiene and sanitation were explained as necessary for good health and prevention and cure of diseases. Waking up early in the morning, cleanliness of house and surroundings, ensuring air circulation in the rooms, spacious rooms with access to abundant natural light were major topics explained within a popular science framework. Such essays followed a general style of explaining the scientific principles in simple language, connecting them to everyday lives. Thus, an unassuming article on housing would start by explaining the fundamentals of blood circulation in the human body and the necessity of fresh air for the process.¹⁶⁴ The discussion is then directed to the importance of fresh air in one's living space. The idea is further elucidated with principles of air circulation and ventilation before commenting on the construction of houses. Traditional architectural styles like *naalukettu* were questioned within the frame of modern science.¹⁶⁵ Sanitation and its relations to epidemics and community health were frequently discussed. Practices like open defecation and building toilets and cattle shelters close to the house were criticised.¹⁶⁶ Matters of personal hygiene like bathing, use of soap, clean clothes, and dental hygiene were also laid down in detail.¹⁶⁷

Social and personal hygiene was discussed from the perspectives of modern medicine and Ayurveda. Writings based on Ayurveda resisted the conception of hygiene and sanitation as a western idea. In an anonymous article on dental care in *Kerala Kesari*, the author argued that individual and social hygiene are discussed in detail in the Indian sciences.¹⁶⁸ The essay stated that the Indian shastras are a compendium of customs, rituals, and practices based on scientific principles meant to achieve physical health and mental purity for the individual and society as a whole.

¹⁶³ Prasad 2015.

¹⁶⁴ From Ladies Magazine (n.d) Gruhasaukhyam, *Bhaashaposhini*.

¹⁶⁵ S. Subramania Ayyan (1897) Shareera Saukhyam, *Bhaashaposhini*, 1(7).

¹⁶⁶ Ibid; A. R. Poduval (1922) Vishoochika (NadappuDeenam), *Kairali*.

¹⁶⁷ Kuzhithara. C. M. Ayyappan Pillai (1904) Vyayamam, *Rasikaranjini*, 2(12); C. D. D. (1889) Aarogya Raksha Margam, *Vidyavinodini*, 5(3-7); S. Subramania Ayyan (1897) Shareera Saukhyam, *Bhaashaposhini*, 1(7).

¹⁶⁸ Anonymous (1919) Pallutheppu, *Kerala Kesari*, 4(3-4).

In the second chapter of this thesis, we have noted that cleanliness, hygiene, and sanitation were important tropes that characterised the missionary and social discourse on Dalit modernity during the nineteenth and twentieth century.¹⁶⁹ Sanal Mohan points out the representation of such discourse in popular literature.¹⁷⁰ Ezhava social reformer Sree Narayan Guru also gave importance to cleanliness.¹⁷¹ Sigsworth, Worboys and Worboys have noted a similar narrative of hygiene and reform in the popular science discussion on the working class in England.¹⁷² This discourse delves on personal and social hygiene and implies their living conditions and food habits. Although I did not find any direct references to caste reform and hygiene, it is worth noting that diverse archival sources may offer more insights into the socio-political dynamics underlying the popularisation of science.

Diet

We have already noted that the discussion on food underlined its functions for the body. Dr Raman Thambi, a medical officer in Travancore, defined food as “the substance that provides nutrition for the body and enables the body for work”.¹⁷³ Given the vital functions of food for the growth and sustenance of the human body, a scientific understanding of food was considered inevitable. An article ‘Aharam’ (Food) in *Bhaashaposhini* starts by citing Francis Bacon to underline the necessity of systematic observation and analysis of every aspect of nature.¹⁷⁴ In several lengthy essays, food was explained as a double-edged sword and caution was advised regarding kinds of food beneficial for the body, quantity of food, how to eat and when to eat different kinds of food.¹⁷⁵ Moderate intake of food was considered an essential virtue for health. The significance of increasing variety in diet and choosing it according to the climate

¹⁶⁹ Mohan 2015 p 55.

¹⁷⁰ Ibid.

¹⁷¹ Bose 2015.

¹⁷² Sigsworth, Worboys and Worboys 1994.

¹⁷³ Dr K. Raman Thambi (1904) Aaharam, *Sharada*, 4(2) p 61.

¹⁷⁴ N. R. K. (n.d) Aharam *Bhaashaposhini*.

¹⁷⁵ C. D. D. (1889) Aarogya Raksha Margam- Bhakshanam, *Vidyavinodini*, 5(5); Dr K. Raman Thambi (1904) Aaharam, *Sharada*, 4(2-3).

and one's lifestyle was underlined.¹⁷⁶ Pointers for selection of good quality, fresh ingredients were popular. The nutritional composition and health benefits of different items were explained. Eggs and nuts were advised as highly nutritious items.¹⁷⁷ Prenatal and postnatal dietary plans for women and diet for children was very popular, especially in women's magazines.¹⁷⁸

Historical scholarship on food culture in India during the colonial period has revealed that culinary practices were enmeshed in the cultural and political negotiations engendered by colonialism. In his study of Bengali popular science, Sengupta shows that the idea of a proper healthy diet was embroiled in the notion of national health.¹⁷⁹ Prasad has contextualised the popular discourse on food in the idea of nationalism through a more pertinent question. She asks –

“In what ways did food in particular (and related discourses about hunger, nutrition, diet, and sustenance) supply the ingredients that could offer a material body for the nation and a politico-moral-cultural body for the citizen”?¹⁸⁰

In Malayalam, although the literature on general health presented the image of a productive body, it was not always related to the concerns of an emerging nation. On the other hand, the discussion on maternal health, infant health and food mainly was articulated within a nationalist framework with eugenic undertones.¹⁸¹ Children were defined as future citizens whose moral and physical health determined the future of an emerging nation. Mothers were thus responsible for nurturing the child and the nation.¹⁸² Such dynamics manifested in essays on prenatal and postnatal dietary plans for women, and infant and child

¹⁷⁶ S. Subramania Ayyan (1898) Arogathayum Manushya Shareeravum, *Bhaashaposhini*, 2(5); Anonymous (1936) Bharateeyarude Bhakshanakuravum Balaheenathayum, *Prabhuddha Bharatham*, 1(1).

¹⁷⁷ Thelapurathu Narayanan Nambi (1923) Aarogya Paripalanam, *Kairali*, 8(3); Anonymous (1951) Mutta- Oru Samrakshana Bhakshyam, *Vidyabhivardini*, 6(5); Sri Cheruvari Achuthan Chovva (1952) Parangi Maangayum Andiyum, *Vidyabhivardini*, 7(4-5).

¹⁷⁸ Dr K. Raman Thampi (1917) Kuttikalku Pattiya Aaharam, *Lakshmibai*, 12(6); K. Govinda Menon (1930) Garbha Raksha, *Lakshmibai*, 25(10); Dr T. K. Koman Nair (1930) Garbhinikal Ariyendathu, *Deepam*, 1(3); Anonymous (1942) Shishukkalkulla Aaharam, *Kairali*, 26.

¹⁷⁹ Sengupta 2010.

¹⁸⁰ Prasad 2015 p 23.

¹⁸¹ Ramanna 2007, Nadkarni 2014.

¹⁸² C. Mariyamma Pootharayil Chambankulam (1927) Shishusamrakshanam, *Muslim Mahila*, 2(1); T. C. K. (1929) Shishukkalude Aaharam, *Lakshmibai*, 24(5).

diet.¹⁸³ These narratives were prevalent in women's magazines and will be explored later in this thesis.

Discussion on a diet was substantiated with a detailed discussion of the process of digestion and nutrition. 'Bhakshanam' (food) by K. C. Mammen Mappila, in *Bhashaposhini*, explained the nutritional composition of food, highlighting the role of carbohydrates and fat in the growth and maintenance of a healthy body.¹⁸⁴ Another article, also titled 'Bhakshanam', explained digestion of food and absorption of nutrients by the blood.¹⁸⁵ Dr Raman Thambi writing in *Sharada*, a women's magazine, suggests –

“Four pointers to determine whether a food item is good or bad for the body-

- (1) Check the nutritional composition of the food item
- (2) An estimation of the energy it provides for work
- (3) Ease of digestion and nutrient absorption
- (4) Benefits of the nutrients for the body”.¹⁸⁶

In his lengthy article on food and digestion, the author also provides a list of everyday food items detailing the proportion of water, carbohydrates, fat, and protein in each of them. The discussion includes various grains, pulses, legumes, vegetables, fruits, nuts, and animal products. In a similar framework of science and health, potable water, measures to ensure the cleanliness of water sources and the process of purification and filtration of water was explained in detail.¹⁸⁷

Discussion on food often involved deliberations on cultural and gastronomic practices. Like in other parts of India during the twentieth century, meat consumption was a common point of contention.¹⁸⁸ Vegetarianism was

¹⁸³ Dr K. Raman Thampi (1917) Kuttikalku Pattiya Aaharam, *Lakshmibai*, 12(6) and (7); Mrs E. Raama Warriar (1924) Shishukkalude Bhakshanam, *Lakshmibai*, 20(3); V. Koman Menon (1906) Garbhinikal Ariyendava, *Sharada*, 1(12).

¹⁸⁴ K. C. Mammen Mappila (n.d) Bhakshanam, *Bhaashaposhini*, 3(9).

¹⁸⁵ From Indian Ladies Magazine (n.d) Bhakshanam, *Bhaashaposhini*.

¹⁸⁶ Dr K. Raman Thambi (1904) Aaharam, *Sharada*, 4(2-3) p 61-62.

¹⁸⁷ From Indian Ladies Magazine (1903) Shuddha Jalam *Bhaashaposhini*; 7(8) S. Subramania Ayyan (1899) Jalam, *Bhaashaposhini*, 3(2); C. D. D. (1889) Aarogya Raksha Margam, *Vidyavinodini*, 5(3-7).

¹⁸⁸ Sengupta 2010.

presented as a more natural diet. Spiritual, as well as scientific arguments, were laid out to further the cause of vegetarianism. M. Lakshmana Iyer cites research at prestigious universities like Yale and Harvard, which explored the disadvantages of non-vegetarian diets.¹⁸⁹ Consumption of meat was considered unhealthy and a cause of diseases like cancer. A vegetarian diet was projected as most beneficial for physical health and attaining spiritual goals.¹⁹⁰ The literature on health often linked food habits to one's temperament. A vegetarian diet was considered vital to provide fitness, gentle demeanour, clear skin and brighter eyes.¹⁹¹ At the same time, others related it to lethargy.¹⁹² Essays that favour non-vegetarianism encouraged meat consumption as a good source of protein and other nutrients.¹⁹³ Advocates of vegetarianism contested this argument by pointing out that all vital nutrient requirements could be met from vegetables, fruits, and nuts.¹⁹⁴

The popular literature reviewed many existing dietary practices based on the scientific principles of food consumption and digestion. Consumption of tea and coffee, a relatively recent development in dietary habits in the region, was a common topic of such essays. The chemistry of the beverages and the neurochemical reaction it generates in the body was explained. The harmful effects of theine and caffeine were detailed.¹⁹⁵ Drinking coffee was seen as part of the tendency to imitate English culture, which led to the erosion of traditional healthy breakfast habits.¹⁹⁶ Coffee was argued to be particularly harmful to women affecting their fertility. Harmful effects during pregnancy and lactation were listed. Similar cautionary narratives discussed habits like smoking.¹⁹⁷

¹⁸⁹ M. Lakshmana Iyer (1915) Mamsaharam, *Mangalodayam*, 8(2).

¹⁹⁰ Ibid; Mrs E. G. Right (1951) Mamsabhakshanathinte Sthanathil, *Vidyabhivardini*, 6(10).

¹⁹¹ P. G. (1918) Vaidyam- Aarogyam, *Kerala Kesari*, 3(1).

¹⁹² M. Lakshmana Iyer (1915) Mamsaharam, *Mangalodayam*, 8(2).

¹⁹³ Dr A. R. Poduval (1944) Bhakshanavum Poshanavum, *Mangalodayam*, 19(6); C. D. D. (1889) Aarogya Raksha Margam, *Vidyavinodini*, 5(3-7).

¹⁹⁴ P. G (1918) Vaidyam- Aarogyam, *Kerala Kesari*, 3(1).

¹⁹⁵ Chayakulla Dhoshangal (1905) *Rasikaranjini*, 3(8); Kaapikudi (n,d) *Bhaashaposhini*.

¹⁹⁶ Sreejith (2013) has made a similar observation about the critique of western food habits in popular literature. He points out that in 'Parangodi Parinayam' (1892), a novel that presented a conservative critique of English education and westernisation, drinking tea is pointed out as a characteristic of the anglicised heroine.

¹⁹⁷ K. S. K. Kazhinbrum Singapore (1950) Pukavaliyude Doshangal, *Vidyabhivardini*, 5(4-5).

While these newer habits were criticised as a western influence on lifestyle, traditional habits were criticised for not being scientific. Thus rice, a staple item in the diet in the region, was brought under scientific scrutiny.¹⁹⁸ Dr Poduval, a military physician, stated that there is no science or rule (*shastramo sootramo*) in the dietary habits of Malayalees.¹⁹⁹ In his essay on food and nutrition, he related a rice-based diet to a submissive demeanour. He recollected that people in the regiments who consumed more rice were more sluggish and came down with illnesses more often than others who consumed wheat. He also speculated that a change in temperament might be observed among the Malayalee diaspora, who no longer consumed rice as a staple. Moderate rice intake, use of unpolished rice and a diet including a variety of grains was suggested to improve the Malayalee diet.

Dr Poduval's arguments about wheat consumption and the health of the military regiment have a history in the British military discourse on martial races of India. Alavi points out that by the mid-eighteenth century, 'climatic environment and dietary practices' were used to identify the martial races. Within this discourse led by Robert Orme, Alavi writes, "the population of India living in the wheat-producing zones was better built and hence more 'martial' than the short-statured people of the rice-producing zones".²⁰⁰ This connection between rice consumption and weakness in character was an essential concern in Bengali popular literature in the twentieth century.²⁰¹ In Bengal, rice assumed a tremendous symbolic value as a cultural practice defining a Bengali identity. In the discourse on food, rice-eating Bengalis were distinguished from wheat eating Hindustanis.²⁰²

Conclusion

This chapter draws attention to the popular discourse on health and medicine in Malayalam periodicals from the late nineteenth to mid-twentieth

¹⁹⁸ K. M. (1933) Nirahara Vrutham, *Bhaashaposhini*, 37(2); Dr A. R. Poduval (1944) Bhakshanavum Poshanavum, *Mangalodayam*, 19(6).

¹⁹⁹ Dr A. R. Poduval (1944) Bhakshanavum Poshanavum, *Mangalodayam*, 19(6) p 300.

²⁰⁰ Alavi 1995 p 37.

²⁰¹ Sengupta 2010.

²⁰² Prasad 2015.

century. The history of the institutionalisation of modern and indigenous medical care and education in the region and the development of public health discourse helps to situate the study in the regional social history. We see that the Princely state and the vernacular intelligentsia actively participated in the production and circulation of popular discourse on health and medicine. Popular science literature simultaneously embodied the administrative imperatives of the modernising state and the local intelligentsia's aspirations for social change and mobility through the vehicle of science. The conversations involving different traditions of medicine in the general periodicals underline the significance of popular science in understanding the systematisation of science and its legitimisation in society. Such deliberations in the realm of knowledge were also expressions of anti-colonial, nationalist, and regional identities.

The imaginaries of health and disease were intricately embroiled in the parallel narratives of modern medicine and modern Ayurveda. The spillage of such polemics into the didactic essays on health, disease, and personal hygiene underlines that the negotiations between different traditions of medical practices were not restricted to the epistemological and institutional realm. It framed the popular discourse on public health in society. The idea of health and disease as conditions amenable to scientific management were embedded in the imaginaries of a body-politic based on technological and industrial development. In colonial India, science acquired a cultural authority for social critique and legitimation during the nineteenth and twentieth century. In the popular literature, we see that this authority of science impinged on notions of health, food, lifestyle, leisure and even architecture. Thus, this literature is presented as a site to understand the nuances of domestication of modern science in the region. These varied narratives embody a critique of colonialism and westernisation and the imaginations of an independent nation, the realisations of which is dependent on the health of the mother, child, and family. Reading this literature in general periodicals, in a frame informed by the sociological and cultural history of popular science, helps to unravel the imaginaries of caste, class, gender and patriarchy in the popular discourse of health and medicine.

CHAPTER FIVE

Popular Science Literature on Agriculture

Introduction

The history of agricultural science and its popularisation in India is a relatively less explored area, and the lacunae deepen when it comes to vernacular history. Until the turn of the century, scholarship on the history of science and technology and science and technology education in India addressed agriculture only in passing.¹ A few more focussed works on agriculture were mainly located in the Presidencies and other important parts of colonial India.² Although the modernisation of agriculture was a significant factor that drove economic and social development in many princely states, the history of agricultural science and research in these areas have received scant attention.³

In the last two decades, the history of agricultural science and related institutions gained more attention in the history of science and the history of agriculture. The development of scientific agriculture in colonial India, discourses and models that drove the colonial investment in agricultural improvement, and institutionalisation of agricultural research and education are now being explored extensively.⁴ The role of the local intelligentsia in shaping the agricultural discourse is also being appreciated.⁵ Recently, Kumar and Raha

¹ Kumar 1995, Arnold 2000.

² For an overview of the history of agriculture in India, see Randhawa 1983. For discussion on agriculture science and research, see Robb 1988. Arnold 2005, Sen 2010, Borthakur and Singh 2013.

³ Raina 2001, Raina and Habib 2004.

⁴ Arnold 2005, Sen 2010, Borthakur and Singh 2013.

⁵ Raha 2012.

drew attention to the importance of studying vernacular contexts for the history of agriculture.⁶ Their edited volume compiled studies on different aspects of science and modernisation in agriculture in different parts of colonial India and revealed the dynamics of colonialism and nationalism. They put forward a case for an increased focus on agriculture in the history of science in India

Following the discussion in the previous chapters, we have seen that reception and domestication assumed great significance in the history of science in colonial contexts from the last quarter of the twentieth century. Such questions assume added significance in agricultural science as extension and popularisation activities are an essential part of agricultural research. Its importance was realised much early by the colonial government.⁷ Furthermore, the recent focus issue of *Review of Agrarian Studies* on popular literature on agriculture underlines the importance of popular science literature in understanding agricultural modernisation in various vernacular contexts.⁸

In his introduction to the issue, Jayaraman made a case for greater attention to the history of agricultural science and popularisation in colonial India.⁹ Despite the stagnation of agriculture and production under colonial rule, the period is marked by the introduction of new crops, methods of cultivation, new implements, and modern agricultural science in the subcontinent. The colonial government and the local intelligentsia participated in the popularisation of these modern means. Jayaraman explained that these processes are essential for understanding the modernisation of agriculture as they throw light on the politics of circulation and dissemination of knowledge in a colonial context. He calls for a focus on the popular literature on agriculture to understand the varied representations of agricultural modernisation among the local intelligentsia.

Jayaraman and the rest of the papers in the issue underline the significance of vernacular sources in studying the history of agricultural science

⁶ Kumar and Raha 2016.

⁷ Voelcker 1893.

⁸ *Review of Agrarian Studies* (2016) *In Focus- Agricultural Modernisation and Indian-Language Journals in Pre-Independence India* edited by Parvathi Menon and Indira Chandrasekhar 6(2).

⁹ Jayaraman 2016.

and agricultural modernisation. Baksi's paper on Hindi popular literature on agriculture, Baksi and Kamble's paper on Marathi agricultural journals, and Roy's study of the changing perceptions of agriculture among the Bengali literati during the nineteenth and twentieth century reveal that the negotiations of modernity and science in agriculture were intricately embedded in different socio-economic and regional contexts.¹⁰ Drawing insights from these works, this chapter discusses the history of agricultural modernisation in Travancore through a reading of the popular science writings on agriculture in Malayalam periodicals published from the mid-nineteenth to the mid-twentieth century. This literature is analysed to understand social imaginaries of the science underlying the discourse of scientific agriculture in colonial Kerala.

In the context of the history of agriculture in Kerala, most of the works were written from the perspectives of economic and agrarian history. These works mainly focus on agrarian relations, caste and class nexus, revenue systems, land use patterns and peasant agitations.¹¹ They understand agricultural modernisation in a narrow sense as the commercialisation of agriculture. The economic history of Travancore points out that agriculture and allied activities in the region flourished during the late nineteenth and early twentieth century.¹² Although the period coincides with the development of scientific agriculture in the region, the contributions of the department of agriculture or the role of modern scientific agriculture are largely overlooked.¹³

As noted earlier in this thesis, the social history of science and development in princely states like Mysore and Baroda have underlined the importance of scientific and technical management of development. Raina

¹⁰ Baksi 2016, Baksi and Kamble 2016, Roy 2016.

¹¹ For a review of literature on the history of agriculture in Kerala, see Prakash 1987. Also see Jose 1977, Kooiman 1991, Kurup 1988, Ravindran 2016 and Yadu 2017. Tharian and Tharakan (1986) very briefly consider the significance of technological innovations in the development of tea plantations in Kerala.

¹² Prakash 1987.

¹³ Prakash (1987) attributes the agricultural development in the region to certain state policies like the "... land policy of 1865 granting full ownerships rights to holders of government pattom land; land proclamation of 1867 giving security of tenure to tenants of janmom lands; concessions given for starting plantation crops; encouragements and tax concessions given for starting plantations, crops, construction of roads to connect hilly tracts with trading centres; encouragement for reclamation activities; and expanding irrigation facilities" p 15.

observes that the development of irrigation, the introduction of new crops, the development of rural industries and the opening of agriculture schools were part of the development agenda in the princely state of Mysore in the early twentieth century.¹⁴ Similarly, the state of Baroda recognised the importance of modern scientific agriculture much earlier and set up the Department of Agriculture as early as 1887.¹⁵ In this context, it is interesting to explore the history of the institutionalisation of modern scientific agriculture in the princely state of Travancore. It situates science in the social history of the region and helps to tease out the regional nuances of the colonial development discourse.

Therefore, the first section of the chapter presents an overview of the development and activities of the Department of Agriculture in Travancore. The discussion serves as a background to contextualise the popularisation of agricultural science in Malayalam. The second part of the chapter directs attention to literature on agricultural science in popular Malayalam periodicals. The literature is analysed to understand the different ways scientific agriculture was construed in the social imagination of the time. What were the meanings and metaphors associated with the modernisation of agriculture? How was the idea of the modernisation of agriculture related to other dominant ideas of the period? How was the introduction of new knowledge and technology negotiated are some of the questions that frame this section? The discussion shows that the vernacular intelligentsia popularised modern (agricultural) science to encourage the modernisation of agriculture. Modern scientific agriculture was deemed unavoidable for agricultural modernisation, which in turn was conceived as a necessary step towards the socio-economic progress of the state and the nation. We will see that the major topics of discussion in the vernacular popular literature resonated with the modernisation discourse of the princely state, enacted and popularised by the state Agriculture Department. While the second section is the crucial part of this thesis, the first section in itself is important as it throws light on a rarely explored area in the history of Travancore and the history of agriculture in colonial India.

¹⁴ Raina 2001.

¹⁵ Raina and Habib 2004.

Popularisation of Scientific Agriculture- A Background

During the period of study, agriculture was a primary occupation of the people in the region. In the 1906 Travancore State Manual, Nagam Aiya estimated that around forty-seven percent of the population of Travancore was dependent on agriculture.¹⁶ According to Velu Pillai's estimates presented in the State Manual of 1940, fifty-five percent of earning population of Travancore was dependent on agriculture. He records that out of a total of 31,00,000 acres of cultivable area, 25,00,000 acres was under cultivation. The cultivable region included various topographical areas like hills, plains, coastal areas, and high ranges. Wet, dry, garden and plantation cultivation were practised. The vegetation in the region was primarily fed by the tropical Monsoons.¹⁷

The nineteenth and twentieth centuries witnessed the increasing commercialisation of agriculture in the region. Removal of import-export duties, introduction on European plantations and increasing adoption of cash crop cultivation changed the economic and social relations of agriculture.¹⁸ Slavery was abolished in the mid-nineteenth century in Travancore, and it had significant implications in terms of the availability of labour for agriculture.¹⁹ Commercialisation favoured communities like Syrian Christians and Ezhavas to acquire more prosperity and power in socio-political relations. Simultaneously, numerous legislations on family, marriage and inheritance led to fragmentation of land and communities like Nayar, who had earlier enjoyed a dominant status, began to decline.²⁰ The development of scientific agriculture is situated in this social-economic history and becomes crucial to the social history of modernity in the region.

The Agriculture Department in Travancore was established in 1907. However, the modernisation of agriculture in Travancore had commenced much

¹⁶ Aiya 1906 Vol 2.

¹⁷ Pillai 1940 Vol 3.

¹⁸ Jeffrey 1992.

¹⁹ Kooiman 1991.

²⁰ Jeffrey 1992, 1976.

earlier. An almanac and other relevant data regarding rainfall, monsoon and weather were regularly published in Government Gazette at least by the mid-nineteenth century by the Trivandrum Observatory.²¹ A public garden was set up at Trivandrum in 1859. From 1887 exhibitions and cattle fares were conducted in the region, and Travancore was represented at agricultural and industrial exhibitions in nearby areas like Madras and Mysore.²² The Agricultural and Horticultural Society of Madras (formed in 1835) provided seeds of new crops like cotton and nutmeg to Travancore.²³ By the late nineteenth century, Travancore had coffee and tea plantations, most of them owned by Europeans, although local ownership was not wholly absent. Scientific and technological inputs for the plantations was provided by the British government.²⁴

As discussed in chapter two, The Textbook Committee (1866) and the Public Lecture Committee (1887) played an important role in initiating the popularisation of agriculture in the region. An overview of the titles of the lectures delivered by the Committee over the years shows that after establishing the Travancore Agriculture Department, the emphasis on agriculture increased considerably.²⁵ Some of the lectures delivered by the Public Lecture Committee on agriculture were- 'The Coconut Palm' (1890) by S. Swamy Iyengar, 'Silk and its Producers' (1890) by H. S. Ferguson, 'The Chemistry of Plant Life' (1898) by A. W. Bishop, 'Some of Our Important Insect Friends and Foes' (1915) by R. Madhavan Pillai, 'The Possibilities of Scientific Agriculture' (1916) by N. Kunjan Pilla, 'Manurial Value of Different Species of Green Leaves Available in Travancore' (1918) by K. Paramesware Pilla, 'Use of Improved Plough and Artificial Manure' (1920) by R. Subramania Iyer, and 'Cattle Feeding on Scientific Lines' (1921) by K. Subramania Pillai. Alongside these developments supported by the Travancore state, vernacular intelligentsia also contributed to the popularisation of science through the medium of popular print. As discussed in chapter three, various literary associations like the Bhaashaposhini Sabha and

²¹ The first Travancore almanac was published in 1838.

²² Pillai 1940 Vol 3.

²³ Chandranna 2003.

²⁴ Tharian and Tharakan (1986).

²⁵ For more, see Appendix.

Vidyavilasini Sabha formed during the period had vernacularisation of science as an important item in their agenda. However, unlike the case of health and medicine discussed in the previous chapter, we do not know of any locally organised efforts towards popularising modern agriculture. Later, we will return to this when we discuss agricultural science in popular print. For now, we will look at the development of the Travancore Agriculture Department and its contributions to agricultural research, education, and the popularisation of modern agriculture in the region.

The Institutionalisation of Agriculture Research and Education

Travancore Agricultural Department

The Report of the Administration of Travancore for the year 1893- 1894 states that the Travancore government established an agricultural demonstration farm in 1894, 'with an intention to ensure the feasibility of practical instruction before making any attempt at theoretical teaching'.²⁶ B. S. Narayanaswamy Aiyar, who had a Diploma in Agriculture from the Saidapet College of Agriculture (established in 1868), was appointed as the farm's Superintendent. The farm was set up on a trial basis for two years. The continuation of the farm and its expansion to include facilities for agricultural education was conditional on its success in demonstration and as a financial enterprise. The report on the establishment of the farm states,

"The country possesses remarkable facilities for the development of agriculture, and if, with these facilities and with his scientific knowledge, the Superintendent succeeds in working the soil so as to show that a departure from the primitive method of culture is of decided benefit and within the reach of an average farmer, the scheme now introduced cannot fail to popularise itself and lead to substantial progress".²⁷

²⁶ TAR 1893-94 p 151.

²⁷ Ibid.

As we can see, the government had a clear idea of the prospects of the demonstration farm and the role of scientific agriculture and its popularisation in the region. In the two years, the farm was meant to introduce modern means of cultivation and new crops and demonstrate their use and relevance to the local farmers.²⁸

Nagam Aiya notes that the demonstration farm at Karamana was very popular among the farmers from its beginning who visited the farm for seeds and implements.²⁹ The farm introduced iron plough and new crops like groundnut, castor oil plant, maize, cotton and indigo. The farm's success encouraged the government to set up a plan for agricultural education. Agricultural training classes were started at the demonstration farm in 1896 to train teachers for the agricultural schools.³⁰ Primary vernacular agriculture schools were started in different parts of the region, and by the end of the 1890s, there were 18 vernacular schools for agriculture.³¹ Velu Pillai credits these early developments in agricultural education to the zealous efforts of Diwan Sankarasubbier and points out that after the retirement of the Diwan, the educational activities of the farm were halted, although demonstration activities continued.³²

Studies in other parts of the subcontinent like Bengal, Bombay and United Provinces show that by the end of the nineteenth century, there was a beginning of the demand for state intervention in the modernisation of agriculture among the vernacular intelligentsia.³³ In Travancore, similar demands were articulated in the popular print, and submissions were made at Sree Moolam Popular Assembly.³⁴ Following this increasing demand, a Directorate of Agriculture was established in 1907. It followed the model of provincial agriculture departments set up in various Indian provinces.³⁵ An agriculture research laboratory and demonstration farm were also set up in the same year. The department was

²⁸ TAR 1893-94.

²⁹ Aiya 1906 Vol 2.

³⁰ TAR 1897-98.

³¹ Pillai 1940 Vol 4.

³² Ibid.

³³ Jayaraman 2016, Baksi 2016, Baksi and Kamble 2016, Roy 2016.

³⁴ Travancore Government Gazette- 1908, XLVI (22), Pillai 1940 Vol 4.

³⁵ Pillai 1940 Vol 4.

under the land revenue department. The demonstration farm and schools set up earlier were brought under the newly formed department.

Meanwhile, the government deputed N. Kunjan Pillai to study agriculture in Edinburg. Kunjan Pillai studied BSc at Edinburg and went on to do a PhD at Leipzig before returning to Travancore in 1908. On his return, Kunjan Pillai assumed charge as the director of the Department of Agriculture.³⁶ Kunjan Pillai initiated scientific study and planning of agriculture in Travancore and played an essential role in institutionalising scientific agriculture in the region. The department conducted a survey and assessment of the total area under cultivation, the area of cultivable land, and the acreage of principal crops cultivated in the region. This data prepared with the help of the revenue department was utilised to direct further research in agriculture and for publishing a forecast of important crops that could boost the economy.³⁷ The introduction of agricultural education in government schools and the establishment of veterinary hospitals in every state division was proposed.³⁸ Kunjan Pillai focussed on experimentation and agricultural extension activities. Two existing demonstration farms - at Quilon and Trivandrum were converted into experimental farms, and new farms were opened.³⁹

³⁶ Travancore Government Gazette 1908, XLVI (22).

Kunjan Pillai served the Travancore government in various capacities. He was the director of agriculture for more than twenty years and was later made the chief secretary to the government of Travancore. He also served as the census commissioner for the 1931 census. He was adorned with the title of Rao Bahadur Rajyasevanirata.

³⁷ According to 1909-1910 estimates the major crops in the region were

<u>Crop</u>	<u>Acres</u>
Paddy	500000
Coconut	243400
Tapioca	173500
Pepper	43700
Gingelly	28000
Horse gram	26300
Ginger	26100
Elephantfoot yam	17300
Banana	16700
Sugarcane	12000

(Travancore Government Gazette 1911, XLIX (8) p 74).

³⁸ Travancore Government Gazette 1909, XLVII (2).

³⁹ A cattle breeding farm at Trivandrum and an experimental farm for root crops at Kottarakara was opened in 1910. A small coconut farm was also opened at Alleppy to study coconut farming in different kinds of soil, especially on sandy soil. A silk farm was opened at Trivandrum on a trial basis for one year. (Travancore Government Gazette 1909, XLVII (2)). Pillai (1940 Vol 4)

Soon the department expanded, incorporating various scientific sections like agricultural chemistry, entomology, mycology, and botany.⁴⁰ The agricultural laboratory conducted soil surveys in various parts of the state. Farmers were encouraged to send soil samples for analysis. Analysis of manures and food items was also done at the laboratory.⁴¹ Pests, weeds and diseases affecting various crops were studied, and remedies were suggested. As major crops of the region, coconut and paddy received significant attention from the department.⁴² The scientific study of silk, pepper, different fruits, cattle breeding, and poultry also gained momentum in Travancore during the first half of the twentieth century.⁴³ The department introduced many new crops like cotton, maize, sunn hemp, soya beans, jute and linseed.⁴⁴ Many new implements were also introduced; among them, the plough was important. The department introduced the Climax plough from Madras and the Meston plough from the United Provinces.⁴⁵ These ploughs offered the advantages of lighter weight, less draught, deeper ploughing and were suitable for tall or short bulls of the region.

Nevertheless, the imported models' higher costs were a challenge for the farmers, and they continued to use the local models. The department of agriculture supported and encouraged local innovations to suit the regional agricultural practices. With the department's support, cheaper varieties of plough like the Pallikkal Plough and Always Plough (for sandy soil) were developed.⁴⁶ Travancore Gazette notifications show that in 1922, a prize of rupees 500 was announced for people who could develop a motorboat tractor

mentions a paddy farm at Nagercoil and a paddy demonstration farm at Eraniel, a pepper farm at Konni, one fruit farm at Cape Comorin, a demonstration farm at Puliyaara and one more coconut farm at Oachira.

⁴⁰ An entomological division was set up in 1913. A mycologist was appointed in 1919. (Travancore Government Gazette 1919, LVII (49)).

⁴¹ Pillai 1940 Vol 3.

⁴² Ibid.

⁴³ TARs various issues 1910- 1930.

⁴⁴ Travancore Government Gazette 1911, XLIX (8).

⁴⁵ Pillai 1940 Vol 3.

⁴⁶ Ibid. Pillai notes that the local plough was charged at Rs 4, whereas the Climax plough cost Rs 9. A cheaper variety of iron plough was also introduced from Madras that cost Rs 4, but its interchangeable parts had to be brought at 4 annas each. The Meston plough parts also had to be brought separately. The Pallikkal plough was priced at Rs 4, and the Always plough cost only Rs 2.

plough that can be used to plough the Punja lands, which are usually submerged underwater.⁴⁷ Tractors were also demonstrated.⁴⁸

Another area of development that had much influence on agricultural practices in the region was manuring. In the 'Travancore State Manual' of 1906, Nagam Aiyya had observed that,

“...manuring is yet in the empirical stage. Ordinary manorial substances and their effects are perfectly understood; but the science of manuring, its mode of action, the improvements of the methods available, the return to the soil of all that is taken from it and the value of mineral manures are unknown. Special manures are used for special produce which are referred to under the different crops. Agricultural demonstration farms and educational institutions on the subject have yet to do much in the way of making improvements”.⁴⁹

This situation was remedied with the opening of an agricultural research laboratory and the appointment of an agricultural chemist in 1910.⁵⁰ Existing manuring practices were studied, and improved organic and artificial manuring methods were suggested. Manorial experiments were conducted with paddy, coconut, tapioca, sugarcane, banana, pepper, and groundnut. Farmers were instructed in the scientific use and preparation of manures. Within a decade of establishing the department, scientific manures became popular in Travancore.⁵¹ By 1928 ammonium sulphate and superphosphate were so extensively used to cultivate paddy, coconut, and sugarcane that the department had to caution the farmers against complete reliance on artificial fertilisers.⁵² Besides these contributions, the Department of Agriculture played a significant role in developing industries like sugar manufacturing, sericulture and apiculture. Pillai encouraged the formation of agricultural cooperative societies to overcome the problem of credit flow.⁵³ The agriculture department also made

⁴⁷ Travancore Government Gazette 1922, LX (40) p 160.

⁴⁸ TAR 1921-22.

⁴⁹ Aiya 1906 Vol 3 p 11.

⁵⁰ TAR 1909-1910.

⁵¹ Ibid.

⁵² TAR 1928-29.

⁵³ Pillai 1940 Vol 4.

major contributions to modernising animal husbandry and introducing modern veterinary science in Travancore.⁵⁴ In 1915 the Department of Agriculture was renamed the Department of Agriculture and Fisheries.⁵⁵

In 1934 Travancore became a member of the Imperial Council for Agricultural Research.⁵⁶ After that, the Council's policies influenced the research and development of agriculture in the region.⁵⁷ Travancore participated in different national research programs like the all India marketing scheme of 1935, milk recording scheme 1942 and the 1943 scheme for the economic welfare of rural areas.⁵⁸ The Council also extended financial assistance to various studies conducted by the Travancore department, including investigating diseases of coconut palm and improvement of paddy cultivation.⁵⁹ In 1936 the department was again reorganised. Board of Agriculture was created with the director of agriculture and fisheries as the chairperson.⁶⁰ However, this board was short-lived as in 1941, the department's fisheries branch was separated and moved to Travancore University (formed in 1937). The professor of marine

⁵⁴ Veterinary hospitals and cattle farms were established. In 1910, there were three veterinary hospitals in the region, and by 1918, the total number of veterinary institutions in the state was 11, with five hospitals and six dispensaries (TAR 1909-1910, TAR 1917-1918). A cattle census was also conducted. Exhibitions and cattle fairs were organised to introduce higher breeds, and grants in aid were provided to encourage the husbandry of good breeds. The department also paid considerable attention to cattle diseases and played an important role during the outbreak of rinderpest disease. Cattle were treated free of cost, and free inoculation was also provided to healthy cattle. A poultry expert was appointed in 1920, and a poultry farm was opened in Trivandrum. The government also acknowledged the relevance of indigenous veterinary knowledge, and grant in aid was provided to four Ayurvedic physicians (Pillai 1940 Vol 3, TAR 1927-28).

⁵⁵ Introduction of fisheries schools, fish curing yard, breeding farms for seawater and backwater fish are some of the efforts made towards modernisation of fisheries in the region (Travancore Government Gazette various issues 1915- 1918). The department also encouraged the formation of associations among the fishing community for furthering their social and economic interests (TAR 1922-23). A system of night school for the boys of the fishing community in Vaikom was also proposed. These schools were meant for training and general education among the Vala community. The schools provided training in weaving, net making, account keeping, curing of fish, etc., besides elementary education. The first school was started in 1918. By 1923 there were around four fisheries schools in the region at Panavalli, Kuzhithurrai, Cheriazheekkal, and Aroor managed by government as well as private agencies. Private schools received a grant in aid from the government (The Travancore Government Gazette various issues 1917- 1923).

⁵⁶ The Imperial Council of Agricultural Research was set up in Delhi in 1929 following the recommendations of the Royal Commission on Agriculture (1928). The Council was set up as a central body to organise and guide agricultural research in various agricultural departments across the subcontinent. (Borthakur and Singh 2013).

⁵⁷ Pillai 1940 Vol 3.

⁵⁸ Ibid, TAR1942-43.

⁵⁹ Pillai 1940 Vol 3, TAR 1938-39.

⁶⁰ TAR 1938-39.

biology and fisheries was made in charge of the department.⁶¹ Later, research sections of the department- biochemistry, entomology, mycology, and economic botany- were brought under the Director of Research at the Travancore University in 1940.⁶² After the independence, the Travancore Department of Agriculture merged with the Cochin Department of Agriculture in 1949.

Here it is important to point out that the department of agriculture in Travancore had a vast network of intellectual and institutional connections with the agriculture departments in other parts of the subcontinent. Officials from the department were sent for training to various institutions in different parts of the country and abroad. For instance, K. Parameswara Pillai, an agricultural chemist, was deputed to Edinburgh for advanced training.⁶³ T. Padmanabha Pillai, a mycologist, went to Switzerland for training. Travancore officers also underwent training at Pusa in areas like soil bacteriology and mycology.⁶⁴ The fisheries inspectors were trained by Sir Fredrick Nicholson of the Madras Fisheries department.⁶⁵ The Travancore Agricultural Department depended on presidencies and other provinces for expert consultation and technology transfer.⁶⁶ Officials from the department published in important scientific journals of the period, including the *Agricultural Journal of India* published by the Imperial Council of Agriculture Research.⁶⁷ Kunjan Pillai, director of agriculture in Travancore, also presided over the agricultural session of the Indian Science Congress, held at Lucknow in 1923.⁶⁸

⁶¹ TAR 1942-43.

⁶² TAR 1939-40.

⁶³ The Travancore Government Gazette 1923, LX (55).

⁶⁴ An agricultural chemist was sent to Pusa for a six-month course in soil bacteriology (The Travancore Government Gazette 1923, LX (55)). A mycologist was sent to Pusa for training under the Imperial mycologist Dr Butler (Travancore Government Gazette 1919, LVII (49)).

⁶⁵ Pillai 1940 Vol 3.

⁶⁶ Fisheries departments consulted Dr Annandale, Superintendent of the Zoological Survey of India (TAR 1922-23). The entomology department depended on Imperial Entomologist at Pusa for expert opinions (Travancore Government Gazette 1918, LVI (51)).

We have already noted that the department brought improved ploughs from Madras and the United Provinces. Another notable instance of technology transfer was the import of the machinery for sugar manufacture brought from the United Provinces. These machinery and new processes of sugar manufacturing developed by Mr Hadi were found to be more cost-effective than the West Indies method and thus more suitable for small entrepreneurs in Travancore. An agricultural assistant Gopala Pillai was sent for training under Mr Hadi (The Travancore Government Gazette 1911, XLIX (8)).

⁶⁷ Pillay (1908), Pillai (1912).

⁶⁸ Scientific Notes and News 1922.

These interactions show that developments in Travancore were connected to the extensive network of agricultural research and training in colonial India. Thus, the evolution of agricultural science in Travancore has to be read in close connection with the developments in other parts of the subcontinent without losing sight of the regional specifics. As pointed out at the beginning of this chapter, the history of agricultural science in colonial India focusses only on the major presidency regions as centres of knowledge production and indirectly ruled India has received little scholarly attention. While it is true that modernisation and institutionalisation of agricultural research and extension commenced in the Presidency towns, the networks of knowledge production and dissemination subsequently forged tell a more grounded history of the circulation of scientific knowledge.

Evolution of Agricultural Education in Travancore

As noted above, within two years of establishing the first demonstration farm in Trivandrum in 1894, a system of elementary agricultural education was also introduced in the state. The scheme was to set up primary schools for agricultural education, but the project suffered a setback after the retirement of Diwan Sankarasubbier.⁶⁹ After Kunjan Pillai took over as the Director of Agriculture, the plans for agricultural schools were revived. However, the proposal for opening an agricultural school was rejected by the government. Under Dr Mitchell, the Director of Public Instruction, agriculture was included as an optional subject in the curricula for Form IV, V and VI of the secondary schools and V, VI and VII classes of elementary school. However, the availability of learned men trained to provide theoretical and practical instruction in agriculture proved to be a major hindrance to the success of this program,⁷⁰ and Kunjan Pillai himself authored textbooks for use in these classes. This scheme was later criticised for its sole focus on theoretical learning.⁷¹ Private agents like missionaries also established agricultural and trade-related educational

⁶⁹ Pillai 1940 Vol 4.

⁷⁰ Travancore Government Gazette 1911, XLIX (8).

⁷¹ Pillai 1940 Vol 4.

institutions during the period. A silk school was opened in 1916 at Nathancode by the Salvation Army. The government assisted successful students from the school in setting up village and cottage industries.⁷² The agriculture department report notes that most of the students at the silk school were from deprived classes⁷³.

Agriculture education in the region acquired definite form with the establishment of three agricultural middle schools at Alwaye in 1921, Kottarakara in 1928 and Konni in 1931.⁷⁴ People trained at agricultural farms were appointed headmasters at these schools. Velu Pillai throws light into the curriculum of these schools. The schools offered a two-year course equivalent to a diploma, and the medium of instruction was Malayalam.⁷⁵ A pass certificate in the VSLC (Vernacular School Leaving Certificate) examination or a certificate of Form III from an English school was set as the eligibility criteria for entry into these schools. The mode of instruction included daily lectures for three hours and three hours of practical training. Theoretical instruction covered agriculture, botany, agricultural chemistry, entomology, agricultural mathematics, plant diseases, cattle breeding, cooperation and rural development. Practical instruction included training in agricultural operations like surveying, irrigation, preparing the land, harvesting, weeding, and dealing with plant diseases and pests.⁷⁶ Velu Pillai records that students were allotted plots of 10 cents each where they had to demonstrate the cultivation of one or more seasonal crops.⁷⁷ Instruction also included field visits to different parts of Travancore, Cochin and Malabar. Various improved tools were introduced, and students were trained in their use. Students were also trained in carpentry and smithery and equipped to repair and make agricultural implements. They were also encouraged to work

⁷² Travancore Government Gazette 1918, LVI (51).

⁷³ Travancore Government Gazette 1923 LX (55).

⁷⁴ Pillai 1940 Vol 3. The school at Alwaye was set up with support from the public, who contributed towards the building for the school. Pillai also notes that the 'success and popularity' of the school encouraged the establishment of two other agricultural schools at Kottarakara (1928) and Konni (1931). The school at Alwaye was later closed in 1932 "...owing to the unsuitability of the station for running the school" p 403. TAR 1931-1932 stated that the school was closed down for financial reasons.

⁷⁵ Pillai 1940 Vol 3.

⁷⁶ Ibid.

⁷⁷ Ibid.

on wages at the farms attached to schools in their free time. Residence at schools was compulsory, and the government paid all expenses for the training and stay. Most of the students who passed out of these schools were 'upper caste' Hindus-Nairs, Pillai and a few Christians.⁷⁸

Agricultural colonies were set up for students who passed out of agricultural schools.⁷⁹ The first of such colonies was started in 1926, at Konni agricultural farm. These colonies played a significant role in advancing commercial agriculture in Travancore, especially for crops like rubber, coffee, pepper, and coconut. They were also home to successful agricultural cooperative societies.⁸⁰

Popularisation of Modern Agriculture

As we have already seen, the Travancore government emphasised the extension and popularisation of scientific agriculture from the very beginning. With the establishment of the Department of Agriculture, popularisation activities became more organised. The department officials - director of agriculture, agricultural inspectors and agricultural sub-inspectors, veterinary inspectors and fisheries inspectors- toured the region extensively.⁸¹ They delivered lectures on improved means of cultivation and visited landlords and ryots with suggestions and supervision.⁸² In his thesis on the farm information services in Kerala, Raman Nair has noted that the department developed an 'efficient information disseminating system'.⁸³ Knowledge about scientific

⁷⁸ Travancore Government Gazette 1928, LXV (45) p 204.

⁷⁹ Perhaps on the model of agricultural colonies in Punjab. Pillai (1940 Vol 3) notes that Punjab was discussed as a model solution for the problem of land fragmentation.

⁸⁰ Three hundred acres of land was devoted to these agricultural colonies. Each student was allotted a plot of 10 acres on a lease which they were to bring under cultivation gradually. These students were to cultivate at least 5 acres by the end of 3 years, 7 acres by the end of 5 years and the entire plot in 10 years. The colonists were provided with an initial capital of Rs 500 which they were to pay back in 10 equal instalments. The repayment started only after three years. First, three years were also rent-free and tax-free. After the successful cultivation of 10 acres and repayment of all dues, the ownership of land was transferred to the students for a small amount (Pillai 1940 Vol 3).

⁸¹ TAR 1928-29.

⁸² Nair, R. 2004.

⁸³ Ibid.

agriculture was popularised through exhibitions, leaflets, lectures and conferences. The department of agriculture also worked towards forming agricultural associations at the village level. These associations were envisaged as intermediaries between the state and the farmers. They assisted the Department of Agriculture in the popularisation and extension activities. For farmers, they served as forums to raise their doubts and concerns about various aspects of improving agriculture. According to Kunjan Pillai, such associations successfully spread scientific knowledge in western countries and some British provinces in India. Pillai noted the presence of many agricultural associations in Travancore but laments that many of them are defunct. Through the activities of the department, he aimed to revive them.⁸⁴

The agriculture department's demonstration farms were popular with farmers seeking information on new crops, improved seeds, manures, and implements.⁸⁵ In the report of the agricultural department for the year 1909-1910, Kunjan Pillai particularly mentions the Oachira farm that was established in 1910 and, within a few months, attracted several thousand visitors. The farm was strategically situated near the venue of the religious festival that takes part twice a year at the Oachira temple. Kunjan Pillai notes that in the first festive season after the establishment, more than 10000 people visited the farm. Demonstration and experimentation were also done on private lands, especially in paddy.⁸⁶ However, the department was cautious about using private land for extension activities. While the experiment's success always encourages the farmer, an unsuccessful experiment scares the farmer from any innovation. Pillai observed that the people of Travancore could not distinguish between experiments and demonstrations. Since the primary aim was to encourage the farmer to take up new scientific methods, it was suggested that private land should be used only for demonstration and not experimentation.⁸⁷

Agriculture department officials published articles in popular vernacular periodicals and other major journals, including the *Travancore Economic Journal*.

⁸⁴ Travancore Government Gazette 1911, XLIX (8).

⁸⁵ Ibid.

⁸⁶ Ibid.

⁸⁷ Ibid.

Leaflets were published by the department and distributed among the landlords and farmers through various means. The Report of the Agriculture Department for the Year 1909-1910 states that 5000 copies of each leaflet were published. Some were republished on demand. Excerpts from the leaflets and sometimes entire texts were reproduced in several major periodicals and the Travancore gazette. The lectures delivered by the department officials were printed, compiled, and made available to the farmers at minimal costs and sometimes free.⁸⁸

Anil Kumar Vadavathoor, in his study of science journalism in Malayalam, notes that in 1913 the department of agriculture brought out a quarterly periodical called *Thiruvithamkore Karshaka Thrimaasika*.⁸⁹ The periodical featured small essays on various issues related to agriculture like modern methods of cultivation, new and improved implements, various diseases affecting crops and cattle, and essays on new and exotic crops. It also published circulars and pamphlets of the agriculture department. Information on imports and exports, rainfall data, and the commodity prices at Cochin and London market were other permanent items in the periodical. A separate section covered news about various agricultural traditions and new experiments from around the world. Farmers were encouraged to share their experiences with modern methods of agriculture. It was published for about six years.⁹⁰ Later in 1920, another periodical was brought out by the agricultural department- *Thiruvithamkore Krishi Vyavasaya Masika*. The magazine served as the mouthpiece of the Agriculture Department, Department of Industries, and the Co-Operative department. The editorial of the first issue of the new edition states that the economic uncertainty caused by the First World War calls for the

⁸⁸ List of leaflets published by the department of agriculture in 1909-1910.

- | | |
|---------------------------------|---------------------------------|
| 1 Agricultural Association | 7 Cultivation of Cholam |
| 2 Night Soil | 8 Bombay Sugar Canes |
| 3 Castration | 9 Manorial value of poonacs |
| 4 Banku Paddy | 10 Iron Plough |
| 5 Prevention of Insect Pest | 11 Scientific Manuring of Paddy |
| 6 Remedies against Insect Pests | 12 Insecticides |
- Source: Travancore Government Gazette 1911, XLIX(8) p 72.

⁸⁹ Vadavathoor 2001.

⁹⁰ Ibid.

cooperation of different government departments, and the new magazine was to be a bold step in that direction.⁹¹

The contents of the magazine were also categorised under respective headings. The periodical covered various informative pieces on scientific agriculture. Possibilities of regional small-scale industries, benefits of cooperative societies for social and economic development etc., were laid down in detail. Vadavathoor observed that the periodicals published essays and excerpts from newspapers and periodicals published from different parts of the subcontinent. It included *Mysore Economic Journal*, *The Textile Journal*, *Daily Express*, *The Madras Mail*, *Indian Scientific Agriculturist* and *The Sugar Journal*.⁹² In 1922, the magazine was brought under the newly formed Development Board. The board was meant to act as an economic advisory council to the government. It comprised members from the departments of agriculture, industries, forest, joint-stock, geology, cooperative, and some non-official members. After this change in 1922, the magazine's contents also changed accordingly. The last available issue of the magazine appeared in 1924.⁹³

After that, we do not know of any periodicals brought out by the Agricultural Department until 1953.⁹⁴ However, the department continued with its other extension activities. In 1936 the government revamped the agricultural extension programmes with an increased focus on the popularisation in the rural areas. For the effective organisation of popularisation, the state was divided into three agricultural divisions- southern, central, and northern. A divisional agricultural officer headed the planning and execution of all experiments, demonstrations, and other extension activities in each division. The agricultural divisions were further divided into four agricultural ranges, which formed the administrative unit for agricultural popularisation.⁹⁵

The above discussion shows that the extension and educational activities of the Department of Agriculture laid the foundations for the popularisation of

⁹¹ Ibid.

⁹² Ibid.

⁹³ Ibid.

⁹⁴ Vadavathoor (2001) records that the officials of the Agriculture Department of the state of Travancore- Cochin brought out the periodical *Kerala Karshakan* in 1953.

⁹⁵ Travancore Administration Report 1938-39.

scientific agriculture in the region. It was essential to present it here in detail to understand the role of scientific institutions in the process of popularisation. The extension and educational activities of the Department of Agriculture laid the foundations for the popularisation of agricultural science in the region. As we will see in the following pages, the topics that were popularised corresponded to the area of focus of the agricultural department. In other words, in agriculture, what is popularised was largely influenced by the princely state's narratives of science and progress. Reading popular science literature in general periodicals (and not just the agricultural periodicals) tells us a lot about the interpenetration of these imaginaries' science and modernity in society.

However, it has to be noted that the account of the contributions of the Travancore Agriculture Department presented in this chapter is mainly based on the government documents and thus essentially follows the government narrative and lacks a critical account of the reception or implications of the programs of the department. For instance, in his study of the natural resource use patterns of the paddy growing regions of Nachilnadu (part of Travancore), Pandian has pointed out that the Travancore government's interventions during the late nineteenth and early twentieth century were driven mainly by motives of revenue maximisation.⁹⁶ He explained that state interventions in the form of forest reservations, conversion of dry land into wetland and the auctioning away of natural tank beds for paddy cultivation destroyed the existing balance of resources, adversely affecting the farmers of the region. Although Pandian's analysis is mainly based on the forest and irrigation departments, his study hints at the implications of state policies for agriculture in the region. Similarly, although iron plough was popularised in the region, economic and agrarian historian B. A. Prakash has noted that even in the late 1940s majority of the farmers used the local wooden plough, the reasons for which are not explained. Citing the Statistics of Travancore records of 1947-48, Prakash points out that out of the total ploughs of 230,112 used in the region, only 1,899 were iron plough.⁹⁷

⁹⁶ Pandian 1987.

⁹⁷ Prakash 2018.

However, besides such passing references, there is a dearth of secondary literature on the topic, which would have been helpful for a critical perspective. A conclusive study of the impact of the agriculture department and its activities in the region calls for a more detailed and intensive analysis focusing on specific crops, industry, or people's experience of adopting modern scientific methods of agriculture which falls outside the scope of this chapter. In this thesis, the discussion of the formation and functioning of the agriculture department is only meant to set a context for reading the popular literature on agricultural sciences.

Agricultural Science in Popular Literature

The first agricultural periodical in Malayalam *Krishikaran* was published in 1909 from Ottapalam by one I. C. Govindan Ezhuthachan. In his introductory editorial, Ezhuthachan reasoned that people need to be healthy to engage in any economic activity. The health of a population is determined by the food they eat, which in turn is dependent on the agricultural practices of the society. Further, agriculture provides the raw material for other sectors of the economy, and as such, people must have all available information on agriculture. The periodical received the support and encouragement of the Director of the Travancore Agriculture Department and the Superintendent of the Cochin Agriculture Department.⁹⁸ *Krishikaran* aimed to popularise literature on agriculture, useful for farmers and the general public. The relevance of the *Thiruvithamkore Karshaka Thrimaasika*, started by the Department of Agriculture in 1913, was already discussed. In 1913, another agricultural periodical, the *Krishi Vyavasaya Darpanam*, also called the *Industrial Mirror*, was started. It was an Anglo-vernacular monthly edited by A Sivaramakrishna Iyyer.⁹⁹ The periodical presented articles related to agriculture, industry, and commerce. It also published an almanac and had a question-answer section. The periodical had a

⁹⁸ See Vadavathoor 2001 for the editorial.

Ottapalam was in South Malabar. This collaboration suggests that the publication and circulation of the vernacular periodicals were not restricted by administrative boundaries.

⁹⁹ Ibid.

separate section for advertisements for various products from different parts of the subcontinent.¹⁰⁰ A few other periodicals followed suit.¹⁰¹

Unlike medicine, in agriculture, we do not know about any organised efforts on the part of the vernacular intelligentsia in the nineteenth or early twentieth century. The only organisation I have come across is the Kerala Jenmi Sabha, an organisation of the landlords in the Malabar area. In 1907 the Sabha started a periodical named *The Jenmi*. The title page (also given in English) described the periodical as “the only organ of the Malabar Landlords”.¹⁰² The periodical was edited by P. V. Krishna Warriar and owned by K. C. Manavikraman Rajah and Mannarghat Moopil Nair.¹⁰³ The contents of *The Jenmi* mainly were related to the activities of the Jenmi Sabha. The discussion on agriculture was restricted to revenue policies and agrarian relations among the tenants and landlords. As the periodical’s focus was less on agriculture and more on the welfare of the landlords, Anil Kumar Vadavathoor, who has worked on the history of farm journalism in Malayalam, opines that *The Jenmi* cannot be considered an agricultural periodical.¹⁰⁴ In my review of the available issues of the periodical, I was also not able to find relevant literature on agriculture sciences.

Besides agricultural periodicals, essays on agriculture featured in most of the popular general periodicals of the period. Numerous articles were featured in periodicals like *Bhaashaposhini*, *Mangalodayam*, *Kerala Chintamani*, *Kerala Kesari*, *Rasika Ranjini*, *Vidyavinodini* and *Vijnana Ratnakaram*.¹⁰⁵ Many periodicals had devoted sections that featured essays on agriculture and allied

¹⁰⁰ Vadavathoor 2001 notes that this was a short-lived periodical. But we do not know when it stopped publishing.

¹⁰¹ For a survey to agricultural magazines in Malayalam published in the twentieth century, see Vadavathoor 2001. His study suggests that agricultural popularisation flourished in the second half of the twentieth century. He discusses several magazines including -*Indian Naliker Journal* (1947), *Krishikaran* (1952), *Karshaka Mithram* (1953), *Kerala Karshakan* (1953), *Rubber* (1965), *Spices India* (1967), *Karshaka Bandhu* (1968), *Agro Industries* (1969), *Kalpadhenu* (1973), *Karshika Keralam* (1989), *Karshikarangam* (1989), *Karshakan* (1992), *Krishiyanganam* (1994), and *Karshakashri* (1995).

¹⁰² *The Jenmi*, 1907, Vol 1, No 2.

¹⁰³ Vadavathoor 2001.

¹⁰⁴ *Ibid.*

¹⁰⁵ In his survey of magazines that contributed towards farm journalism in Malayalam Vadavathoor (2009) also lists- *Nair* (1902), *Vyavasaya Chandrika* (1915), *Atma Poshini* (1913), *Deepam* (1930), *Kuttanadan* (1928).

areas and covered agricultural news from around the world. *Kerala Kesari* had a permanent section called *Krishi* (Agriculture)/ *Krishi Karyam* (Agricultural Affairs), *Vidyabhivardhini* had *Karshika Pankti* (Agriculture Series), *Kerala Chintamani* also had *Krishi Karyam* and *Krishi Vishayam* (Agricultural Matters) featured in *Mangalodayam*. Agriculture-related literature featured in women's magazines also. *Lakshmibai*, a popular women's magazine, carried several articles on agriculture.¹⁰⁶ Articles from English journals, including the *Journal of Asiatic Society of Bengal* and *Indian Forester*, were translated and reproduced.¹⁰⁷ Pamphlets of the agriculture department were also reprinted in popular periodicals.¹⁰⁸ Periodicals served as space for farmers to share their experiences with modern farming.¹⁰⁹ They sought explanations and clarifications on modern methods of agriculture through the periodicals.¹¹⁰

Following a common practice of the period, many articles were written anonymously, and a few were signed only in initials or pseudonyms. Generally, authors belonged to various sections of the emerging intelligentsia. Many authors were associated with the agriculture department in various ways. For instance, N. Shankara Pilla, who wrote extensively on agriculture, was an agriculture inspector.¹¹¹ Kunjan Pillai, director of the Travancore department of agriculture, contributed to popular periodicals like *Bhashaposhini* and *Vijnana Ratnakaram*.¹¹² Authors trained in scientific agriculture were encouraged, and their credentials were highlighted in the article. An article on the modernisation

¹⁰⁶ E. M. Joseph (1922) Nel Krishikaarku Sheemayo, *Lakshmibai*, 17(11); K. C. Kesavan (1926) Pazha Krishi, *Lakshmibai*, 21(5); V. Parukuttyamma, (1927) Paadashaala Thottangal, *Lakshmibai*, 22(6); K. P. A (1930) Krishi Mahatmyam, *Lakshmibai*, 25(9).

¹⁰⁷ Anonymous (1913). Uses of Plantain, *Krishi Vyavasaya Darpanam*, 1(7); Anonymous (1914) Marunnu Chedikal, *Krishi Vyavasaya Darpanam*, 2(2).

¹⁰⁸ Anonymous (1915) Krishikaryam Oru Karshakante Anubhavam (Banku Nellu), *Kerala Kesari* 1(4); Agriculture Department Pamphlet No.4 (1913) Ground Nuts *Krishi Vyavasaya Darpanam*, 1(5).

¹⁰⁹ Anonymous (1915) Krishikaryam Oru Karshakante Anubhavam (Banku Nellu), *Kerala Kesari* 1(4).

¹¹⁰ Korapathu Raman Menon (1919) Krishi- Chila Samshayangal, *Kerala Kesari*, 4(11-12).

¹¹¹ N. Shankara Pillai (1913) Nellukrishi, *Vijnana Ratnakaram*, 1(6); N. Shankara Pillai (1899), *Krishi Parishkaram*, *Bhaashaposhini*, 3(3); N. Shankara Pillai (1900) Amalapuram Talukkile Adakya Krishi, *Bhaashaposhini*, 4(4).

¹¹² N. Kunjan Pillai (1913) Thiruvithamkoorile Krishiyum Vyavasayangalum, *Bhaashaposhini*, 17(5- 6); N. Kunjan Pillai (1913) Kozhikrishi, *Vijnana Ratnakaram*, 1(4); N. Kunjan Pillai (1913) Unakka Thenga, *Vijnana Ratnakaram*, 1(1).

of agriculture published in 1889 started with an editor's note stating that the "... author has studied in Madras agricultural college for three years and has acquired scientific competence in the subject".¹¹³ Women authors marked their presence in women magazines.

Krishi Shastram- Krishi Parishkaram

Discussion in the popular literature on agricultural science in Malayalam periodicals largely centred around two themes- *krishi shastram* and *krishi parishkaram*. *Krishi shastram*, which can be translated as agricultural science, mostly covered descriptive, informative essays on various aspects of agriculture. *Krishi parishkaram* discussed what can be described as the modernisation of agriculture. Parishkaram in Malayalam refers to change, improvement, reform, or progress mostly associated with colonial modernity.¹¹⁴ A reading of the literature used for this study shows that *krishi parishkaram* is simply used to refer to the improvement of agriculture through modern scientific practices. For instance, the essay 'Krishi Parishkaram' in *Vidyavinodini* discussed the improvement of agricultural practices through applying scientific principles of manuring.¹¹⁵ Several essays followed on similar lines.¹¹⁶ *Krishi parishkaram* and *Krishi shastram* emerged as overlapping themes, and most often, *krishi parishkaram* was considered tantamount to practising modern scientific agriculture. The discussion on agrarian relations or land, labour or revenue was almost absent or marginal in these essays. However, the thesis approaches the popular literature on agriculture from the perspective of the history of science popularisation. Resources used for the chapter are restricted to the science-related popular literature on agriculture. Literature on land, labour, agrarian legislation, and agrarian social relations were excluded for the sake of brevity. A close reading of the literature related to these aspects of agriculture may offer a

¹¹³ Kottlil Kochu Govinda Maarar (1889) *Krishi Parishkaram*, *Vidyavinodini*, 8(4) p 140.

¹¹⁴ For a discussion on the different meanings and usages of the term *parishkaram*, see Antony 2013.

¹¹⁵ Kottlil Kochu Govinda Maarar (1889) *Krishi Parishkaram*, *Vidyavinodini* 8(4-5).

¹¹⁶ P. Subramania Iyyer (1897) *Krishi Parishkaram- Chila Soochanakal*, *Bhaashaposhini*, 1(6); P. Kunjiraman Nayanar (1889) *Krishi Parishkaram*, *Vidyavinodini* 6(2); Kottlil Kochu Govinda Maarar (1889) *Krishi Parishkaram*, *Vidyavinodini* 8(4) and (5).

different understanding of the vernacular intelligentsia's perception of *Krishi parishkaram* as a social process related to land or labour. Nonetheless, in this chapter, as the focus is on the popularisation of agricultural science, *krishi parishkaram*- agricultural improvement or modernisation is understood as the changes in the agricultural practices brought about by the application of modern science and technology.

Krishi Shastram

Popular science literature on agricultural science presented a modern scientific understanding of agriculture to the readers. It provided scientific explanations for various aspects of farming and popularised basic principles of chemical and biological sciences. For instance, an essay titled 'Krishi' (Agriculture) gave a detailed explanation of soil formation.¹¹⁷ Then various soil types are described, and some compatible crops are listed. The preparation of different types of soil is also elaborated. According to the anonymous author, the success of any agricultural endeavour depends on the farmers' ability to distinguish between the different soil types and their nutrients. He explained that knowledge of the compatible crops would help to avoid wastage of resources and disappointment. An article on earthworms discussed the anatomy, life and physiology of earthworms and explained how they are helpful for farmers.¹¹⁸ Similar essays discussed scientific ways of using manures and implements.¹¹⁹

Many articles on *Krishi shastram* (Agricultural Sciences) were descriptive - informative pieces about various crops. Some of the crops discussed were areca nut, cardamom, pepper, tapioca, groundnut, nutmeg, sugarcane, cocoa, barley, potato, and cotton.¹²⁰ Articles on crops discussed the soil conditions suitable for

¹¹⁷ Anonymous (1913) *Krishi, Krishi Vyavasaya Darpanam*, 1(11-12).

¹¹⁸ M. Yohannan (1916) Njannjool- Verakal, *Kerala Kesari*, 2(6).

¹¹⁹ P Kunjiraman Nayanar (1889) *Krishi Parishkaram, Vidyavinodini* 6(2); Anonymous (1914) Nellinu Valam Cherkenda Vidham, *Krishi Vyavasaya Darpanam*, 2(1); Kottilil Kochu Govinda Maarar (1889) *Krishi Parishkaram; Vidyavinodini* 8(5).

¹²⁰ N. Shankara Pillai(1900) Amalapuram Talukkile Adakya *Krishi, Bhaashaposhini*, 4(4); K. M. Mathulla Mapila (1913) Ealakrishi, *Bhaashaposhini*, 17(7-8); K. Shankunni Nair (1908) Kurumulaku *Krishi, Kerala Chintamani*, 4(1) K. N. Kochappi Vaidyar (1913) Maracheeni *Krishi*,

the crop, seed preparation, sowing seasons and best sowing practices, irrigation, manuring and weeding, and the best time for harvesting and preserving produce. Some of the essays provided guidelines about familiar crops, while others introduced new or less popular ones. Essays on new crops often provided information about per capita yield and the status in the commodity market.¹²¹ It was supposed to help farmers choose the crops with better marketing prospects.¹²² More elaborate articles presented a background of the cultivation of the crop. For instance, an article on sugar cane traces the history of sugarcane cultivation worldwide. It then narrows down the discussion to the history of the crop in India before discussing crop varieties and giving a detailed description of its cultivation process and jaggery manufacturing.¹²³

Animal husbandry and poultry farming were also popular themes. There was a general lament that farmers in the region do not pay much attention to the cattle's quality and health.¹²⁴ Thus essays detailed the significance of healthy cattle for preparing the land for agriculture and manure collection. Higher yielding breeds were introduced, and instruction was provided for setting up cattle rearing and poultry farming.¹²⁵ An article titled 'Cattle'- in the periodical *Krishi Vyavasaya Darpanam* explained the significance of crossbreeding for the cattle's health. The crossbreeding process, ways to ensure proper breeding, selection of seed bull and other aspects were explained.¹²⁶ Diseases affecting cattle was a recurrent topic. Articles presented the concerns as localised problems but contextualised them in the larger scenario. Agricultural inspector

Krishi Vyavasaya Darpanam, 1(6); Agriculture Department Pamphlet No 4 (1913) Ground Nuts, *Krishi Vyavasaya Darpanam*, 1(5); M. Govinda Pillai(1913) Nutmeg- Jathikka, *Krishi Vyavasaya Darpanam*, 1(5); Anonymous (1919) Karimbu Krishi, *Kerala Kesari*, 4(11-12); S. V (1906) Cocoa, *Rasikaranjini*, 4(3); Anonymous (1905) Yavam, *Rasikaranjini*, 3(3); Anonymous (1905) Urulakizhangu, *Rasikaranjini*, 3(2); Anonymous (1922) Paruthi, *Kairali*.

¹²¹ Agriculture Department Pamphlet No 4 (1913) Ground Nuts *Krishi Vyavasaya Darpanam*, 1(5); Madangarli Raman Namboothiri (1930) Keraleeyarum Inji Krishiyum, *Mangalodayam*, 17(3).

¹²² Madangarli Raman Namboothiri (1930) Keraleeyarum Inji Krishiyum, *Mangalodayam*, 17(3); Anonymous (1912) Rubber Krishi, *Mangalodayam*, 3(12).

¹²³ Vaani Daasan (1900) Karimbum Panjasarayum, *Bhaashaposhini* 4(5-6).

¹²⁴ N. K. T. (1912) Keraleeya Krishivalanmaar, *Dakshina Deepam*, 1(8-9).

¹²⁵ K. K. T. (1903) Kannukaali Valarthal, *Bhaashaposhini*, 7(8); Anonymous (1913) Cattle, *Krishi Vyavasaya Darpanam*, 1(6); Anonymous (1913) Poultry Farming, *Krishi Vyavasaya Darpanam*, 1(7); Salgurunathan (1929) Gorakshanam, *Lakshmbai*, 24(12).

¹²⁶ Anonymous (1913) Cattle, *Krishi Vyavasaya Darpanam*, 1(6).

N. Shankara Pillai's essay on rinderpest disease in South Travancore started with describing the disease in different parts of India and discussed the Cattle Plague Commission Report. Then the situation in Travancore was analysed, and methods to prevent the disease and control its spread was discussed.¹²⁷ Cattle and poultry were presented as profitable business opportunities, especially in the wake of price fluctuations and the decreasing yield of paddy.¹²⁸

Knowledge of scientific agriculture was considered highly rewarding as a significant proportion of the population depended on agriculture for livelihood.¹²⁹ The practical knowledge of farmers was considered insufficient and was to be supplemented with specialised, systematic knowledge. Such sentiments manifested in articles like 'Farmers of the Present Time'. The author P. N. Raman Nair observed that despite manuring being a common practice, people lack knowledge about the nutrient content of different manures and how to preserve them.¹³⁰ According to him, a scientific understanding of manuring was necessary for increasing the yield.

Another commentator, N. Narayana Pillai, observed that 'when asked for, not many people will be able to reflect upon agriculture elaborately. But people think that they know everything about it as it is part of their everyday life. This attitude and general laziness have led to the lack of any serious attention on agriculture.'¹³¹ According to Pillai, farmers should be informed about topics like-

“.... soil types, agricultural implements, seeds and cattle. In other words, a basic knowledge of geography, biology, chemistry, veterinary science and astrology is necessary. Otherwise, when the crop fails, he will blame god. One blames god only when he is not able to give a reasonable

¹²⁷ N Shankara Pillai (1899). Kannukaalikalude Nadappu Deenam. *Bhaashaposhini* 3(7).

¹²⁸ Anonymous (1913) Poultry Farming, *Krishi Vyavasaya Darpanam*; K. C. K (1913) Keeping of Milch Cows- Pashu Paripalanam, *Krishi Vyavasaya Darpanam*, 1(5).

During the 1850s, there was an increasing demand for paddy in the region, and at the request of the Travancore State, the British government removed the duty on the import of paddy from the British territories. As a result, from 1861, paddy was freely imported to Travancore, and this led to a decline in the price of rice. It eventually led to the diversion of resources from rice cultivation to other areas including cash crops (Prakash 2018).

¹²⁹ Anonymous (1919) *Krishi, Kerala Kesari*; N. K. T. (1912) Keraleeya Krishivalanmaar, *Dakshina Deepam*, 1(8-9).

¹³⁰ The English title of the article provided was provided in the periodical. P. N. Raman Nair (1913) Adhunikar Krishikar, *Krishi Vyavasaya Darpanam*, 1(6).

¹³¹ N. Narayana Pillai (1920) *Krishi, Keraleeya Yuvajana Mithram*, 4(3) pp 92-93.

explanation for the event. If one has enough knowledge of important topics, he will not succumb to such errors”.¹³²

One author signed as N. K. T. underlined the need for scientific knowledge of agriculture in the following words-

“Our farmers have acquired their agricultural knowledge through ages of practice. I do not wish to argue that one can be competent in agriculture only by scientifically studying it. However, if a farmer has a scientific knowledge of agriculture, he can be competent in agriculture much faster than those who do not have scientific know-how of the subject. Understanding the soil type and finding suitable crops and fertilisers becomes easy with a scientific understanding of agriculture. It reduces the wastage of time and other valuable resources. Farmers should attempt to attain the maximum possible productivity in the least possible efforts. In this endeavour, scientific training helps a great deal”.¹³³

Farmers also participated in this discourse of scientific agriculture. They shared their experiences with modern farming and sought explanations and clarifications on modern methods of agriculture through the periodicals. A good instance is the essay ‘Oru Karshakante Anubhavam- Banku Nellu’ (A Farmers Experience- Banku Paddy).¹³⁴ In this unsigned essay, a farmer narrated his experience with the new variety of paddy provided by the agricultural department. The essay presents a detailed picture of the cultivation of the Banku paddy, pointing out the challenges and possibilities involved. Similarly, farmers sought expert opinion through the periodicals. Korapathu Raman Menon, a reader of the periodical *Kerala Kesari*, wrote to the periodical for clarification on different aspects of scientific agriculture, like usage of various types of manures and new methods in coconut or paddy cultivation.¹³⁵ He stated that information

¹³² Ibid p 98.

¹³³ N. K. T. (1912) Keraleeya Krishivalanmaar, *Dakshina Deepam*, 1(8-9) p 382-383.

¹³⁴ Anonymous (1915) Krishikaryam Oru Karshakante Anubhavam (Banku Nellu), *Kerala Kesari* 1(4).

¹³⁵ Korapathu Raman Menon (1919) Krishi- Chila Samshayangal, *Kerala Kesari*, 4(11-12).

and clarification provided through the periodical would benefit numerous other farmers like him.

Thus, we can see that for the local intelligentsia as well as for the farmers, the aims of the popularisation of agricultural sciences were laid out. History of science popularisation in India tells us that by the end of the nineteenth century, science was understood as a vehicle of progress by the English educated emerging local intelligentsia who took upon themselves the task of disseminating modern science in society.¹³⁶ Impressed by the prospects of agricultural improvement on modern lines, the local intelligentsia performed the didactic role of popularisation of scientific agriculture. Popular periodicals served as an effective means to achieve this end. While for the farmers, popular science served as a source of information that could be utilised to achieve agricultural improvement.

Krishi Parishkaram

Almost all early articles on agriculture underlined the necessity of *krishi parishkaram*. The need for improvement was justified in a discourse of declining agricultural productivity, and its causes were discussed in the popular literature. In this discourse, there was an idea of an earlier productive period when nature was more bountiful. The geographical and climatic conditions of Travancore were considered most conducive for successful agriculture.¹³⁷ Later, several socio-economic factors resulted in a decline in agricultural productivity. Lack of enterprise among the people, reluctance to adapt to modern technology, depletion of soil fertility from years of unscientific cultivation, no regard of soil types or proper manuring, fragmentation of land, lack of irrigation facilities, lack of cattle, lack of access to capital, exploitation of money lenders, and a growing perception of farming as a lowly job among the educated people were among the recurring themes.¹³⁸ In this scenario, the improvement of agriculture and

¹³⁶ Raina and Habib 2004, Sehgal, Sangwan and Mahanti 2000.

¹³⁷ P. N. Raman Nair (1913) Framers of the Present Time, *Krishi Vyavasaya Darpanam*, 1(6); N. K. T. (1912) Keraleeya Krishivalanmaar, *Dakshina Deepam*, 1(8-9).

¹³⁸ P. N. Raman Nair (1913) Framers of the Present Time, *Krishi Vyavasaya Darpanam*, 1(6); N. Sankara Pillai (1913) Nellukrishi, *Vijnana Ratnakaram*, 1(6); P. Kunjiraman Nayanar (1889)

economic progress was deemed possible only through the application of modern science and technology.

However, the argument for scientific agriculture was not presented in an outright criticism of the local practices as unreasonable or deficient. The need for the improvement in agriculture was presented as a contemporary concern driven by local economic, political, and social conditions. There was an understanding that traditional agricultural practices were productive and profitable because the demand for agriculture was less due to the smaller size of the population and economy in older times.¹³⁹ But traditional cultivation practices failed to meet the demands of the contemporary economy and society. Over the years, with the rapidly increasing population and developing economy, the pressure on land increased, and productivity declined. As a remedy, farmers were urged to adopt scientific agriculture, which helps to maximise output with minimum input of resources.¹⁴⁰ This Malthusian idea of increasing population reminiscence of the colonial discourse on agricultural improvement and famines.¹⁴¹ An essay 'Keraleeya Krishivalanmaar '(Farmers of Kerala) represented it explicitly. The essay explained that the decline and neglect of agriculture was the cause of famines in different parts of India. Scientific agriculture was suggested as the best means to prevent any famines in the future.¹⁴²

Krishi parishkaram was also articulated as necessary for regional and national development. Farmers were urged to contribute to national development by expanding agricultural activities. The increasing area under cultivation, engaging in novel farming methods and taking up new crops that generate more profit were suggested as means to achieve economic progress of the region and nation at large.¹⁴³ On similar lines, some essays highlighted the

Krishi Parishkaram, *Vidyavinodini* 6(2); Anonymous (1914)); Kottilil Kochu Govinda Maarar. (1889) Krishi Parishkaram, *Vidyavinodini* 8(4-5); Anonymous (1909) Krishi Parishkara Margangal, *Kerala Chintamani*, 4(9-10).

¹³⁹ P. N. Raman Nair (1913) Framers of the Present Time, *Krishi Vyavasaya Darpanam*, 1(6); N. K. T. (1912) Keraleeya Krishivalanmaar, *Dakshina Deepam*, 1(8-9).

¹⁴⁰ Ibid.

¹⁴¹ Robb 1988.

¹⁴² N. K. T. (1912) Keraleeya Krishivalanmaar, *Dakshina Deepam*, 1(8-9).

¹⁴³ Madangarli Raman Namboothiri (1930) Keraleeyarum Inji Krishiyum, *Mangalodayam*, 17(3); Anonymous (1912) Rubber Krishi, *Mangalodayam*, 3(12).

possibility to contribute to the national struggle. An article on rubber cultivation featured in *Mangalodayam* hoped that the information would encourage people to take up rubber cultivation and end the European monopoly in rubber plantations.¹⁴⁴ The idea of swadeshi was also evoked, and agriculture was encouraged as a means to attain economic self-reliance.¹⁴⁵ Decreasing reliance on imports through increasing agricultural and industrial production was suggested as a goal.¹⁴⁶

In this nationalist narrative, *krishi* (agriculture), *kachavadam* (trade) and *kaithozhil* (handicrafts) - designated in Malayalam as *kakarathrayam* (The three Ks) formed the cornerstones of rural development and economic regeneration of the nation.¹⁴⁷ Improvement of agriculture, the revival of old industries and trades, conditions for the profitable sale of agricultural and industrial products, development for transport, provisions for supplying seeds, fertilisers and implements at low cost to the farmers, ensure availability of easy and low-interest credit for farmers and small scale industries were deemed necessary conditions for the economic welfare of rural areas.¹⁴⁸ The revival of the manufacturing industry was understood as an opportunity to expand the market for agricultural products and a necessary condition to bring down products' prices.¹⁴⁹ Numerous essays explained various agro-based and other small-scale industries that are less capital intensive and utilise readily available natural resources and raw materials. Information regarding the economic prospects of these industries, procurement of raw materials, machinery, processing and marketing were all laid down in detail. Some of the industries discussed were

¹⁴⁴ Anonymous (1912) Rubber Krishi, *Mangalodayam*, 3(12).

¹⁴⁵ Madangarli Raman Namboothiri (1930) Keraleeyarum Inji Krishiyum, *Mangalodayam*, 17(3).

¹⁴⁶ Anonymous (1913) A New Industry, *Krishi Vyavasaya Darpanam*, 1(6); R. K. (1913) Brush Making Industry, *Krishi Vyavasaya Darpanam*, 1(5); A. S. I. (1913) Manufacture of Scents, *Krishi Vyavasaya Darpanam*, 1(5).

¹⁴⁷ Oru Swadeshi (1908) Kakarathrayam- Krishi, Kachavadam, Kaithozhil, *Kerala Chintamani*, 4(4).

¹⁴⁸ K. George (1928) Karshika Vyavasayam, *Bhaashaposhini*, 32(7-9) p 212.

¹⁴⁹ Anonymous (1913) Methods for Reviving Indian Industries, *Krishi Vyavasaya Darpanam*, 1(11-12).

fruit drying and preservation, manufacture of scents, glass manufacture and soap making.¹⁵⁰

Krishi Parishkaram as a Collaborative Process

Previously, we have seen that there was an increasing demand from the public for government intervention to improve agriculture. Vernacular literature, especially towards the end of the nineteenth century, represented this demand. Writing about *krishi parishkaram* in 1897, in *Bhaashaposhini*, the author P. Subramania Iyer noted that around 60 percent of the people in the country are dependent on agriculture for their livelihood. Agriculture was also one of the largest revenue-generating areas for the government. Hence state intervention through the formation of a separate department for agriculture was presented as the need of the hour. The economic and social advancements achieved through agricultural development in Prussia, Australia, Italy, Denmark, Sweden, and Belgium were highlighted.¹⁵¹ It was suggested that the success of agricultural and industrial improvement depends on the adoption of modern science and technology and the states' encouragement to it.

After establishing the agriculture department, the demand for state intervention in agriculture was directed to the establishment of agricultural schools and colleges.¹⁵² Introduction of agriculture as a compulsory subject in all schools and set up school gardens for practical training were demanded. School gardens were considered helpful for inculcating curiosity about nature and observation skills among the students. Again, examples from nations like Norway, Italy, France and Germany were cited to support the necessity of agricultural education.¹⁵³ Demands for government support were also made to establish agricultural banks and form cooperative societies and agricultural

¹⁵⁰ Anonymous (1913) Fruit Drying Industry, *Krishi Vyavasaya Darpanam*, 1(8); A. S. I (1913) Manufacture of Scents, *Krishi Vyavasaya Darpanam*, 1(5); Anonymous (1909) Soap Manufacture, *Kerala Chintamani*, 4(9-10); Anonymous (1909) Madirashi Glass Factory, *Kerala Chintamani*, 4(9-10).

¹⁵¹ P. Subramania Iyer (1897) *Krishi Parishkaram-Chila Soochanakal*, *Bhaashaposhini*, 1(6).

¹⁵² Anonymous (1913) Methods for Reviving Indian Industries, *Krishi Vyavasaya Darpanam*, 1(11-12); Anonymous (1913) Necessity of School Gardens, *Krishi Vyavasaya Darpanam*, 1(8); Anonymous (1913) *Krishiyum Kaithozhilum*, *Krishi Vyavasaya Darpanam*, 1(7-8).

¹⁵³ Anonymous (1913) Necessity of School Gardens, *Krishi Vyavasaya Darpanam*, 1(8).

associations. Agricultural banks and cooperative societies were seen as a solution to the problem of credit access.¹⁵⁴ Agricultural associations were considered necessary for the popularisation of scientific agriculture.¹⁵⁵ Government support for organising industrial and agricultural exhibitions to encourage farmers was demanded.¹⁵⁶ The state was also urged to publish information on chemical analysis of the soil in different parts of the region and the list of compatible crops. Such information was deemed necessary to select the most appropriate crops to achieve profitable agriculture.¹⁵⁷

However, state intervention was not projected as a panacea for problems of declining agriculture. Agricultural modernisation was understood as a process in which both the princely state and the people had their parts to play. While the state was responsible for institutionalising scientific agricultural research and education, the onus was on the farmers to take advantage of the government's policies.¹⁵⁸ People were urged to cooperate with the efforts of the agriculture department.¹⁵⁹ An anonymously written essay stated that establishing an agriculture department led by an expert trained in agriculture from Europe had ensured the accessibility to scientific information about agriculture. However, its utilisation for the improvement of agriculture was contingent on the cooperation of the people.¹⁶⁰ The resistance to the improvement of agriculture in modern lines was condemned. Reluctance was seen as a result of a lack of education and the dominance of a fatalist attitude. One commentator, P. N. Raman Nair, wrote,

“Even when the government promises to provide new, more improved ploughs, some insist on using the same plough they have been using since the time of Parashurama. This is nothing but a sign of a lack of education”.¹⁶¹

¹⁵⁴ Anonymous (1913) *Krishiyum Kaithozhilum, Krishi Vyavasaya Darpanam*, 1(7-8); K. George (1928) *Karshika Vyavasayam, Bhaashaposhini*, 32(7-9).

¹⁵⁵ Anonymous (1913) *Krishiyum Kaithozhilum, Krishi Vyavasaya Darpanam*, 1(7-8).

¹⁵⁶ N. K. T. (1912) *Keraleeya Krishivalanmaar, Dakshina Deepam*, 1(8-9).

¹⁵⁷ Anonymous (1919) *Krishi, Kerala Kesari*, 4.

¹⁵⁸ N. K. T. (1912) *Keraleeya Krishivalanmaar, Dakshina Deepam*, 1(8-9); (1913) Anonymous (1913) *Krishiyum Kaithozhilum, Krishi Vyavasaya Darpanam*, 1(7-8).

¹⁵⁹ P. N. Raman Nair (1913). *Adhunika Krishikar. Krishi Vyavasaya Darpanam*, 1(6); Iyyer, P Subramania. (1897) *Krishi Parishkaram, Bhaashaposhini* 1(6).

¹⁶⁰ Anonymous (1913) *Krishiyum Kaithozhilum, Krishi Vyavasaya Darpanam*, 1(7-8).

¹⁶¹ P. N. Raman Nair (1913). *Adhunika Krishikar. Krishi Vyavasaya Darpanam*, 1(6) p 85.

An essay 'Keraleeya Krishi Valanmaar' (Farmers of Kerala) featured in *Dakshina Deepam* presented a scathing critique of farmers reluctance towards modern means of agriculture. He commented that people make an excuse of the financial burden for not adopting scientific means of agriculture when they spent lavishly for marriages and other rituals. He urged the farmers to divert the money spent for such rituals to agriculture which, according to him, was also a contribution to social and economic welfare.¹⁶² In other words, successful agricultural reform was deemed possible only with the people's collaboration, which was conditional on their awareness about the scientific ways of agriculture. Hence the local intelligentsia sought to popularise useful information on scientific agriculture through the medium of popular periodicals.

Imaginarities of Gender and Caste

As mentioned earlier, Malayalam women's magazines also featured literature on agriculture. It included articles related to botanical knowledge, animal husbandry and articles discussing various problems in agriculture.¹⁶³ Handouts of the agricultural department were also published in these magazines.¹⁶⁴ Gardening was a frequent theme. In these periodicals, agriculture was construed as a domestic activity rather than a commercial enterprise.¹⁶⁵ Kitchen gardening and cattle rearing were encouraged for their impact on the nutrition and health of the family.¹⁶⁶ An essay titled 'Gorakshanam '(Care of Cattle) described that-"it is important to take good care of the cattle, as after mothers, cows are the most important source of nutrition for children. Cow milk is indispensable not only for babies, but also for the sickly, aged, and youth".¹⁶⁷ It suggests that in the imagination of modern scientific agriculture, women's role in agriculture was restricted to the domestic domain. Thus, these articles

¹⁶² N. K. T. (1912) Keraleeya Krishivalanmaar, *Dakshina Deepam*, 1(8-9).

¹⁶³ E. M. Joseph (1922) Nel Krishikaarku Sheemayo, *Lakshmibai*, 17(11); K. C. Kesavan (1926) Pazha Krishi, *Lakshmibai*, 21(5); V. Parukutty Amma, (1927) Paadashaala Thottangal, *Lakshmibai*, 22(6); Anonymous (1916) Bhoothadayayillatha Chila Chedikal, *Sumangala*, 1(9-10).

¹⁶⁴ C. S. Venkitasubbahyyan (1920) Chellu, *Lakshmibai*, 14(10).

¹⁶⁵ N. Madhava Kuruppu (1933) Adukkala Thottam, *Lakshmibai*, 28(7); Salgurunathan (1929) Gorakshanam, *Lakshmibai*, 24(12).

¹⁶⁶ Ibid.

¹⁶⁷ Salgurunathan (1929) Gorakshanam, *Lakshmibai*, 24(12) p 478.

conjoined the rhetoric of agricultural and national development to the discourse of domesticity and engendering. Despite women being an important part of the agricultural economy, the discussion on scientific agriculture and modernisation did not represent any serious engagement with the questions of gender. A report of the Cochin Industrial Exhibition mentions that the last day of the exhibition was reserved for women,¹⁶⁸ suggesting that women were also considered as participants in the process of popularisation of agricultural science. However, other than this, there was a lack of reflection on gender in the agricultural literature.¹⁶⁹ Women's magazines published during the nineteenth and twentieth centuries in India represent the cultural and political notions embedded in the ideal of modern women. These magazines played a significant role in the identity formation of modern women.¹⁷⁰ Literature related to agricultural science in Malayalam women's magazines mirrored this discourse. The discussion on popular science literature in Malayalam women's magazines in chapter seven will further demonstrate this observation.

Similarly, we do not see any discussion on caste even though agriculture as an activity is deeply embedded in the caste system. During the nineteenth and twentieth-century agricultural commercialisation and development offered different experiences of mobility for different caste and communities. Some of them, like the Ezhavas, articulated agriculture, commerce, and industry as crucial modes of mobility for the community. The popularisation of the scientific industry was among the important activities of the SNDP Yogam.¹⁷¹ The Ezhavas organised the first major agricultural and industrial exhibition (1905 at Kollam) in the region as part of the community mobilisation.¹⁷² We have already seen that the development of agricultural and technical education was often directed to the marginalised castes. Dalit history in Kerala has pointed out that the lives of Pulayar- the hitherto agrarian salve caste changed drastically with the commercialisation of agriculture. Mohan explained that combined with literacy

¹⁶⁸ Anonymous (1908) Kochiyile Krishivyavasaya Pradarshanam, *Kerala Chintamani*, 4(1).

¹⁶⁹ Baksi and Kamble (2016) have observed the same for agricultural literature in Marathi.

¹⁷⁰ Bagchi 1993, Shukla 1991, Orsini 1999, Sen 2004.

¹⁷¹ Balakrishnan 2006 (1954).

¹⁷² The exhibition was organised at the second annual meeting of Sree Narayana Dharma Paripalana Yogam (SNDP).

and technical education, agricultural development led to a change in the nature of agrarian labour. It enabled a transformation of social consciousness and mobility among Dalits in Kerala.¹⁷³ Nevertheless, we do not see any discussion on caste and agricultural improvement in the popular literature. I reiterate that this observation is based on the sources used for this study, and the focus of archival work was the literature on agricultural science.¹⁷⁴ A focus on popular literature related to labour, land and agrarian relations may present a different story of the relationship between modernity, agriculture, and caste.

In the popular science writings on agriculture discussed above, we can see that the discourse of modern science was articulated in the language of economic and social progress. Modern science in agriculture was advocated for the economic and social benefits derived from its application in cultivation. This rhetoric legitimised (agricultural) science and simultaneously established its authority. Perhaps this imaginary of science remained dominant in agricultural discourse until the late nineteenth century when the problems created by the Green Revolution led to a critique of modern scientific agriculture in India.¹⁷⁵ In Malayalam popular literature, even during the late 1940s, when science and technology came under the critical lenses for its disastrous implication for the Second World War, scientific inputs in agriculture were praised and represented as a testimony for science's contribution to humanity.¹⁷⁶ This belief in science as a vehicle of progress and its popularisation by the local intelligentsia suggests that earlier frames of history of science that conceived colonial science only as a tool of the empire are inadequate to understand science in society during the period. It asks for a more nuanced understanding of vernacular intelligentsia's perceptions towards science and its popularisation, as Raina and Habib have rightly pointed out.¹⁷⁷

Further, the discussion hints at the variety and ambiguity embedded in the process of negotiation and legitimation of science in a colonial context. The

¹⁷³ Mohan 2015.

¹⁷⁴ Baksi and Kamble (2016), in their study of Marathi agricultural literature, have noted a rare instance of reference to caste in the discussion on bone manure.

¹⁷⁵ Saha 2013.

¹⁷⁶ M.C. Namboothiripad (1947) Setsin Gothambu, *Mangalodayam*, 23(3-4).

¹⁷⁷ Raina and Habib 2004.

history of science in India reminds us that the idea of a bygone golden age was a popular trope in the discourse of science among the local intelligentsia.¹⁷⁸ In its varied responses to the intellectual and cultural encounter with modern science, the local intelligentsia sought to revive and revitalise this golden age.¹⁷⁹ The revivalist frame was characterised by the recovery of this golden past based on the learnings from the ancient Indian knowledge corpus. On the other hand, the revitalisation stressed assimilation of relevant aspects both from the Indian traditional knowledge and modern science. In both these discourses, the idea of a unified Indian nation with a Hindu past became predominant.¹⁸⁰ However, in the popular writings on agriculture, the idea of the ancient golden age was not essentially connected to the classical Hindu texts. Besides sections on agriculture in different Vedas and Samhitas, texts like 'Krishi-Sukti' and 'Krishi-Parashara' offered detailed commentary about agricultural practices in the ancient period.¹⁸¹ However, we do not see the utilisation of these texts to develop an argument for indigenous agricultural knowledge like in medicine, where local medical knowledge was presented as an alternative to modern science.

As discussed in the earlier chapters, the history of science and technology and its popularisation in India indicates that the local intelligentsia's support for modern science was mainly based on the notions of science as an agent of economic progress and social reform.¹⁸² The articulation of science and technology as an imperative of development neutralised its meaning as a western import, which enabled the legitimation of science in society.¹⁸³ Raina and Habib observed that this feature of science in colonial India corresponded to the nature of science discourse in Europe that was based on the 'Baconian optimism'.¹⁸⁴ The emphasis on empiricism was a reaction to scholasticism that marked the Indian knowledge scenario. As Sangwan points out, "it reflected the progressive idealism of the age".¹⁸⁵ "...the more people acquainted with useful

¹⁷⁸ Panikkar 1992, Prakash 1999, Raina and Habib 2004.

¹⁷⁹ Raina and Habib 2004.

¹⁸⁰ In the previous chapter we saw such negotiations in the context of medicine.

¹⁸¹ Randhawa 1980.

¹⁸² Raina and Habib 2004.

¹⁸³ Ibid.

¹⁸⁴ Raina and Habib (2004).

¹⁸⁵ Sangwan 2000 p 18.

knowledge, the faster the progress of society".¹⁸⁶ According to him, the popularisation of useful knowledge itself was a 'philosophical rhetoric'.

Conclusion

This chapter discusses the popular literature on agricultural sciences in the Malayalam popular periodicals published from the mid-nineteenth to mid-twentieth century. The discussion is contextualised in the history of the institutionalisation of modern agricultural research and education in Travancore. It adds to the contemporary perspectives in the history of agriculture that direct more attention to regional and vernacular histories. It simultaneously throws light on a little-explored area of regional history and places Kerala within an intellectual network of colonial knowledge production and circulation.

By the second half of the nineteenth century, the state of Travancore was invested in the institutionalisation of modern agricultural research. Through its educational and extension activities, the princely state popularised scientific agriculture in the region. For the state, science was a means for reforming agriculture to achieve economic development and social progress. Through its popularisation efforts, the intelligentsia performed the essential didactic task of inducting the larger population into the discourse of agricultural improvement and modernity. Drawing together the discussion on the development of the Travancore Department of Agriculture and popular literature, we can see that the popular discourse on agriculture and the institutional discourse informed each other. The popular science writings on agriculture deliberated and justified the need for agricultural improvement and the means to achieve it. The cultural authority of science during the period played an important role in legitimising these ideas in public. The chapter locates the literature on agriculture in the

¹⁸⁶ Ross 1962, quoted in Sangwan 2000, p 18.

popular socio-political discourses of the period, but it fails to situate the discussion in the discourses of the emerging communist movement.

Although a more detailed study is needed to assess the tangible impacts of the introduction of modern scientific methods on agricultural production and commerce, an overview of the agriculture-related literature in popular Malayalam periodicals shows that state intervention in the modernisation of agriculture was highly appreciated. The scientific agriculture and modernisation supported by the state department and the intelligentsia influenced agricultural practices and implied the interpenetration of modern science in the experience of modernity. It thus popularised and reinforced social imaginaries of science informed by the discourse of modernity and progress. Approaching the history of agriculture from the vantage point of the history of popular science enables us to move beyond the conventional definitions of agricultural modernisation that focusses narrowly on economic aspects and agrarian relations. Including science and its popularisation in the discussion helps us to connect the history of agricultural development to the very pertinent discourse of science and modernity in colonial India.

CHAPTER SIX

Astronomy and Astral Sciences

Introduction

In the history of astronomy in the nineteenth and twentieth-century India, two themes are predominant.¹ The history of astronomical observatories established during the eighteenth and nineteenth centuries and the cultural engagement of modern astronomy and Indian astral sciences.² Scholars have explored the European engagement with the local knowledges and have pointed out a multitude of responses among the local intelligentsia. They highlighted the dynamics of nationalism and anti-imperialism in the negotiation of knowledge.³ However, a majority of these works have mainly focused on the interlocutors situated at the centres of learning in the colonial metropolises. We know very little about the cultural conversations about astronomy and astral science in the larger, non-specialist or vernacular public sphere. It cannot be due to the dearth of popular literature on astronomy. Studies on Hindi popular literature have pointed out that the political and social contexts of intellectual engagement in the twentieth century motivated the production and circulation of popular Hindi texts on astronomy and meteorology.⁴ Several magazines were devoted to popularising astronomical knowledge during the twentieth century.⁵ Sen has

¹ See Sen (2014) Chapter one for an elaborate review of the history of astronomy in India, covering the orientalist, indologist, nationalist and transcultural accounts.

² Ansari 1985, Dodson 2007, Bayly 1996, Venkateswaran 2016, Raina 2020, 2022 (forthcoming), Schaffer 2012, Sen 2014.

³ Dodson 2007, Bayly 1996, Sen 2014, Venkateswaran 2016, Raina 2020.

⁴ Mishra 2015, Singh 2015.

⁵ Mishra 2015.

noted that interlocutors like Bal Sastri contributed to popular literature in Marathi periodicals like *Darpan* and *Dig Darshan*.⁶ In Malayalam, too, astronomical knowledge was a popular theme of scientific and cultural discussion in vernacular literature. As Bayly pointed out during the late nineteenth and twentieth centuries, the public sphere of astronomical knowledge was not significantly different from medicine. Both were engrained in social life with the coexistence of learned and popular practices, and both were reimagined in different ways to support the growing nationalist consciousness.⁷

Nevertheless, popular discourse on astronomy failed to garner the wide scholarly attention accorded to medicine. While the reasons for this lacuna are elusive, this chapter aims to narrow that gap by exploring popular literature on astronomy and astral sciences in general Malayalam periodicals published during the late nineteenth and twentieth centuries. It aims to locate the social history of astronomical knowledge in colonial India outside the imperial institutions and learned societies. Further, it situates the history of astronomy in colonial India in the regional history of the Princely state of Travancore. Following the general pattern of the thesis, the first part of the chapter contextualises the development of popular literature in the history of the relevant institutional developments. The role of the local intelligentsia is also discussed. The second part discusses the popular literature on astronomy and astral sciences to trace the social imaginaries of science embedding the discourse of popular science.

Popular Discourse on Astronomy- A Background

In the previous chapters on health and agriculture, we saw that the institutionalisation of government departments and the development of education played a crucial role in the production and circulation of popular knowledge on the sciences. In the case of astronomical knowledge, we do not know of any such state institutions that can be directly linked to the

⁶ Sen 2014.

⁷ Bayly 1996.

popularisation of astronomy or astral sciences. Nonetheless, there are two points of reference in the history of astronomy in Kerala that must be recalled here to contextualise the popular literature. The first one is the history of the Kerala School of Astronomy, and the second one is the establishment of the Trivandrum Observatory.

Kerala School of Astronomy

The history of science in Kerala is usually traced back to the treatises on astronomy and mathematics produced between the twelfth and sixteenth centuries.⁸ Madhava of Sangamagrama (1340-1425), Vatasseri Parameswara (1360-1455), Neelakantha Somayaji (1444- 1545), Sankara Varrier (1500-1560), Narayanabhattan (1500-1575), Jyestadeva (1500- 1610), Achuta Pisharati (1550-1621) and Pudumana Somayaji (1660-1740) are some of the important scholars from the period.⁹ Historians of science came to refer to it as the Kerala School of Astronomy and Mathematics.¹⁰ The Kerala School, also called the Nila School, is based mainly on Aryabhata's astronomy and developed through commentaries and necessary corrections to suit the regional socio-economic and intellectual concerns. It is believed to have made many important mathematical discoveries equivalent to the Gregory series for the arctangent, the Leibniz series for π , Newton's power series for sines and cosines and Taylor series for finding sines and cosines.¹¹ The School also assumes significance because of its insistence on continuous observations and inferences in the study of astronomy.¹²

The majority of the texts produced by the School were in Sanskrit, Malayalam, and some in a hybrid form of Sanskrit and Malayalam called the Manipravalam. Because of the provincial and linguistic nature of the caste and

⁸ Balakrishnan 2007, Nair, C. G. R. 2011, Namboothiri 2008, Kurup 2011.

⁹ Ibid, Sarma 1972, Joseph 2009.

¹⁰ Sarma 1972, Pingree 2003, Joseph 2009.

¹¹ Ibid.

¹² Ibid.

Pingree writes, "the only Sanskrit work that has so far been found in which the role of observations (pratyaksa, pariksana) and inference (anumâna) are discussed extensively and carefully as fundamental to the proper practice of astronomy is the *Jyotirmimamsa* of the important Kerala astronomer, Nilakantha Somayâjin" (Pingree 2001, p 187).

family-based learning traditions and lack of exchange with schools in other regions of the subcontinent, the contributions made by the Kerala School did not circulate widely.¹³ Even though astronomy and mathematics continued to develop in the region, they did not garner much attention from the history of science and astronomy. In 1835, Charles Whish, a civil servant in the East India Company, published an article- 'Quadrature of the Circle and the Infinite Series of the Proportion of Circumference to the Diameter Exhibited in the Four Sastras- The Tantra Samgraham, Yukti Bhasha, Karana Paddathi and Sadratnamala', in *Transactions of Royal Asiatic Society of Great Britain and Ireland*.¹⁴ It is considered the first instance of introducing the contributions of the Kerala School to the Western world. However, within the imperial centre-periphery intellectual and political dynamics, Whish's paper was not received well.¹⁵ The Kerala School of Astronomy was later brought to the limelight during the 1940s through scholars like C. T. Rajagopal, K. Mukunda Marar, A. Venkataram, T. V. Vedamurthy Aiyer, K. Balagangadharan.¹⁶ Later, K. V. Sarma, M. D. Srinivas, M. S. Sriram, K. Ramasubramanian, George Gheverghese Joseph and others have contributed considerably.¹⁷

The history of the Kerala School of Astronomy directs us to seek the pertinent yet little-explored question of the social memory of the Kerala School in twentieth-century Kerala. Any account of science, especially astronomy or mathematics, in Kerala starts with a discussion of the contributions made by the Kerala School. In the discussion on medicine, we have witnessed that interlocutors built their arguments of comparability with modern knowledge on the basis of such corpora of traditional local knowledge. It implied identification with the larger nationalist past and simultaneously negotiated a distinct regional identity. It is interesting to explore how popular discourse on astronomical knowledge represent such negotiations.

¹³ Sarma 1972, Pingree 1978, Joseph 2009.

¹⁴ Whish 1835.

¹⁵ Pingree 2003.

¹⁶ Sarma 1972.

¹⁷ For more on Kerala School, see Sarma 1972. He presents a bibliography of texts produced by the Kerala School. Also see Joseph 2000,2009, Sarma et al. 2008, Pingree 2001.

Trivandrum Observatory

Modern, institutionalised astronomy was introduced in Travancore in 1836 with the establishment of the Trivandrum Observatory. Maharaja Swathi Thirunal established the Observatory at the suggestion of Stuart Fraser - the British Resident at Travancore.¹⁸ Trivandrum was chosen as an ideal location for an observatory as the earth's magnetic equator passed through the state.¹⁹ John Caldecott, a commercial agent and an amateur astronomer, was appointed the director of the Observatory.²⁰ The Observatory started by printing an ephemeris modelled on the Nautical Almanac.²¹ Meteorological observations made at the Observatory were published in the journal of the Madras Literary Society.²² Caldecott was later elected as the Fellow of the Royal Astronomical Society and was influenced by the geomagnetic research project started by the British Association for Advancement of Science (BAAS).²³ However, Caldecott could not publish his observations, a failure that was later attributed to faulty instruments and incompetent and lazy assistants.²⁴ Caldecott died in 1849, and Reverend Sperschneider (head of the government press) took up the responsibility of the Observatory briefly before Allan Broun joined as the director.

In 1852 Allan Broun took over as the director of the Trivandrum Observatory.²⁵ Broun had served as the director of the Thomas Brisbane's Observatory at Makerstorm and trained at the Royal Observatory of

¹⁸ See Broun 1874, Appendix One.

¹⁹ Magnetic equator is "the line on which the magnetic needle dips neither to the north nor to the south" Broun 1874 p vi. Ratcliff (2016) points out that such geographical features were an important stimulus for scientific research in the subcontinent.

²⁰ See Broun 1874, Appendix One.

²¹ Pillai 1940 Vol 4.

²² Caldecott 1837a, 1837b.

²³ Broun 1874. See Appendix One; Ratcliff 2016.

In 1839, BAAS started a project for observing global geomagnetic variations. The project included a global network of observatories around the world that will record local magnetic and meteorological conditions on coordinated dates and times to explore global variations in terrestrial magnetism. In India, observatories at Madras, Shimla, Bombay, Oudh, and Trivandrum were part of this global network. For more on this *magnetic crusade*, see Cawood 1979, Enebakk 2014, Ratcliff 2016.

²⁴ Broun 1874. See Appendix One.

²⁵ Aiyar 1906 Vol 3.

Allan Broun is considered a pioneer of solar-terrestrial physics and has been credited for postulating several ideas that later became fundamentals of fields like astrophysical plasma physics. Most of his work was published during his tenure at Trivandrum (published between 1854-1874). See Girish, Gopakumar and Eapen 2013.

Greenwich.²⁶ Committed to Brisbane's terrestrial magnetism project, he focused on magnetic and meteorological research at Travancore. Broun convinced the Rajah to set up a magnetic observatory at the Agastyar Peak at the Western Ghats.²⁷ The observations made by Broun at this observatory were published by the Royal Society of London and the Royal Society of Edinburgh.²⁸ He updated the Travancore Almanac to include meteorological observations, rainfall data, atmospheric pressure and temperature and other relevant information.²⁹

In 1865 Travancore Government discontinued support for the operations of the Observatory for financial reasons. Routine observations regarding local time were continued.³⁰ In 1883 the tabulation of rainfall data was entrusted to the Observatory, and a small staff was hired. Data on weather and rainfall was regularly sent to Madras, Simla and Bombay. Observation required for local timekeeping was also updated. Later in 1927, the meteorology and astronomy sections were separated. The astronomical section was mainly responsible for observations and standardisation of local time. The local mean time of rising, setting, and meridian passage of planets, sun and moon were published weekly in the Government gazette. By 1927, the Meteorological Department of the Government of India recognised Trivandrum Observatory as a first-class meteorological observatory.³¹ The Observatory was placed under the University of Travancore in 1939.³² Later in 1951, the Government of India acquired the meteorological section of the Observatory. The astronomical Observatory continues under the Department of Physics, Kerala University.

Caldecott's introduction to the Observatory suggests that the Travancore was aware of its role in advancing science. Caldecott wrote that the Rajah of Travancore, Swathi Thirunal Rama Varma, established the Observatory "with the double view of affording his aid to the advancement of astronomical science, and of introducing by its means correct ideas of the principles of this science among

²⁶ Obituary Notices of Deceased Fellows 1879-1880.

²⁷ Ratcliff 2016, Broun 1874 Appendix Two.

²⁸ Sen 2014, Ratcliff 2016.

²⁹ Broun 1874. See Appendix Three.

³⁰ Broun 1874. See Appendix Two.

³¹ Pillai 1940 Vol 4.

³² TAR 1938-39.

the rising generation under his government”.³³ Joydeep Sen has argued that the intellectual improvement of the locals suggested by Caldecott was a justification put forward for the establishment of the Observatory.³⁴ Indeed, we do not know of any efforts towards the popularisation of modern science under Caldecott. The argument of the improvement of locals remains a rhetorical promise advanced for the pursuit of colonial science and perhaps Caldecott’s personal curiosity.

After Broun took over, he started a series of lectures for the local assistants at the Observatory.³⁵ Lectures covered the first six books of Euclid, Prof Kelland’s Algebra and Snowball’s Analytical trigonometry, among other texts. By the end of the class, the assistants could solve quadratic equations.³⁶ In order to encourage the assistants, prizes were given to those who made proper notes and performed well. He also gave lectures on the nature and functions of the instruments at the Observatory and trained the assistant to make observations and do preliminary calculations and deductions. In his report on the Observatory, Broun noted that,

“The assistants now in the observatory can observe as accurately as the ordinary class of observers in European observatories and that they have an intelligent comprehension of the precautions to be taken for accurate scientific observations as well as (in the case of several of them) of the object for which observations are made”.³⁷

Broun’s lectures were open to anyone interested, but we do not know if anyone other than the observatory staff attended them.³⁸ Broun’s training for the staff was apparently very successful as he complained that many assistants

³³ Caldecott 1837a p 56.

³⁴ Sen 2014.

³⁵ Broun 1874. See Appendix One.

When Broun arrived in Travancore, he found the local assistants incapable of doing proper observations. He complained that the assistants did not realise the need for accurate observations and were often forging the data. He fired some of the dishonest assistants and trained others to make correct observations.

³⁶ Broun 1874. See Appendix One.

³⁷ Ibid p 469.

³⁸ Broun 1874. See Appendix One.

moved to higher-earning jobs after taking the training, forcing him to train a new set of assistants.³⁹

Broun also opened the Observatory for local visitors “...to encourage as much as possible the desire for information”.⁴⁰ The Observatory was open to visitors six days a week from 10 am to 4 pm. The number of visitors, their religion, profession, literacy levels and the locality they came from was recorded and reported. Visitors came from different parts of Travancore and India. Broun records 1121 visitors between 1852 and 1857, including farmers, merchants, writers, government employees, sepoys, local physicians, and Christian priests.⁴¹ Although the number of visitors seems small, it is significant when considering that modern science in the region was in its infancy. At this stage, perhaps the Observatory satiated the intellectual curiosity of the elites who had early access to modern education and science. Later on, by the 1930s, science and mathematics students from local colleges and even outside the state visited the Observatory.⁴² Beyond that, we do not know much about the Observatory’s role in popularising astronomy in the region.

Nonetheless, the history of Trivandrum Observatory places Travancore as an important site to understand the practice of colonial astronomy and knowledge production in India.⁴³ As Jessica Ratcliff points out, Travancore made significant contributions to the colonial process of knowledge-making in the case of geomagnetic research. Although lying at the peripheries of colonial rule as a princely state, through the Observatory, Travancore was able to participate in the global pursuit of science.⁴⁴ Further, the Observatory was set up when modern science education was in its infancy in the region. Other than some limited modern medical aid, scientific institutions or government departments were not established. The first government press (with imported machinery from England) was established in association with the Observatory (1837). The first

³⁹ Ibid. In order to overcome this, Broun arranged for an agreement that required the newly hired assistants to work with the Observatory for at least five years. Broun hired assistants from the Rajah’s Free School at Trivandrum.

⁴⁰ Ibid p 500.

⁴¹ Ibid.

⁴² TAR 1927-28, TAR 1932-33.

⁴³ Sen 2014.

⁴⁴ Ratcliff 2016.

anglo-vernacular calendar in Travancore was printed at this press in 1838. Lieutenant Horsely of Madras Engineers constructed the building for the Observatory and later headed an 'experimental engineering department started with the aim of "introducing a knowledge of the European engineering art into Travancore".⁴⁵ He undertook many public works constructions and built many bridges and canals in Travancore. The Irrigation department also developed under him.⁴⁶ While in Travancore, Broun played a significant role in establishing a museum (1855, opened for the public in 1857) and a public garden and zoological park (1859) in Trivandrum.⁴⁷ He also initiated the standardisation of weights and measures and currency in Travancore.⁴⁸ Thus in a way, the Trivandrum Observatory served as a departure point for many modern scientific institutions and assumed a crucial role in the history of the institutionalisation of modern science in the region.

Before we move on to the discussion of popular literature, there is one more aspect of vernacular history to which I wish to direct our attention-the development of Sanskrit education in colonial Kerala. The history of nineteenth-century astronomy in India tells us that the development of modern Sanskrit education was a crucial factor in the cultural and political engagement of interlocutors of Indian astral sciences.⁴⁹ Modern institutional Sanskrit education began in colonial Kerala in the late nineteenth century. In Travancore, the government started a Sanskrit college at Trivandrum in 1889.⁵⁰ Similar to

⁴⁵ Menon 1878 p 53.

⁴⁶ Horsely is also noted as the author of the first history of Travancore written in English. His 'Memoirs of Travancore: Historical and Statistical' (1839) was printed at the government press at the Observatory. See Nair, S. A. 2004.

⁴⁷ For more on Broun's contribution to Museum, see Broun 1874 Appendix Four and Five. For public gardens, see Broun 1874 Appendix Six.

⁴⁸ Broun 1874.

⁴⁹ Hindu College Calcutta, Benaras Sankrit College and the Poona Sanskrit College served as sites of cultural interaction for traditional Indian sciences and modern science- See Dodson 2007, Bayly 1996, Sen 2014.

⁵⁰ Aiya 1906 Vol 2.

A. R. Raja Raja Varma was the first principal of the college. He was succeeded by T. Ganapati Sastri (who later curated the Oriental Manuscript publication). The college was affiliated to the University of Madras in 1936. Until then, the examinations were conducted by a committee of experts appointed by the Travancore government. Scholarships were provided for students. The full length of the course of study at college was nine years. The students qualified for the Sastri exam after five years, the Upadhhaya exam after seven years and the Mahopadhyaya exam after nine years. The highest qualification of Mahopadhyaya was available only for Brahmins. Though

Sanskrit colleges set up in other parts of the subcontinent during the period, the curriculum combined elements of traditional Indian and modern scholarship. Instruction was imparted in logic, grammar, rhetoric, Mimamsa, literature and Vedas, and modern science, mathematics, and history. The latter group was taught in Tamil or Malayalam. The Travancore State Manual of 1906 notes that this combination of subjects in the curriculum “...adds considerably to the value of their education as it broadens their (students’) mind and makes them less bigoted than the old school Pandits”.⁵¹ Many private Sanskrit padashalas were also started in the region. In 1906 there were three private institutions, and by 1940 the number had increased to 56 (33 recognised and 23 unrecognised Sanskrit schools).⁵² Cochin also followed suit, and in 1914 the government started the Sanskrit college at Tripunithura. Local elites like Punnassery Nambi Neelakanda Sarma led the way in the Malabar region.

Sarma was keenly interested in the popularisation of Sanskrit. He started a Sanskrit school -the Saraswathodyothini Sanskrit Padashala- in Pattambi in 1889, which was later recognised by the University of Madras. The padashala was upgraded to a college in 1911. Sarma opened the school for all castes, and his association with Sree Narayana Guru (the Ezhava social reformer) brought numerous Ezhava students to the school.⁵³ Sarma published a *panchangam* known as the Pattambi *panchangam* from 1872. He also published a Sanskrit journal *Vijnanachintamani* from 1887.⁵⁴ The journal had two parts- ‘Bhashamayoogham’ in Malayalam and ‘Samskrithamayoogham’ in Sanskrit. In the beginning, the Sanskrit section was also published in Malayalam script. The journal carried literary, cultural, social, and scientific essays. Sarma started the Vijnanachintamani Press to facilitate the publication of the journal. He also authored numerous texts in Sanskrit and Malayalam on literature, *jyothisha* and

there were a few non-Brahmin ‘upper castes’ in other courses, the majority of the students were Brahmins. The curriculum was reorganised over the years. In 1919 Sanskrit college was opened to all castes (Travancore Government Gazette, 1919, LVII (20)).

TAR 1926-27 records one Pulaya student in the Kavya section. Women also joined the course.

⁵¹ Aiya 1906 Vol 2 p 464.

⁵² TAR 1939-1940.

⁵³ Jayakrishnan 2015.

⁵⁴ The journal was originally started by Sarma’s mentors Vellannissery Vassunni Moosath in 1884 and stopped publishing after one year. Sarma took over the journal in 1887. The journal stopped briefly after that but was revived in 1891.

medicine. His noted *jyothisha* texts are 'Jyothishastrasubodhini' and 'Prasnamargam Vyakhyanam'. Many other Sanskrit interlocutors published numerous texts on *jyothisham*, medicine and *Vaastu sastra*. K. V. Sarma notes the contributions of Kaikulnagara Rama Varier, A. R. Rajaraja Varma, Vellanisseru Vasunni Moosath and Punnasseru Nambi Neelakanda Sarma.⁵⁵ Mention must also be made of Kanipayyur Sankaran Namboothiripad, who set up the Panchangam Press in 1929 at Kunnamkulam to print and popularise *jyothishastram* and *Vaastu sastra*.⁵⁶

Although some of these scholars are noted for their contributions to Sanskrit literature, Ayurveda or Astrology, their cultural and epistemological significance as interlocutors of local knowledge remains to be explored. Exploring the narratives these interlocutors put forward, their sources, and the functions they envisaged for the texts can tell us a lot more about the vernacular expressions of the domestication and legitimation of modern science and its popularisation. Moreover, exploring the *jyothisham* texts and commentaries produced by these interlocutors may throw more light out on the social history of the Kerala school of Mathematics during the nineteenth and twentieth centuries.

As mentioned in chapter three, within the limitations of this thesis, I have not delved deep into the contexts and contributions of individual interlocutors. A dearth of studies on the development of Sanskrit learning and curriculum in the nineteenth and twentieth-century Kerala hinders the further exploration of the intellectual negotiations and institutional history of astronomy- astrology. Nevertheless, I hope the brief discussion above draws attention to the institutionalisation of Sanskrit education and the popularisation of Sanskrit in the twentieth century in Kerala. It helps to contextualise the development of

⁵⁵ Sarma (1972) mentions these scholars as the noted Kerala Astronomers of the nineteenth and twentieth century (p 80-81). Major jyotisha works of these scholars are- 'Samudrikasastra', 'Gaulisastra', commentaries of 'Hora' and 'Prashnamarga' by Kaikulnagara Rama Varier, 'Karanapariskarna', 'Panchangasuddhipadhathi', 'Jyotisaprakasana' (on 'Golodhyaya' of BhaskaraII), by A. R. Raja Raja Varma, Commentary on 'Panchabodha' by Vellanisseru Vasunni Moosathu, 'Jyothishastrasubodhini', 'Panchabodhakriya- Bhasha', 'Chamatkarachintamani' and 'Prasnamarga' by Punnasseru Nambi Neelakanda Sarma.

⁵⁶ Sarma (1972) notes Kanipayyur as the author of an adapted commentary of 'Jatakapaddhati' of Vatasseru Parameswara.

popular literature on astral science in both Sanskrit and Malayalam. As we witnessed in the discussion on medicine, the popularisation of the Sanskrit language was a crucial factor in the cultural interaction between modern medicine and Ayurveda. It enabled the production and circulation of numerous texts on local knowledge, which were earlier not accessible outside the family, sect, or caste ties. Translations and interpretations of classical texts began to be circulated widely. For some castes, Sanskrit offered a source of mobility and agency for negotiation in the realm of sciences. A study of the production and circulation of popular literature on astronomical knowledge in Malayalam may reveal related cultural negotiations.

Much like other areas discussed in this thesis, the Travancore Book Committee, Public Lecture Committee, Travancore Sanskrit Series and publications by different literary organisations and zealous individuals also contributed to the contextualisation of astronomical sciences in Malayalam social imaginary. Moreover, during the nineteenth and twentieth century in Kerala, agriculture, commerce, architecture, medicine, religious rituals, and many mundane aspects of life was defined by traditional astrological knowledge. As Inkster pointed out, 'the scientific and social are inherently combined in astronomy'.⁵⁷ It is worthwhile to explore the dynamics of popularisation and negotiations of knowledge it engendered.

Reading Astronomical Literature

Astronomy was one of the first areas of science to be featured in popular science literature in Malayalam periodicals. In the first issue of '*Paschimodayam*' (1847) - the first periodical to feature science articles in Malayalam- there were at least three articles that discussed modern astronomy.⁵⁸ The first article, 'Jyothishavidya' (Astrological Knowledge), explained the use of the telescope and warned its readers about the superstitious beliefs regarding planets and their movements. 'Nakshatrasanjarangal' (Movements of the Stars),

⁵⁷ Inkster 1982 p 119.

⁵⁸ Mohandas (2011) lists the contents of the first issue of '*Paschimodayam*'.

'Sooryasamsthithi' (Solar System), and 'Bhoogola Sanjaravum Athinaal Undakunna Visheshangalum' (Movements of the Earth and its Influences) were other articles in the same issue.⁵⁹

Unlike health or agriculture discussed in previous chapters, we do not know of any specialised periodicals on astronomy or astral sciences during the period of the study. Popular science related to astronomical knowledge was published in the general periodicals of the period. They were published in almost all major periodicals like *Bhaashaposhini*, *Mangalodayam*, *Arunodayam*, *Vidyavinodini*, *Kairali*, *Rasika Ranjini*, and women's magazines like *Sumangala* and *Sharada*. Some periodicals like *Vidyabhivardini* had a devoted column called *jyothishapankti* (astrology series) for astronomical literature, while others featured it in general science columns.

As noted in the previous chapters, several essays were anonymous, and some were signed with only initials, whereas a few signed with pseudonyms like *oru pracheenan* (an ancient man).⁶⁰ Some identified themselves as astrologers or experts on astronomical knowledge- as *jyotsan* or *jyothisha pandithan*.⁶¹ Other authors who could be traced include Sanskrit teachers and scholars, literary, social and political figures who contributed to a variety of science-related and other topics in these periodicals. Some noted authors were Punnassery Nambi Neelakanda Sarma, the Sanskrit scholar noted earlier, A. D. Harisharma, K. Kunjunni Raja, A. R. Raja Raja Varma and Rama Varma Maru Thampuran. Literary and social figures included Murkoth Kumaran, C. K. Anthappai, O. M. Cherian and Rama Varma Appan Thampuran. I could not trace any women authors in the popular literature on astronomical knowledge.

⁵⁹ Ibid.

⁶⁰ Oru Jyothsyan (1890) Aadityan, *Chandrika*, 1(7); Oru Pracheenan (1889) Jyothishastram, *Vidyavinodini*, 4(3); N. R. K. (1898) Sooryan, *Bhaashaposhini*, 2(1); C. N. K. (1917) Sooryodayam, *Bhaashaposhini*, 21(10).

⁶¹ K. Kannan Nair Jyothisha Panditar Pattambi Sanskrit College (1928) Vaarakramam, *Arunodayam*, 1(4); Kizhakeppattu Variyathu Jyotsan Rama Warriar (1915) Bhoomi Chalikunnilla-Sooryan Charikunnu, *Kerala Kesari* 1(5).

Major themes

Popular essays on astronomical knowledge were generally long, extending into 6-8 pages on average. Many topics were serialised. They covered a variety of themes, including the description of various planetary bodies-sun, moon, stars, planets, and solar system; possibilities of life on moon and planets like Mars and Venus; description of astronomical events – eclipses, meteor showers, Transit of Venus, Haley’s comet and introduction of modern scientific instruments. Calculation of time and calendar making was explained. Biographical notes on scientists were also common. Didactic essays featured modern as well as local astronomical literature. Some of the corresponding titles were ‘Saurayootham’ (Solar System), ‘Sooryan’ (Sun), ‘Chovva’ (Mars), ‘Grahanangal’ (Eclipses), ‘Halikethu’ (Haley’s Comet), ‘Kollam Maasam Thiyathi’ (Year, Month and Date), ‘Chovvayil Janavaasam Undo’ (Is there Life on Mars?), ‘Palmermalayile Dooradarshini’ (The Telescope at Palomar Hills), and ‘Galileo Galilei’ (Galileo Galilei).⁶² Similar to the discussion on different traditions of medicine in the first chapter, there were polemical essays that juxtaposed modern astronomy and local astral sciences. Such engagements can be seen in essays like ‘Pracheena Malayalikaude Jyothishastra Njanavum Madhyakaala Malayalathile Pazhaya paattukalum’ (Astronomical Knowledge of Ancient Malayalees and Medieval Malayalam Songs), ‘Bhaarateeyarum Jyothishastravum’ (Indians and Astronomical Knowledge) and ‘Hindukalode Idayil Jyothishastraabhivridhi’ (Progress of Astronomical Knowledge among the Hindus).⁶³ The polemical literature on different traditions of astronomical knowledge is discussed first. After that, general popular science essays are explored to understand the didactic narratives of science.

⁶² O. M. Cherian (1903) Saurayutham, *Bhaashaposhini*, 7(12); K. M (1904) Sooryan, *Rasikaranjini*, 2(2); K. Govindan Thambi (1916) Chovva, *Sumangala*, 1(7-8); K. R. Harihara Iyyer (1906) Grahanangal, *Sharada*, 2(8); T. K. Joseph (1910) Halikethu, *Bhaashaposhini*, 14(7-8); Murkoth Kumaran (1933) Kollam, Maasam, Thiyathi, *Keralam*, 4(7); V. C. George (1921) Chovvayil Janavaasam Undo, *Bhaashaposhini*, 26(5-6); Anonymous (1949) Palmermalayile Dooradarshini, *Jayabharatham*, 1(3); V. M. Govinda Menon Kumaranloor (n.d.). Galileo Galilei. *Mangalodayam*.

⁶³ Anonymous (1927) Pracheena Malayalikalude Jyothishastra Njanavum Madhyakaala Malayalathile Pazhaya Pattukalum, *Arunodayam*, 1(3); R. Subbaraya. Sharma (1932). Bharateeyarum Jyothishastravum. *Bhaashaposhini*, 36(12); A. R. Raraja Varma (1889) Hindukalode Idayil Jyothishastraabhivridhi. *Vidyavinodini*, 11(11).

Jyothisham- Jyothishastram

In the popular literature in Malayalam, the terms *jyothisham* and *jyothishastram* were used for astronomical knowledge. In the present-day common parlance, they refer to astrology and astronomy, respectively. In twentieth-century popular literature, *jyothisham* was used to refer to traditional knowledge, while *jyothishastram* was used to denote traditional and modern sciences. Qualifiers like *paschathya* (western), *naveena* (new) or 'English' were used for modern astronomy. Local knowledge was variably referred to as *bharateeya* (Indian), *Arya* (Aryan), *Hindu* (Hindu), *pracheena* (ancient), or *purathana* (ancient). In his study of Indian astral sciences, Pingree has explained that the term *jyothishastra* included references to both astronomy and astrology. *Jyothishastra* included "Western areas of inquiry as astronomy, mathematics, divination, and astrology".⁶⁴ "This sastra was conventionally divided into three subteaching: *ganita* (mathematical astronomy and mathematics itself), *samhita* (divination, including by means of celestial omens), and *hora* (astrology)."⁶⁵ During the nineteenth century, under the scrutiny of modern science, there were attempts to distinguish between astrology and astronomy. Dodson understands such attempts as a 'starting point' of distinguishing between *siddhantic* and *puranic* astronomical knowledge. He points out that the arguments for such distinctions were based on 'relative methodology, utility and cultural value'.⁶⁶

Nonetheless, the intersection of astrology and astronomy continued as many modern educated astrologers adopted modern mathematical and astronomical calculations for astrological predictions.⁶⁷ Sen notes that this continuing overlap has alerted scholars of the history of astronomy in India to include both astronomy and astrology in their referential frameworks.⁶⁸ The following pages will add to this observation and discuss the representations of the cultural conversations between modern astronomy and astral sciences as

⁶⁴ Pingree 2003 p 45.

⁶⁵ Ibid p 46.

⁶⁶ Dodson 2007 p 165.

⁶⁷ Dodson 2007, Bayly 1996.

⁶⁸ Sen 2014.

represented in Malayalam popular periodicals. As Sen points out, there was no attempt to organise Indian *jyothishastra* as an alternative to western astronomy. The attempt was restricted to an assertion of its reasonability.⁶⁹ We will explore the nuances of this assertion in Malayalam popular literature.

As noted above, the popular discussion on astronomical knowledge was framed as Indian- Western, East-West, or old- new. Such adjectives of *jyothishastra* evoked the orientalist constructions of Indian knowledge- the West for ever-renewing, the East- frozen in time and unchanging. Raina has explained that terms like Indian astronomy and Hindu astronomy are products of disciplinary history writing, in which European Orientalists and Indologists played an important role. By the late nineteenth century, the emerging intelligentsia has also started to use such references.⁷⁰ In the discussion of the literature on local medicine, we have noted that the multiplicity of references like India, Aryan and Hindu underlie the ambiguities engendered by the national and regional identity negotiations during the twentieth century. In the popular literature on astral science, we do not see arguments for a distinct regional identity of knowledge and practice. As the adjectives suggest, the narratives were framed by appealing to unified civilisational and national identity. The appeal to a unified, glorious past was an essential feature of the cultural and political response to colonialism and modern science.⁷¹ Many articles on local astronomical knowledge followed a standard narrative of past advancements in astronomy made by Indians.⁷² Some traced the golden age back to antiquity. In contrast, others traced it to the Middle Ages, arguing that dialogues should be based on scientific texts produced by the likes of Aryabhatta and Bhaskara and not based on ancient Smritis and Puranas.⁷³ As mentioned above, the distinction between Siddhantas and Puranas was one of the defining features of the discourse of astral sciences during the nineteenth century.⁷⁴

⁶⁹ Ibid p 164.

⁷⁰ Raina 2020.

⁷¹ Raina 2004, Panikkar 1992, Prakash 1999.

⁷² R. Subbaraya Sharma (1932) Bharatiyarum Jyothishastravum, *Bhaashaposhini*, 36(12).

⁷³ Ibid, Punnassery Nambi Neelakanda Sarma (1898) Jyothishastram, *Bhaashaposhini*, 2(1); Adiyathu Krishna Menon (1928) Grahnam, *Kairali*, 12(5).

⁷⁴ Dodson 2007, Bayly 1996, Sen 2014, Raina 2020.

Irrespective of the foundations of the legacy in Siddhantas or Puranas, the priority of invention or discovery for many modern scientific theories were ascribed to Indian astronomy.⁷⁵ Some argued that traditional astrology is entirely scientific, based on advanced mathematical calculations and observations made with the help of sophisticated instruments. A. V. Krishna Iyer, in his essay 'Jyothishastram', stated that Hindu *jyotishastram* contained many modern scientific discoveries. It is based on complex mathematical calculations and determines the position of the planetary bodies and their movements. He argued that several instruments like *naadivalayam*, *yasthiyantram* and *chakrayantram* were used for that purpose, even before the West invented any instruments. Myths and stories about *rahu-kethu* and eclipses are all superstitions rooted in society over the period. In his words,

“There is nothing in English jyothishastram that was not already present in Hindu jyothishastram. However, whatever they had, the English developed it through hard work and invented several instruments. On the other hand, Hindus completely forgot their science”.⁷⁶

As Iyyer's article implied, the evocation of the golden age required some retrospection about the causes of the decline in the status of traditional knowledge. Laziness and lack of aptitude for hard work among the local population, lack of curiosity for new knowledge, foreign invasion, esoteric nature of traditional knowledge and caste system were listed as reasons. Conducive conditions for the progress of modern science were examined, and a lack of them was extrapolated to explain the stagnation of traditional astronomical sciences.⁷⁷ Some authors tried to locate the reason for the decline in knowledge practices. Kunjan Thampuran argued that astrology is a systematic body of knowledge and requires mastering various knowledge branches, including advanced mathematics.⁷⁸ Practising astrology demanded following a simple life of

⁷⁵ Punnassery Nambi Neelakanda Sarma (1898) Jyothishchakram, *Bhaashaposhini*, 2(6); Punnassery Nambi Neelakanda Sarma (1898) Jyothishastram, *Bhaashaposhini*, 2(1); Anonymous (1931) Bhoolokam, *Vijnana Sagaram*, 1(5-6).

⁷⁶ A.V. Krishna Iyer (1889) Jyothi Shastram, *Vidyavinodini*, 6(7) p 266.

⁷⁷ C. Kuttikrishnan Nair (1924) Brahmaandam, *Samabhavini*, 2(4); C. Govinda Menon (1889) Bhoomi, *Vidyavinodini*, 6(7).

⁷⁸ Alangottu Vidwan Kunjan. Thampuran (1899) Jyothishastram, *Bhaashaposhini*, 3(8).

integrity, honesty, and worship (of astronomical texts). However, because of laziness, many people read only a few texts and start practising astrology without any capability to do the necessary calculations. Thus, the predictions they make and the horoscopes they write went wrong, which eventually led to the decline of the reputation of astrology. Another author who signed in initials as P. K. also understood the decline of the local astronomical knowledge in terms of a failure of astrological predictions. He speculated that the predictions of the local astrologers are failing, perhaps due to the influence of numerous unknown planetary bodies that have not been accounted for in the Hindu cosmology. While the West constructed modern instruments to explore the universe and discovered new planets and stars, local knowledge became stagnant and declined.⁷⁹

The search for causes of decline was accompanied by a discussion on reform. The need for the revival of traditional astronomical knowledge was highlighted, and different strategies were discussed. Correcting and updating the almanac was identified as the most crucial step towards revival.⁸⁰ However, the decline of the astral sciences led to the paucity of experts capable of undertaking the necessary mathematical calculations. While the modern astronomy calculations were acceptable, complete reliance on them was discouraged as that would result in the loss of valuable contributions of Indian astral science. It was also pointed out that modern astronomy did not provide some of the essential calculations needed for *jyothisham*, like the true sidereal longitudes (English terms in the original text). Hence popularisers of traditional astronomical knowledge sought to introduce and popularise the necessary astronomical, mathematical calculations referring to texts like 'Yuktibhaasha' and 'Surya Siddhanta'.⁸¹

Similar to the discourse on medicine, in the popular literature on astronomical knowledge, we can see attempts to establish that traditional knowledge stood in parity and was sometimes superior to modern science by

⁷⁹ P. K. (1916) *Jyothishastram, Mitavadi*, 4(1).

⁸⁰ K. V. M. (1911) *Ayanachalanam, Mangalodayam*, 3(1); Rama Varma Maru Thampuram (1944) *Ayanachalanam, Mangalodayam*, 20(6-7).

⁸¹ *Ibid.*

revealing the underlying logic in traditional knowledge. As we saw above in A. V. Krishna Iyyer's article 'Jyothishastram', Indian astral sciences were portrayed as entirely scientific, based on advanced mathematical calculations and observations made with the help of complex instruments. Some of the oft-repeated points of contention were the shape, position and movement of the earth, sun, moon, stars, and knowledge of planets like Saturn, Venus, Jupiter, and causes of eclipses.⁸² It was claimed that traditional Indian astronomical and mathematical treatises had advanced understanding of many of these planetary bodies. Such essays argued that both western astronomy and Indian astral sciences offer similar explanations with the difference only in the style of presentation of knowledge.⁸³ From this position, an article on an eclipse stated that modern science views the world only as an inorganic entity that follows certain mechanical laws. On the other hand, Hindu Vedas understand the world as organic and believes that every aspect of the universe has life and essence to it. The author argued that this difference in the way of understanding the universe resulted in the difference in the explanations given to natural phenomena.⁸⁴

The juxtapositions of different traditions- the western astronomy and Indian astral sciences- were based on modes of representation and historical explanations for the evolution of knowledge. In other words, it implied a deeply contextual explanation about the similarity and dissimilarity in the nature of knowledge and the process of knowledge production and dissemination. Such narratives can be witnessed in essays that extended the rhetoric of status parity by drawing parallels to the Christian understanding of the universe and highlighting the conflict between the church and science.⁸⁵ The colonial narrative

⁸² Punnassery Nambi Neelakanda Sarma (1898) Jyothishchakram, *Bhaashaposhini*, 2(6); A. Shankara Poduval. (1904) Bruhaspati, *Rasikaranjini*; 2(4-5) K. M. (1904) Sooryan, *Rasikaranjini*; 2(2) S. R. V. (1904) Kujan *Rasikaranjini* 2(1); Adiyathu Krishna Menon (1928) Grahanam, *Kairali*, 12(5); K. Kannan Nair Jyothisha Panditar Pattambi Sanskrit College (1928) Vaarakramam, *Arunodayam*, 1(4); Punnassery Nambi Neelakanda Sarma (1898) Jyothishastram, *Bhaashaposhini*, 2(1).

⁸³ K. Kunjuni Raja (1941) Rahukethukkal, *Kairali*; Anonymous (1931) Puranathathvam, *Vijnana Sagaram*, 1(5-6).

⁸⁴ Adiyathu Krishna Menon (1928) Grahanam, *Kairali*, 12(5) pp 215-216.

⁸⁵ V. M. Govinda Menon Kumaraneloor (n.d.) Galileo Galili, *Mangalodayam*; Achanthodi Narayanan Nair (1927) Prapancha Rahasyam, *Kairali*, 11(7); Murkoth Kumaran (1933) Kollam, Maasam, Thiyathi, *Keralam*, 4(7).

equated traditional Indian knowledge with Hinduism and modern scientific knowledge with Christianity to establish the superiority of culture.⁸⁶ Discussing the colonial states' narrative on astronomy, Tiwari has pointed out that the British created a 'transnarrative of superiority by suppressing the history of the church- science conflict and highlighting the conflict between Indian beliefs and science.'⁸⁷ A reading of popular astronomical literature in Malayalam presents a subversion of the imperial rhetoric and hints at the resistance and negotiation that underlies the complex process of domestication of science in a colonial context. I could not trace any explicit dialogue between Christianity and Hinduism in popular astronomical literature referred to for this study. Though the idea of creationism underlined some essays on planetary bodies⁸⁸, the dialogue was mostly formulated in terms of the debates on science and religion.⁸⁹

Some interlocutors extended the argument of difference in style of representation to explain myths and folk tales, arguing that many stories from Indian myths though seemingly just imaginative, represent complex natural laws.⁹⁰ An article about the astronomical knowledge in Medieval Malayalam folk songs explained the astronomical knowledge in Malayalam *Vanjipattu* and *Thiruvathirapattu*.⁹¹ Excerpts from the songs are quoted and interpreted. An instance is a passage from *Thiruvathirapattu* where a woman tells her friends how to calculate time, based on the position of stars, to get up at a particular time on the day of the Thiruvathira festival. The article succinctly stated that "Malayalees understood and correctly calculated eclipses for a very long time, but they presented scientific principles couched in tales of unending wonders like the Arabic tales".⁹²

⁸⁶ Dodson 2007, Bayly 1996, Sen 2014.

⁸⁷ Tiwari 2006 p 1274.

⁸⁸ A. D. Harisharma (1935) Anthareeksham, *Kairali*; C. Govinda Menon (1894) Bhoomi, *Vidyavinodini*, 6(7).

⁸⁹ Aachathodi Narayanan Nair (1927) Prapancha Rahasyam, *Kairali* 11(7).

⁹⁰ Anonymous (1931) Puranathathvam, *Vijnana Sagaram*, 1(5-6).

⁹¹ *Pattu* literally means song in Malayalam and is an early form of verse. There are varieties of *pattu*, distinguished according to the theme, occasion, accompanying instruments and singers. *Vanchipattu* (Boat songs), also called *vallapattu*, are rowing songs. *Thiruvathirapattu* are the songs for *thiruvathirakali* a form of dance performed by women as part of the festivities on the occasion of *Thiruvathira* -Aiya 1906 Vol 2.

⁹² Anonymous (1927) Pracheena Malayalikalude Jyothishastra Jnanavum Madhyakaal Malayathile Pazhaya Pattukalum, *Arunodayam*, 1(3) p 147.

Interestingly the advocates of modern science inverted the same argument to criticise traditional astronomical knowledge. K. R. Harihara Iyyer, who wrote on topics like eclipses and meteor showers from the perspective of modern science, critiqued that traditional knowledge used only imagination and did not employ any systematic methods to understand nature. According to him, such a metaphorical understanding of natural phenomena was the major cause of superstitions regarding astronomical events like eclipses.⁹³ Pailo Paul (author of an English-Malayalam technical glossary serialised in *Bhaashaposhini*) countered arguments of the metaphorical nature of Indian knowledge in his article on *jyothishastram* in *Bhaashaposhini*. He critiqued that the act of tracing semblances of modern scientific discoveries in ancient Indian texts is as nonsensical as tracing the origins of scientific discoveries to the novels of Jules Verne.⁹⁴ Nonetheless, he agrees that the astral sciences in India have made significant advancements and stands in comparison with western knowledge in the past. However, with the help of several scientific instruments, modern science advanced the understanding of the universe, while Indian knowledge remained stagnant and declined. Thus, according to him, there is no pride in highlighting the glorious achievements of the past. Like the heirs who squander family fortunes, it only brings shame and disappointment to the present generation of Indians. On similar lines, C. Govinda Menon, author of a long-serialised article titled 'Bhoomi' (The Earth) in *Vidyavinodini*, evoked the decline of the golden age to highlight the achievements and relevance of modern science. He wrote that

“Indians and some other eastern civilisations were much ahead of the West in their understanding of the universe.... At one point in time, people in the West also believed that the earth was flat. However, they developed their knowledge through their hard work.... Since they did not believe in any stupidity like the caste system, they shared knowledge with everyone. Now they have achieved the zenith of knowledge and progress. Hindu knowledge remained stagnant because all our sciences

⁹³ K. R. Harihara Iyyer (1906) *Grahanangal*, *Sharada* 2(8).

⁹⁴ Pailo Paul (1898) *Jyothischakram*, *Bhaashapohini*, 2(5).

are based on shrutis, smritis, puranas and epics. Whereas the European knowledge is based on thought and experiments, which helped them discover numerous secrets of the world and make inventions like the telegraph and steam engine.”⁹⁵

Enamoured by modern science and its systematic investigation, advocates of modern astronomy argued that Indian astral sciences did not fit the methodological criteria for sciences. In an essay ‘Jyothisham’ published in *Vidyavinodini* in 1889, the author, R. V, put forward four criteria that characterise any systematic body of knowledge.⁹⁶ The criteria listed were -

- “The principles of science shall be equally applicable to all situations.
- The principles of science shall provide all necessary facts about the subject matter.
- The principles of science should not contradict each other.
- The principles of science should be easy to verify”.⁹⁷

The author argued that Hindu astrology blurs the coincidental and causal. Its premises and theories of causation lack comprehensibility, often contradict each other and are not universally applicable or verifiable. Thus, for him, *jyothisham* lacked methodological rigour and was not fit to be called science. He criticises the practice of astrology, stating that astrology was not meant to make predictions about man’s future. Astrology and mathematics were intricately connected, and astrology developed from the need to calculate almanacs for agriculture- in a society where most of the population was involved in agriculture. When astrologers became successful in predicting seasons, rainfall, and drought, they gained some status in society. They started to misuse astronomical knowledge to make predictions about human life, which led to the decline of astral sciences. Thus, for the popularisers of modern astronomy, there was no denial that Indian *jyothishastra* flourished in the ancient golden period,

⁹⁵ C. Govinda Menon (1889) Bhoomi, *Vidyavinodini*, 6(7) p 256.

⁹⁶ R. V. (1889) Jyothisham, *Vidyavinodini*, 7(12).

⁹⁷ Ibid p 492.

but it declined and was outdated. They denied the possibilities of its revival. Then again, as we see above, their critique was mainly based on shrutis, smritis, Puranas, epics and astrology (though not restricted to it). At the same time, the interlocutors of astral sciences continued to argue that the scrutiny should be based on the Siddhantas.⁹⁸

As noted earlier, the distinction between the siddhantic and puranic legacies of Indian astronomical knowledge was an extension of the Orientalist discourse. It served as an essential point of reference for the Indian interlocutors for the philosophical rationalisation or reconciliation of practices in modern astronomy and Indian astral sciences.⁹⁹ Malayalam popular literature on astral sciences utilised the works of Orientalist's like Sir William Hunter, Colebrook and Elphinstone to highlight the Indian contribution to Astronomical knowledge.¹⁰⁰ Narratives that highlighted the Indian achievements repeatedly referred to texts like *Suryasiddhanta* that were canonised in the Orientalist construction of Hindu astronomy.¹⁰¹ They repeatedly referred to Bhasakaracharyar, Aryabhatta, and Varahamihiran and often quoted from 'Goladhyaya', 'Suryasiddhanta' and 'Aryabhateeyabhasyam'.¹⁰²

As far as the social memory of the Kerala School of Astronomy in popular literature is concerned, there are occasional allusions to Parameswara's dragganita or texts like the 'Yuktibhasha'.¹⁰³ The essay 'Ayanachalanam' (Precession- English title given in the text) in 1944 in *Mangalodayam* is a case in point. Its author, Rama Varma Maru Thampuram, is famed for his edition of the mathematical part of the text 'Yuktibhasha' (1948) presented in modern

⁹⁸ Punnassery Nambi Neelakanda Sarma (1898) Jyothishchakram, *Bhaashaposhini*, 2(6).

⁹⁹ Dodson 2007, Bayly 1996, Sen 2014, Raina 2022 (forthcoming).

¹⁰⁰ Chirayankeezhu P. Govinda Pillai (1923) Bharatiyarum Jyothishastravum, *Bhaashaposhini*, 27 (7-9).

¹⁰¹ Raina 2020.

¹⁰² K. Kannan Nair Jyothisha Panditar Pattambi Sanskrit College (1928) Vaarakramam, *Arunodayam*, 1(4); R. Subbaraya Sharma (1932) Bharateeyarum Jyothishastravum, *Bhaashaposhini*, 36(12); Punnassery Nambi Sarma (1898) Jyothishchakram, *Bhaashaposhini*, 2(6); K. V. M. (1911) Ayanachalanam, *Mangalodayam*, 3(1); Anonymous (1931) Puranathathvam, *Vijnana Sagaram*, 1(5-6); Kanipayyur Sankaran Namboothiripad (1933) Nammude Jyothishastram, *Malayala Rajyam*.

¹⁰³ K. V. M. (1911), Ayanachalanam, *Mangalodayam*, 3(1); Rama Varma Maru Thampuram (1944) Ayanachalanam, *Mangalodayam*, 20(6-7).

Malayalam.¹⁰⁴ This text produced by Rama Varma and Akhileshwarayyar is considered seminal for the study of contributions of the Kerala School. In the essay in *Mangalodayam*, Rama Varma presents a lengthy quote from the 'Yuktibhasa', which is probably from his edition of the text. In this very detailed and technical essay on the reform of panchangam, Rama Varma examines the corrections made to panchangam by scholars in Kerala and other parts of the subcontinent. He reviews the works of P. K. Purushothaman Namboothiri, Dr Swamikannu Pillai, C. P. Rajan and the calculations agreed upon at an astrologers' conference at Poona in 1925. He then compares them with his calculations derived from the texts like Yuktibhasa and Suryasiddhanta. In the essay, Rama Varma tries to demonstrate that it is possible to reform the panchangam based on Indian astral science and discourages the complete reliance on modern science. Highlighting this discussion in the Malayalam popular literature is vital to draw attention to such cultural negotiations taking place in the vernacular public sphere. A discussion of the mathematical algorithms and astronomical calculations he gives for this observation is beyond the scope of this dissertation since its concern is with the social imaginaries.

Popularisation- Forms and Functions

Other than the polemics discussed above, popular essays on astronomical knowledge mainly consisted of educative pieces explaining the various celestial bodies and events, written from the perspective of modern astronomy and Indian astral sciences. A closer look at the narratives, their structure and style help to explore the competing and coexisting social imaginaries of science and science popularisation. Similar to the discussion on agriculture and health, in the literature on astronomical knowledge, we see an embedded understanding of the forms and functions of popular science in society.

Popular writings on modern astronomy aimed to overcome superstitions by spreading scientific understanding about natural phenomena through engaging themes. Several essays explaining the sun, moon, meteors and eclipses

¹⁰⁴ Thampuran and Akhileshwarayyar 1984.

followed this narrative.¹⁰⁵ They stressed the significance of the scientific method in understanding the universe.¹⁰⁶ The use of modern scientific instruments and mathematical calculations to explore the universe was highlighted.¹⁰⁷ Inference (*anumanam*) was suggested as the preferred method when the observation was not possible.¹⁰⁸ Besides countering the superstitions, many didactic essays invoked a feeling of awe and amusement in exploring the celestial mechanisms. Discussion on meteor showers and the lengthy deliberations about the possibility of life on the moon and Mars belong to that style of narration.¹⁰⁹

We can see that the interlocutors took care to present science in a form that is easily accessible to the readers of these popular magazines. In his preface to an article on earth, Parameswara Menon writes,

“Only meaningful and interesting small astronomical facts are explained here. Although the science behind it is interesting, it is difficult, broad, and based on complex sciences like mathematics and hence difficult to present in a form enjoyable to everyone. So, the intention here is to write it in a form and length that common people can understand”.¹¹⁰

Authors used simple language and various literary techniques like examples, syllogisms and analogies from everyday life.¹¹¹ Illustrations were used to make science more accessible.¹¹² A few examples from these essays will help us understand more about how the interlocutors conceived popularisation. In an article on Venus, Pailo Paul explained how stars and planets reflect light. He gives

¹⁰⁵ Vennikulam C. K. Varughese, (1921) Chandran, *Bhaashaposhini*, 26(9-10); T. K. Joseph (1910) Halikethu, *Bhaashaposhini*, 14(7-8).

¹⁰⁶ T. K. Joseph (1910) Halikethu, *Bhaashaposhini*, 14(7-8); T. N. T. (1897) Nakshatrangalude Ennam, *Bhaashaposhini*, 1(4).

¹⁰⁷ K. Parameswara Menon (1917) Jyothishastram, *Kairali*, 2(11); Pailo Paul (1898) Dooradarshini Kannadi, *Bhaashaposhini*, 2(3); A. D. Harisharma (1935) Anthareeksham, *Kairali*; Pailo Paul (1898) Shukran, *Bhaashaposhini*, 2(6).

¹⁰⁸ Pailo Paul (1898) Chandranil Manushyar Undo, *Bhaashaposhini*, 2(1).

¹⁰⁹ S. Subramania Iyyer (1897) Brahmandam, *Bhaashaposhini*, 1(3); Pailo Paul (1898) Chandranil Manushyar Undo, *Bhaashaposhini*, 2(1); V. C. George (1921) Chovvayil Janavaasam Undo, *Bhaashaposhini*, 26(5-6); T. K. Joseph (1910) Halikethu, *Bhaashaposhini*, 14(7-8); Anonymous (1931) Dhooma Kethukkal, *Keralam*, 2(3-4); C. Anthappyi (1914) Ulkakal, *Mangalodayam*, 6(7).

¹¹⁰ K. Parameswara Menon (1916) Bhoomiyude Udbhavam, *Kerala Chintamani*, 9(2) p 75.

¹¹¹ T. N. T. (1897). Nakshatrangalude Ennam. *Bhaashaposhini*, 1(4); O. M. Cherian (1903) Saurayutham, *Bhaashaposhini*, 7(12); Pailo Paul (1897) Velichathinte Gathivegam, *Bhaashaposhini*, 1(10).

¹¹² T. K. Joseph (1910) Halikethu, *Bhaashaposhini*, 14(7-8); Anonymous (1889) Bhoomiyude Aakriti, *Vidyavinodini*, 3(2); O. M. Cherian (1903) Saurayutham, *Bhaashaposhini*, 7(12).

an example of a lamp kept in a dark room.¹¹³ Until the lamp is lit up, people or things in the room are not visible. However, when the lamp is lighted, the light falls on people and things in the room and makes them visible. The lamp also becomes visible in its light. Thus, he explains how the sun and the stars become visible in their light while the planets become visible as they reflect light from the sun. Another article, while discussing the sun, its position, and properties, puts forward a hypothetical situation where a child is born with hands long enough to touch the sun. The child gets up and touches the sun as soon as he is born. It is explained that he will never know the pain of his burnt hand because it will take hundreds of years for the sensation of pain to travel through his nerves and reach the brain, and before that, he will be dead.¹¹⁴ Sarcasm and humour were also part of the rhetorical repertoire. A telling example is Chirayankeezhu Govinda Pillai's remarks in his essay on life on Mars. Pillai writes,

“Meanwhile, some people are trying to argue that there is life on Mars. If this turns out to be true, we could see Viceroy's from earth rushing to rule that planet. On their way to Mars, they can stop for tea on the moon, and eager journalists would reach the moon even before them and pick up what these Viceroys are discussing, and our newspapers could publish them too. However, we should first examine if people on Mars are the kind who would subject themselves to the rule of these Viceroys”.¹¹⁵

As mentioned earlier, the idea of cosmic design unravelling through the work of science was a standard trope. Inkster tells us that the idea of sublimity performed two crucial functions in 18th century England. It legitimised the practice of astronomy and also performed a social control function. ‘He explained that in times of social distress and conflict in society, astronomy demonstrated man's subordination to and dependence on the divine.’¹¹⁶ In the popular

¹¹³ Pailo Paul (1898) Shukran, *Bhaashaposhini*, 2(6).

¹¹⁴ T. L. T. (1897) Nakshatrangalude Ennam, *Bhaashaposhini*, 1(4).

¹¹⁵ Chirayankeezhu Govinda Pillai (1908) Chovvayil Manushyar Undo, *Bhaashaposhini*, 12(5-6) p 170.

¹¹⁶ Inkster 1982 pp 122-123.

literature on traditional astronomical knowledge, this idea of divinity also performed an additional function of legitimising the knowledge, as the practice of traditional astronomy was intimately connected to the worship of the divine. For instance, an author signed as K. M. described the solar system, the sun, its functions and concluded the article with a comment that ‘no wonder Hindu scriptures considered the sun as the source of all life.’¹¹⁷ Such essays also embedded a vague idea of anthropocentrism. Even without references to cosmic design, the sun, moon, and planets, their position and movement were all explained in terms of their importance to life on earth.¹¹⁸

Some interesting observations emerge in the reading of popular literature on modern astronomy and Indian astral sciences. While the popular essays on modern astronomy aimed to fight superstitions, the popularisation of traditional astronomical knowledge implied resistance to the growing influence of modern science. The primary aims of the articles were stated as the enlightenment of people regarding the valuable contributions made by Indians. Subbaraya Sharma introduced his essay in the following words:

“The general perception is that the Indians were incapable of even basic understanding of the earth they inhabit. So, oh children of India, who had hung their head low in shame, thinking that the rays of modern knowledge woke you up from the darkness, witness the description of the earth in ‘soorya Siddhanta’ that was written much before the westerners came to India”.¹¹⁹

As the above discussion shows, popularisers of modern astronomy used imaginative language that corresponds to the cultural frames of meaning-making of the audience as a technique to make science accessible to the broader public. Popularisers of traditional knowledge, on the other hand, tried to highlight the scientific value of texts by downplaying their imaginative narratives. As noted, interlocutors of astral sciences sought their parity with sciences by taking

¹¹⁷ K. M. (1904) Sooryan, *Rasikaranjini*, 2(2).

¹¹⁸ G. Vaidyanatha Iyyer (1921) Sooryagolam, *Bhaashaposhini*, 25(2-3); K. Parameswara Menon (1919) Chandran, *Kairali*, 4(6).

¹¹⁹ R. Subbaraya Sharma (1932) Bharatiyarum Jyothishastravum, *Bhaashaposhini*, 36(12) p 455.

recourse to the relativisation of different modes of representation of knowledge. Polemical writings on astral science tried to provide rational explanations for the metaphorical representations, but the didactic essays avoided the imaginative language in favour of a style detailing the technical aspects.

A popular narrative style in the literature on astral sciences was to explain the knowledge present in Indian astrological/mathematical texts.¹²⁰ Some of the literature offered an interpretation of entire Sanskrit texts in Malayalam, serialised into several parts.¹²¹ Others dotted the discussion with passages from Sanskrit texts and provided interpretations as needed. A good instance is '*Aryabhatacharyarum Jyothishastravum*' (Aryabhata and Jyothishastram), where the author discusses the characteristics of the orbits of the earth and other planets. Excerpts from Aaryabhata's text are quoted and explained in detail.¹²² English technical terms are provided in parenthesis.¹²³ The use of Sanskrit passages and references lent credibility to the discussion deriving from the classical texts of the golden age. As Panikkar pointed out in the context of the modernisation of Ayurveda, the reference to Orientalist texts served the purpose of legitimising the antiquity and validity of traditional knowledge.¹²⁴ Indicating related English terms in parenthesis was a way to prove the advancement of the Indian sciences.¹²⁵ The presence of equivalent technical terms possibly seemed to suggest parity of the two systems of knowledge. Thus, popularisers of astral sciences used both Sanskrit and English as sources of legitimation. In other words, they simultaneously highlighted the antiquity of knowledge and underlined its relevance and translatability to meet the requirements of modernity.¹²⁶ Popularisers of modern astronomy also extensively used English terms in the texts. Sometimes these terms were transliterated in Malayalam; some provided Malayalam or Sanskrit translations

¹²⁰ S. Thanu Pillai and, T. Ramalinga Pillai (n.d.) *Aryabhattacharyarum Jyothishavum, Bhaashaposhini*; Pandalam Krishan Varrier, (n.d.) *Kaalam, Bhaashaposhini*.

¹²¹ As was done in other languages like Hindi at the same time. See Mishra 2015, Singh 2015.

¹²² S. Thanu Pillai and T. Ramalinga Pillai (n.d.) *Aryabhattacharyarum Jyothishavum, Bhaashaposhini*.

¹²³ *Ibid.*

¹²⁴ Panikkar 1992.

¹²⁵ S. Thanu Pillai and T. Ramalinga Pillai (n.d.) *Aryabhattacharyarum Jyothishavum, Bhaashaposhini*.

¹²⁶ Raina 2022 (forthcoming).

while others provided a detailed explanation of each of the terms.¹²⁷ For literature on modern science, English terms served the major purpose of popularising technical terms of modern astronomy in the social imaginaries of the region.

A closer reading of the narratives also helps to understand the nature of sources available for these interlocutors of science. It gives us an idea of the nature of science in circulation in the colonial context. As discussed earlier, literature on astral sciences referred to Orientalist scholarship and canonical texts of Hindu *jyothishastras*. They reworked the Orientalist discourse in a nationalist framework to suit the political and cultural needs of the time. In the Malayalam astronomical literature on western astronomy, references to names like W. H. Pickering, Pervical Lowell, Alfred Wallace, Flammarion and Sir Robert Ball suggest that popular astronomical literature in English were the major sources for vernacular interlocutors.¹²⁸ Malayalam popular science literature summarised, explained, and translated ideas and arguments in these popular texts for the vernacular audience. As discussed in chapter three, popularisers of modern science were part of the emerging English educated elite who aimed to share the benefits of the knowledge they had acquired with the larger public. As Raina has pointed out in a different context, they were often driven by nationalist aspirations and belief in modern science's ability to bring social development.¹²⁹

Discussion of the sources available to the interlocutors also provides insights into the adapted style of writing. The profuse use of examples that any non-specialist reader can comprehend was a characteristic of nineteenth-century popular astronomical texts.¹³⁰ Another technique that was preferred in English popular astronomy was chronological narration. In the discussions on popular astronomy, the chronological presentation of topics was encouraged as

¹²⁷ P. K. Kumaran (1942) *Sandhya Velicham, Kairali*; C. A. Kunjuni Raja (1935) *Shanigruhathileku Oru Yatra, Kairali*; Joseph Mundassery (1935) *Shuklapadalangal, Kairali*.

¹²⁸ Pickering, Wallace, and Lowell's works were widely circulated and well received and, Flammarion and Ball were prolific popularisers of science.

For more on Pervical Lowell, see Crossley 2000, Hetherington 1981. For Alfred Wallace and astronomy, see Smith 2015. For Ball, see Lightman 2007, Ruiz-Castell 2004. On Flammarion, see Pernet 1988, Seidengart 1988.

¹²⁹ Raina 2004.

¹³⁰ Karnfelt 2009.

a reliable technique to present knowledge as a product of systematic enquiry based on scientific methods. It served to discourage a romantic faith in science by inculcating a critical understanding of the process of scientific knowledge production.¹³¹ In Malayalam, many articles on modern science followed a chronological narration listing the development of the subject matter over the centuries through the work of various scientists.¹³² The best example is the essays on Mars. These essays discussed the possibility of life on Mars tracing the controversy over Martian canals starting from Schiaparelli to Lowell and Pickering.¹³³ Discussion on Martian civilisation was a major theme in the 1910s in the English popular press.¹³⁴ Recently, Joshua Nall has demonstrated that the debate on life on Mars and Martian canals in the media played a vital role in developing the discipline of astrophysics and planetary sciences during the nineteenth and twentieth century.¹³⁵ Although they did not participate in the development of astrophysics at the time, interlocutors of Malayalam popular science summarised and translated these controversies for the audience located far away from the centres of such controversies and knowledge production. They presented science as an activity following systematic procedures of hypothesis, scepticism, investigation, and validation.

The preceding discussion on popular literature also directs our attention to the popularisation of astrology during the twentieth century. In the 'Report on Popular Astronomy' for the Committee on Science and Its Social Relations in 1939, Bart J. Bok lamented the 'rapid rise of public interest in astrology' during the twentieth century.¹³⁶ The 'astrological wave' was evident in the English-speaking countries of the United States, Canada, Netherlands, Australia, South Africa and the British Isles.¹³⁷ He suggested that attempts to popularise astronomy should point out the fallacies of astrology.¹³⁸ Jennifer Lynn Zahrt has

¹³¹ Bok 1939.

¹³² V. C. George (1921) Chovvayil Janavaasam Undo, *Bhaashaposhini*, 26(5-6).

¹³³ K. Govindan Thambi (1916) Chovva, *Sumangala*, 1(7-8); V. C. George (1921) Chovvayil Janavaasam Undo, *Bhaashaposhini*, 26(5-6); Chirayankeezhu Govinda Pillai (1908) Chovvayil Manushyar Undo, *Bhaashaposhini*, 12(5-6); E. M. Joseph (1909) Mars, *Kerala Chintamani*, 4(6).

¹³⁴ Bowler 2009.

¹³⁵ Nall 2019.

¹³⁶ Bok 1939, p 362.

¹³⁷ Ibid.

¹³⁸ Bok 1939.

explored the imaginaries of astrology in Germany during the early twentieth century.¹³⁹ She also points out that there was a revival of interest in Astrology in Germany during the period.

In the discussion above, we have noted the coexistence of astronomy and astrology in nineteenth and twentieth-century India despite the attempts to keep them separate. While the discourse on astronomy gathered momentum in most parts of South Asia in the 19th century, astrology never went away and remained in the background – the *panchangams* continued to be produced and informed astrological practices. Malayalam popular discourse on astral sciences signals a renewal of Indian astrology. By tracing the decline of *jyothisha* in social circumstances and corrupt practitioners, the vernacular intelligentsia validated and highlighted the need for renewal and popularisation of astrology. We saw that some popularisers of modern astronomy in Malayalam countered and dismissed the claims of *jyothisha*. Whether they won or not, what interests us here, is the coexistence of varied and sometimes opposing social imaginaries of science in society. The standard narratives of modernity in Kerala draw a linear history that begins with the development of modern education, and popular printing passes through the pipeline of literary, social and political reforms of the nineteenth and twentieth century to deliver the Kerala Model of development and secularism in the second half of the twentieth century. However, such histories fail to understand that modern education and popular printing enabled a parallel process of circulation of different forms of knowledge, some of which does not fit into the rhetorics of development and social progress. Their failure to fit the secular frames may also explain the scant attention paid to them in the history of Kerala.

Conclusion

Through reading the science writings in general Malayalam periodicals, the chapter shows that popular literature was an important site of political and epistemological negotiation between modern western astronomy and Indian

¹³⁹ Zahrt 2012.

astral sciences. Exploring this literature helps to explore the myriad manifestations of legitimisation and domestication of modern science and local knowledge in colonial India. On the one hand popularisation of modern astronomy situated and reinforced modern science, its method and rationality as the only legitimate means to knowledge. On the other, popular literature on astral science, without denying the claims of western methods, argued for a parity in status based on the explanations of the arrested development of the sciences that once flourished in antiquity. Thus we can see the two as different aspects of the same discourse. Both the discourses developed simultaneously in the public sphere and nurtured the emerging social imaginaries of science. It implied nationalist aspirations similar to the discourse on medicine but did not develop into an assertion of regional identity. The chapter also discussed the functions of popularisation envisaged by different interlocutors and explored how it influenced the style of narratives and selection of sources. Finally, while situating Kerala in the social history of astronomy in the nineteenth and twentieth-century India, the chapter puts forward three pertinent questions. The first one is the history of modernisation and development of Sanskrit education in the region. The second one relates to the social memory of the Kerala School of Astronomy in the nineteenth and twentieth-century Kerala. The third one underlines the need to situate a social history of astrology in the history of modernity in Kerala.

CHAPTER SEVEN

Popular Science in Malayalam Women's Magazines

Introduction

In 1905 Rokeya Sakhawat Hossain published her monumental work *Sultana's Dream*.¹ In this novella, Sultana dreams of a visit to Ladyland. Ladyland is an inverted utopian world where women were able to confine men to *zenanas* with their astute minds and scientific prowess. Women in Ladyland are educated, no one marries before twenty-one, and they engage in scientific research in their universities, laboratories, and observatories. They have developed ways to harness the sun's energy and use it for cooking, heating, and defeating their enemies in crucial battles. They keep balloons flying above the clouds to draw water and understand the management of rainfall. Hydrogen balls and electricity is used to propel flying cars. The fields in the Ladyland are tilled using electricity. The queen's interest in botany has led to the transformation of the entire country into a beautiful and bountiful garden. There are no epidemics or mosquito bites in Ladyland, and people rarely die in their youth.

Rokeya Sakhawat Hossain is a celebrated feminist and a pioneer of Muslim women's education in colonial India. Literary theory and the history of gender in India have explored the ideas of education and women's empowerment in her works.² *Sultana's Dream* particularly has been examined as

¹ *Sultana's Dream*, Rokeya's first English fiction work, appeared in *Indian Ladies Magazine* published from Madras. The volume and number of the journal are not available.

See Bagchi 2005.

² Jahan 1988, Ray 2005, Bagchi 2005, 2009, 2020, Mookerjee-Leonard 2017.

feminist science fiction.³ What interests us here is the imagery of science presented in this small piece. The novella presents a picture of progress driven by science and technology that enables women to create a dream world that inverts the real world's patriarchal practices. In other words, the faith in the idea of a social change driven by scientific progress is what constitutes Hossain's feminist utopia. Writing in a period when physical sciences were not even considered desirable in women's education, what made Hossain project science and technology as the source of women's empowerment?

This chapter is not about the sources of the imaginaries of science in *Sultana's Dream*. Nevertheless, Hossain's novella does open up a set of pertinent questions for this thesis - How can we situate the imaginaries of science in the history of women in India? What was the nature of science available to women during the period? How did they participate in the discourse of popular science in colonial India? Conversely, what are the imaginaries of women and their role in society that underlie the discourse of science during the twentieth century? How are these related to the broader socio-political discourses of the period? In this chapter, I try to explore these questions through a study of popular science literature in Malayalam women's magazines published during the twentieth century.

The chapter is organised into three sections. The first section situates the chapter in the history of popular science. The second section discusses women's magazines and their significance for exploring women's history in India. The later part of the discussion focuses on Malayalam magazines. Section three discusses popular science literature.

Women and History of Popular Science

Histories of science popularisation in Victorian England have pointed out the gendered nature of popular science discourse. In her study of 'the cultural history of science in women's magazines of the early nineteenth century, Shteir

³ Bhattacharya and Hiradhar 2019, Hasanat 2013.

observed that the botany popularised in the women's magazines was only at the level of an introductory knowledge, whereas in the men's magazines, more advanced knowledge was discussed.⁴ Shuttleworth, Dawson and Noakes also argue that reading women's magazines from the perspective of the history of popular science helps to delineate the gendered socio-cultural politics of science popularisation.⁵ Science in these magazines represented a variety of themes but was framed within the dominant Victorian notions of femininity and domesticity. It ranged from the encouragement to women's education in nursing and medicine underlying their innate motherly instincts as caregivers, participation in other sciences, usefulness or uselessness of science education in modern domesticity, and the scientific rationale given for advice etc. According to Shuttleworth, Dawson and Noakes, women magazines were the primary sites of access to science for many readers and can be used to explore the sources of scientific knowledge available to women during the period. In the context of America, Linde has pointed out that "by the 1820s, "popular science" tailored to a female audience was a well-accepted social activity".⁶ This popular science for women was justified and legitimised for its role in spreading scientific understanding of the household and in the spiritual insights it provided. These justifications were extended for science education for women, and in America, many popular science books found their way into the formal science curriculum for women.

However, in the history of science and science popularisation in India, the questions of gender have not received much attention. As pointed out at various instances of this thesis, the social history of science in colonial India informs us that from the mid-nineteenth century, modern science and technology were seen as heralding progress.⁷ Domestication of modern science and its popularisation during the period was hinged on the idea of science and development.⁸ The role of women in these discourses has been largely overlooked. Medicine and

⁴ Shteir 2004 p 18.

⁵ Shuttleworth, Dawson and Noakes 2001.

⁶ Lindee 1991 p 22.

⁷ Prakash 1999, Sehgal, Sangwan and Mahanti 2000, Raina and Habib 2004.

⁸ Kumar 2005, Prakash 1999, Sehgal, Sangwan and Mahanti 2000, Raina and Habib 2004.

healthcare is one area of convergence of the history of science and gender history in India. The colonial discourse on women and medicine, institutionalisation of women's health as maternal health, the role of women doctors as interlocutors of modern medicine and gendered implications of the discourses of hygiene and sanitation have been explored in different Indian contexts.⁹ Abha Sur's study of women scientists in the late twentieth century and Vinita Damodaran's biography of botanist Janaki Ammal are other notable works.¹⁰ Beyond these, not many works are available on women and science in colonial India. The colonial context, in general, remains under-explored in the Feminist history of science. Reflecting on this lacuna in 2004, Schiebinger gave a call for more focus on the area that she called the feminist history of colonial science.¹¹ This chapter takes inspiration from Schiebinger and aims to situate women in the history of science in colonial India, focusing on popular science in Malayalam women's magazines.

Reading History of Women in Women Magazines

One of the major themes around which the nationalism of nineteenth and twentieth-century India evolved was the question of women. Partha Chatterjee has pointed out that a resolution of this question was attained through demarcation of the inner and outer-the inner realm identified with the spiritual east and the outer associated with modern science, technology and modern organisation of economy and polity.¹² While the material aspects of the west were appreciated and considered worthy of being incorporated into the colonised lives, in the spiritual realm, claims for the superiority of the east was laid down. Chatterjee explains that by keeping the two realms separate, the nationalist intelligentsia was able to justify the selective, ambiguous nature of colonial modernity. The material, spiritual distinction in the social realm

⁹ Arnold 1993, Lal 1994, Ramanna 2008, Ray 2014, Burton 1996, Forbes 1996.

¹⁰ Sur (2012) delineates the dynamics of nationalism, colonialism, caste, and gender in the history of physics in India. She discusses the life and works of three scientists- Lalitha Chandrasekhar, Sunanda Bai, and Anna Mani, who worked with C. V. Raman at the Indian Institute of Sciences at Bangalore. Damodaran (2013) presents a detailed social history of Janaki Ammal's career as a botanist during colonialism and thereafter. The study teases out the dynamics of gender, race, and science.

¹¹ Schiebinger 2004.

¹² Chatterjee 1989.

translated as the home and the outer world. The increasing educational and professional prospects made men more suitable for life in the outer world, whereas women were considered responsible for the inner realm. This inner realm, defined by religious and cultural traditions, was to be preserved as pure without the encroachment of the outer-material world. Thus, by distinguishing home as a separate realm and placing women at the centre of it, Chatterjee argues that nationalism achieved a resolution of the women's question. It simultaneously redefined patriarchy and established an ideal of a 'new woman'.

Various scholars have extended, refined and critiqued Chatterjee's thesis in different South Asian contexts. Sinha has critiqued Chatterjee for presenting women as subjects without any agency and draws attention to women's participation in women's movements.¹³ In a similar line, Devika has pointed out the increasing presence of women in the public sphere of Kerala and suggests the category of the public-domestic instead of the public-private.¹⁴ Hancock suggested that nationalism did not achieve a resolution of the women's question but restructured it within the domestic realm.¹⁵ Nonetheless, they all have pointed out that modern domesticity acquired primacy in the definition of this new Indian woman.

The relegation of women's interests and issues to the domestic space implied the construction of a new female subject who embodied modern sensibilities without threatening the existing patriarchal order.¹⁶ She combined the skills and values of the educated Victorian homemaker with the spiritual, ritualistic rigour of the Hindu tradition.¹⁷ This image was crafted through a careful cherry-picking of values from both sides (Victorian and Hindu traditions). These values were derived from a glorified, essentialised, invented tradition, in which the social and cultural notions of an elite, 'upper-caste', middle-class were reified.¹⁸ In the context of Kerala, women's question and its restructuring manifested in various dimensions of socio-political life that include

¹³ Sinha 2000.

¹⁴ Devika 2007.

¹⁵ Hancock 1999.

¹⁶ Sangri and Vaid 1989, Bagchi 1993, Devika 2007, Sen 2004, Walsh 2004, Forbes 1996.

¹⁷ Sen 2004.

¹⁸ Orsini 1999.

the legal and social reforms that pertained to family and conjugality, women education, clothing, and so on.¹⁹

Women's magazines published during the nineteenth and twentieth centuries serve as a testimony to these processes of construction of modern women, that is, the modern housewife. For gender history in India, these magazines have been an essential site to explore the formation of gendered subjectivities under colonial rule.²⁰ Women's magazines were published to educate and entertain women and distinguish themselves from other magazines in content, narrative style, and layout. They covered women's education, fiction, health and hygiene, home management, personal care, child development, biographies, and science. They served an important role in creating and institutionalising the modern domestic space and establishing women within it. They have been understood variously as sites for articulating women's agency, casting and recasting the ideal of women, and negotiating nationalist concerns.²¹

Malayalam Women's Magazines

To recall the discussion in chapter two, by the mid-nineteenth century, the spread of popular print and modern education was already shaping a reading public. We saw that the first Malayalam women's magazine was published in 1885 from Trivandrum.²² Published under the patronage of Kerala Varma Valiya Koyil Thampuran, almost everyone who worked for the magazine was men. K. Chidambara Vadyar and M. C. Narayana Pillai were editors. It stopped publishing just after six months and later resumed in 1892. *Sharada*, published in 1904, was the second women's magazine in Malayalam. Other than the owner K. Narayana Menon, everyone who worked for the magazine was a woman. Rani Sethu Lakshmibai, Rani Parvathibai and Ikkuvama Thampuran were patrons, and T. C. Kalyaniama, T. Ammukuttamma and B. Kalyaniamma were publishers. These

¹⁹ Devika 2007, Velayudhan 1998, Kodoth 2001, Arunima 2003 a.

²⁰ Sangri and Vaid 1989, Bagchi 1993, Bannerji 1991, Orsini 1999, Sen 2004, Walsh 2004, Shukla 1991.

²¹ Ibid.

²² Raghavan 2008 (1985) mentions that around the same time, another magazine called Maharani, published from Madras by Ravu Bahadoor Krishnamacharyar, was in circulation. But more details about it are unknown.

women wrote most of the articles published in *Sharada*.²³ *Sharada* stopped publishing after two years and later resumed under the stewardship of Ramakrishna Pillai.²⁴ In 1913, T. K. Kalyanikuttyamma published a women's magazine with the same name *Sharada* from Punaloor.

Mahila was another notable magazine in the twentieth century. Unlike many other women's magazines of the period, *Mahila* had a long tenure and ran for over twenty years, starting from January 1921. Published by B Bhageerathiyamma *Mahila* had a broad base audience and government girls' schools subscribed to the magazine.²⁵ *Bhasha Sharada* (1914), *Mahilaratnam* (1914), *Sumangala* (1915), *Vanithamithram* (1944), *Muslim Mahila* (1924), *Vanitha Kusumam* (1927) and *Lakshmibai* (1905) were other prominent women's magazines in Malayalam. The periodicals used for this study include *Sharada*, *Sumangala*, *Mahila*, *Lakshmibai*, *Sthree*, *Mahila Mitram*, and *Muslim Mahila*.

As discussed above, women's magazines as manuals that educate and inform women about the ideas and practices of modern domesticity. The editorials of some of the women's magazines under scrutiny here and the kind of topics that they dealt with indicate the didactic nature of these periodicals. For instance, the introductory editorial of *Sumangala* stated that the magazine is meant as a good adviser for householders and especially for housewives who have to look after the homes. The magazine aimed at presenting important topics related to domestic life in simple and interesting narratives.²⁶ Another magazine, *Lakshmibai*, came out with a lengthy introductory editorial that ran into six pages. The editorial began by laying down the case for encouraging women education-

"It is really difficult for a well-learned person to spend even a few minutes with an ignorant, stupid person. Given that, imagine the plight of a learned man who is forced to spend his entire life with an uneducated, ignorant wife. Think of a young boy who spends the

²³ Ibid.

²⁴ Ibid.

²⁵ Priyadarshanan 1982 (2010).

²⁶ *Sumangala* (1916) Vol.1, No.1.

foundational years of his life under the care of his mother. If that mother happens to be an uneducated, ignorant woman, then there is no foreseeable good future for that son. So, it is crucial to encourage women education".²⁷

Many women's magazines were aimed at the education of women. The first Malayalam periodical for Muslim women, *Muslim Mahila*, came out with a famous proverb for the masthead- *vidyadhanam sarvadhanal pradhanam*- translated as knowledge is the greatest treasure.²⁸

Just like the women's magazines brought out in other vernacular contexts discussed above, women's magazines in Malayalam covered a variety of themes related to education and leisure. Most of the discussion centred on the idea of modern domesticity and the role of women. Other topics like 'politics and narrow argumentation about religion' were kept outside the purview of topics in women's magazines.²⁹ Devika has explained that a distinction between the public and the domestic was maintained and reinforced through the periodicals.³⁰ Scholars have noted that these magazines were one of the major arenas for the articulation and construction of modern Malayali's women. However, most of them focused on the discourse on education, marriage, family and occasionally on health and reproduction.³¹ This chapter will focus on popular science literature in these periodicals. It will explore the cultural conversations of gender, domesticity, and science in women's magazines.

Reading Science in Malayalam Women's Magazines

Vadavathoor, in his brief discussion of science magazines for women, acknowledges the presence of science articles in the magazine *Vanitha Rathnam* (1926) but categorically states that 'earlier women's magazines like *Mahila*, *Shtreemaasika*, *Sharada* and *Lakshmibai* did not give importance to science'.³²

²⁷ Prasthavana (1905) *Lakshmibai*, Vol 1, No 1.

²⁸ *Muslim Mahila* 1924.

²⁹ Devika (2007) elucidates this point by drawing attention to the introductory editorial of *Keraleeya Sugunabodhini* p 50.

³⁰ Ibid.

³¹ Ibid, Antony 2013, Vinayan and Raj 2019.

³² Vadavathoor 2001 p 142.

Even a quick overview of the literature used for the study, which includes three out of the four magazines mentioned by Vadavthoor, we see that science was one of the significant areas of focus for women's magazines. Popular science literature in Malayalam women's magazines covered various areas, including health and medicine, astronomy, botany, geography, and general science.³³ Further, periodicals like *Sumangala* listed essays that feature everyday science and medicine among the major themes covered in the magazine.³⁴ *Lakshmibai* aimed to cover maternity care, childcare, healthy living, cooking, and domestic life.³⁵ *Mahila* had a regular feature on health called *Arogyapankti* (Health Series). Pamphlets of the department of agriculture and department of public health were reprinted in women's magazines.³⁶

Even magazines that did not consider science areas as part of their mandate frequently featured health and medicine and general science-related essays. One prominent example is *Sharada*. From the second issue onwards, *Sharada* published 'Praveshika- Prakritiyum Shastravum' (Introduction- Nature and Science), written by M. Udayavarma Raja.³⁷ This serialised essay was the translation of Thomas Henry Huxley's 'Introductory' from the Science Primers series. *Sharada* also serialised the translation of Isabel Brander's 'Talks on Health'.³⁸ The translation titled 'Talks on Health-Aarogya Shastram' (Health Science) was prepared by B. Kalyaniyamma, who was one of the publishers of *Sharada*. It discussed the anatomy and physiology of the human body with illustrations. The translated work was later included in the Travancore Government syllabus for classes four and five.³⁹ It is also considered an

³³ Science-related literature in women's magazines was fewer in numbers compared to other general magazines like *Bhaashaposhini*, *Mangalodayam* or *Rasikaranjini*.

³⁴ Other areas covered include articles dealing with moral and ethical issues, life sketches of famous men and women, small stories that entertain and educate, articles related to home.

³⁵ Prasthavana (1905) *Lakshmibai*, 1(1).

³⁶ C. S. Venkitasubbahyan (1929) Chellu, *Lakshmibai*, 24(10); Pothujanarogya Prasadheekaranam (1932) Garbha Sooshrooksha, *Mahila*, 12(4-5).

³⁷ M. Udaya Varma Raja (1905) Praveshika- Prakritiyum Shastravum, *Sharada*, 1(2).

³⁸ Mrs Isabel Brander (1908) Talks on Health- Aarogya Shastram, *Sharada*, Vol 3.

Isabel Brander was an inspector of schools at Madras and author of several books that were translated into many Indian languages and used as textbooks. Some of her works include- 'Domestic Economy for The Indian Household' (1891), 'Kindergarten Teaching in India- Stories, Object Lessons, Occupations, Songs, and Games' (1899), 'Talks on Health for Indian Housewives' (1912).

³⁹ Priyadarshanan 1982 (2010).

important text to understand the translation of scientific terms from English to Malayalam.⁴⁰ Other long serialised articles were 'Prathama Sushroosha' (First aid) by C. D. N. K, 'Balaparicharanam' (Child Care) by B. Neelakandan and Seevoli Narayanan Namboothiri's 'Garbhasamrakshaneeyam' (Prenatal Care) - all published in *Lakshmibai*.⁴¹

Most of the authors of science-related literature in women's magazines were men. Hence, it will not be wrong to read popular science literature as 'men giving advice for women'.⁴² Nevertheless, a few women also made their mark, as in the case of B. Kalyaniyamma's translation of 'Talks on Health' discussed above. In the previous chapter, we observed that women were more active as authors in the literature on health and medicine compared to other areas like astronomy or agriculture. A lot of these articles on women's health and child care authored by women appeared in the women's magazines.⁴³ Women also wrote on other topics, including pests and gardening, although these were less in number.⁴⁴ Like the trend observed in general magazines, numerous articles were also published anonymously in women's magazines.⁴⁵ The use of pseudonyms or only initials was also common.⁴⁶ Thus reading popular science literature in women's magazines does not offer much scope to understand who wrote popular science for women. Perhaps a more extensive study including other textual sources like popular books and textbooks, biographies and autobiographies will open up such vistas. For now, this chapter focuses on the social imaginaries of science available to women as an audience of women's magazines.

⁴⁰ Ranjith 2014.

⁴¹ C. D. N. K. (1926) Prathama Sushroosha, *Lakshmibai*, 12; B. Neelakandan (1927) Balaparicharanam, *Lakshmibai*, 22; Seevoli Narayanan Namboothiri (1907) Garbha Samrakshaneeyam, *Lakshmibai*, 2.

⁴² Walsh 2004.

⁴³ V. Narayaniyamma (1910) Shishu Samrakshanam, *Lakshmibai*, 6(4); Thekke Ambadiyil Meenakshiyamma Thripunithura (1928) Sal Prasoothi Shastram, *Kairali*, 12(8); Mrs B. K. Menon (1938) Kshaya Rogam, *Lakshmibai*, 33(8); Mrs E. Raama Warriar (1924) Shishukkalude Bhakshanam, *Lakshmibai*, 20(3).

⁴⁴ E. R. Madhaviyamma (1909) Kothuku, *Sharada*, 4(7); T. B. Kalyanikuttyamma (1905) Vastra Dharanam, *Sharada*, 1(9); V. Parukuttyamma (1927) Paadashaala Thottangal, *Lakshmibai*, 22(6).

⁴⁵ Anonymous (1916) Yudhathepatti Edison Abhiprayam, *Sumangala*, 1(2); Anonymous (1905) Vyayamam, *Sharada*, 1(4); Anonymous (1918) Shareera Samrakshanam, *Lakshmibai*, 13(9); Anonymous (1933) Aarogyam, *Mahila*, 13(3).

⁴⁶ Oru Midwife (1921) Garbhnikalodu, *Mahila*, 1(5); Vridha Vaidyan (1934) Ayurveda Chikitsayude Aadhunika Sthithi, *Lakshmibai*, 29(11).

Major Themes

In the popular science literature in Malayalam women's magazines, health and medicine were dominant themes. The majority of the literature on health and medicine was related to maternal health and childcare. Other common themes were general health and diseases, food and nutrition, horticulture, animal rearing and astronomy. Many of these were basic informative essays. Some addressed the superstitions and rituals using the discourse of science to dispel them and, at times, justified them within the modern scientific framework. Another set of articles presented science as a source of amusement and fascination. It included small snippets about scientific facts and discoveries. The following pages discuss some of these science-related essays that will help us understand the different socio-cultural notions underlying social imaginaries of science and gender in Malayalam. Since health was a predominant theme, it is discussed under a separate sub-section. Occasionally, essays on women and child health from other periodicals of general interest are also cited.

Mundane- Amusing- Rationalizing

As we saw in the previous chapters, science in everyday life was one of the most common tropes of popular science writing during the nineteenth and twentieth century. Different items, events and processes commonplace in day-to-day lives were explained within the frame of science. Women's magazines also followed suit. For instance, in her essay 'Vastra Dharanam' (Clothing), T. B. Kalyanikuttyamma explained how clothes function to protect and maintain the body temperature in different weathers. She then goes on to describe fabrics suitable for different climates, their features, and their production.⁴⁷ Another article titled 'Vellam' (Water) by C. D. D. in *Lakshmibai* started by explaining the chemical composition of water and explains how rain is created. The author then discussed various sources of water, its contamination, and methods to avoid it. It also explained the methods to identify contaminated water and suggested

⁴⁷ T. B. Kalyanikuttyamma (1905) Vastra Dharanam, *Sharada*, 1(9).

ways of purification.⁴⁸ 'Bhakshanapaakam' (Cooking) in *Sharada* presented the scientific basis for cooking, explaining the nutritional advantage of cooking and the optimum temperature for cooking different food items.⁴⁹ On similar lines, the discussion on hygiene would highlight the necessity of daily showers by explaining how skin collects dead cells and other impurities. Then the function of alkaline soap in removing the impurities from the skin is explained.⁵⁰ Even a seemingly mundane essay on the sewing needle and its uses explained the process of making the needle, starting from the mining of iron ore, its purification process to shaping and polishing the needle.⁵¹

Many essays educated readers about household pests. While discussing the menace created by these tiny creatures in the house and how to eliminate them, such essays also explained the lifecycle and habitats and provided necessary scientific information about these insects, sometimes supported with pictures. Houseflies, mosquitoes, spiders, and coconut beetles are featured in such essays.⁵² Besides these familiar topics, science also featured as a source of curiosity and awe. The essay 'Boothadaya Illatha Chila Chedikal' (Some Merciless Plants) by J. K. Pillai presents an amusing description of various plants that trick and kill small insects for food. The article starts with a mention of J. C. Bose's study on the nervous mechanisms of plants and goes on to explain the strategies used by various plants like darlingtonia, venus, grapple fruit, martynia and many more.⁵³

Other popular topics were related to astronomy. They ranged from scientific explanations of phenomena like eclipses to discussions on the possibility of life on other planets. For instance, the article entitled 'Chovva' (Mars) by K. Govindan Thampi discusses the controversy on Martian canals.⁵⁴ The article written in simple language explained various speculations regarding

⁴⁸ C. D. D. (n.d) Vellam, *Lakshmibai*.

⁴⁹ Anonymous (1909) Bhakshanapaakam, *Sharada*, 4(1).

⁵⁰ K. C. Narayana Pillai (n.d) Suchitham, *Lakshmibai*.

⁵¹ Mrs M. G. Zachariah (1906) Soochiyum Athinte Pravathiyum, *Lakshmibai*, 1(8).

⁵² A. Shankunni Menon (1916) Eechakalum Rogangalum, *Sumangala*, 1(1); A. Shankunni Menon (1909) Chilanthi, *Sharada*, 4(3); E. R. Madhaviyamma (1909) Kothuku, *Sharada*, 4(7); C. S. Venkitasubbahyan (1929) Chellu, *Lakshmibai*, 24(10).

⁵³ G. K. Pillai (1916) Bhoothadayayillatha Chila Chedikal, *Sumangala*, 1(9-10).

⁵⁴ K. Govindan Thambi (1916) Chovva, *Sumangala*, 1(7-8).

life on Mars and discussed the works of Alfred Russel Wallace, Cervical Lowell, and William Henry Pickering, among others. In a similar vein, 'Jeevikal Ulla Lokangal' (Worlds Where Life Exists) speculates about the possibility of life on other planets. The essay begins with explaining the conditions that make life possible on earth and then discuss other planets in the light of it.⁵⁵

In the previous chapter, we have observed that astronomical essays, while explaining different celestial phenomena, also addressed the superstitions regarding them. Many of such essays were featured in women's magazines. In 'Grahanangal' (Eclipses), K. R. Harihara Iyyer attempted to remove the superstitions about solar and lunar eclipses. He explained the causes of eclipses in detail, referring to simple demonstrations to elucidate the movement of planetary bodies.⁵⁶ Another essay, 'Aakshathile Chila Manohara Sambhavangal' (Amazing Events in the Sky), by the same author, dispelled the superstitions about meteors and comets as inauspicious and omens of disease or war.⁵⁷ It explained the nature and causes of meteors, described their chemical composition and dismissed any speculations about the medicinal properties of meteorites.

As seen in the previous chapters, the didactic essays on modern science stressed the importance of observation and careful scrutiny to understand any natural phenomenon. It was pointed out that scientific facts are valid because they are products of a structured quest for knowledge. For instance, the previous article on meteors placed the argument as follows,

"Although there are several superstitions regarding the meteors, we get a very different set of experiences and inferences from the perspectives of natural science. But let me first describe some similar events that occurred in different places and how experts studied them. In this way, an explanation of the causes of these (phenomenon) will be much less difficult to understand".⁵⁸

⁵⁵ K. P. (1906) Jeevikal Ulla Lokangal, *Sharada*, 2(6-7).

⁵⁶ K. R. Harihara Iyyer (1906) Grahanangal, *Sharada*, 2(8).

⁵⁷ K. R. Harihara Iyyer (1906) Aakshathile Chila Manohara Sambhavangal, *Sharada*, 2(12).

⁵⁸ Ibid p 266.

Like the previous chapters, in such informative essays, we can observe the use of scientific terms written in English or transliterated in Malayalam.⁵⁹

In the discussion on astronomical literature in chapter six, we have seen that interlocutors argued for parity of status between traditional astronomical knowledge and modern astronomy. Within such a discourse, attempts were made to justify and legitimate different rituals and myths as scientific. This trope can be seen in the astronomical literature in women's magazines too. Consider the article 'Chandran' (Moon) by K. Narayana Menon in *Sharada*.⁶⁰ The article starts by recollecting some proverbs and idioms in Malayalam about the moon and tries to bring out the scientific understanding underlying them. The author draws attention to proverbs and beliefs regarding the moon in other cultures, including the German and the English, highlighting that such traditional ways of knowing existed even in the west. The essay then explained the moon's appearance, position, movement, and phases based on modern scientific knowledge. It went back to the proverbs and idioms to stress that wisdom in these proverbs is not always superstition. It emphasised that many of the traditional customs and rituals embody scientific knowledge.

Astronomy was not the only area that addressed superstitions. Vadavathoor has noted that science literature in *Vanita Ratnam* aimed to abolish superstitions regarding menstruation.⁶¹ *Sharada* offers an interesting example of superstitions regarding health. The article is titled 'Pakshipeeda' (roughly translated as Ailment Caused by Birds), and the author is marked as *Oru Manthravaadi* (A Black Magician).⁶² The article talks about specific health issues in children apparently caused when a child or the pregnant mother sights or hears the sound of a particular bird. The symptoms of the sickness are listed in detail. The essays then suggest some rituals and black magic as a cure. What is interesting for us here is not the article but a small note at the end of the article by the magazine's editors. The note reads:

⁵⁹ Ibid.

⁶⁰ K. Narayana Menon (1906) Chandran, *Sharada*, 2(9).

⁶¹ P. E. Chacko (1926) Streekalum Sciencum, *Vanitha Rathnam*, 1 (5-6). For a discussion on the article, see Vadavathoor 2001.

⁶² Anonymous (1905) Pakshipeeda, *Sharada*, 1(10).

“This article gives a picture of the myth regarding pakshipeeda. But it would be great if the doctors could tell us more about the scientific reasons behind it”.⁶³

This small note is enough to suggest the increasing cultural authority of modern science in the social imaginaries of the period. Modern science offered a frame for the explanation of familiar and unfamiliar phenomena. ‘Explaining the scientific reasons’ had emerged as a measure of legitimacy and validity. As Lightman points out in the context of nineteenth-century England, science was presented as “the best method for determining all truth..... In order to be deemed intellectually legitimate, ideas and theories had to be determined through the scientific method”.⁶⁴ This cultural authority enabled the appropriation of science to challenge the traditional and legitimise the novel.

Simultaneously, the authority of science was subverted and appropriated to explain and rationalise existing practices and customs. Although this point has been illustrated in the preceding discussion, it is important to cite one more essay here. It inverts the scientist’s arguments but still appeals to the authority of science and thus presents an intriguing manifestation of science as a means of legitimising the social. The article is titled *Yudhathepatti Edisonthe Abhiprayam* (Edison’s Opinion on the War). As the title suggests, the article presented Edison’s opinion on the First World War. The source of information is not identified in the anonymously written article. It starts with a short description that reads, “Edison, the most prominent American scientist, has said the following about the European war”.⁶⁵ The essay is presented within double quotation marks and is seemingly an excerpt from an interview. The article portrays Edison as a pacifist who talks about the disastrous effects of modern industrial warfare. When asked about why America does not build modern war machinery, Edison replies, according to this essay, that-

“I have never tried to make machinery that hurts or kills people. All my scientific endeavours have been to increase human comfort. I can make

⁶³ Ibid p 7.

⁶⁴ Lightman 2007 p 5.

⁶⁵ Anonymous (1916) *Yudhathepatti Edisonthe Abhiprayam*, *Sumangala*, 1(2) p 63.

war machinery, but I have not done that because my conscience does not allow me to participate in mass murder. However, if any enemy army reaches the shores of America, I am ready to do it".⁶⁶

This essay is perhaps based on Edison's interview with *The New York Times* and was published in May 1915. The interview described Edison as a "no peace -at- any-price man".⁶⁷ In the interview, Edison presented his plan for war preparedness, its necessity, and the means to achieve it without over taxation. Edison wanted America to be 'invincible' in the wake of the attack and was called upon to build vast reserves of arms and ammunitions, fleets of battlecruisers and other such military machinery. Thus, the essay in the Malayalam periodical presents an entirely different picture of Edison and his thoughts on the war. It perhaps put forward the anonymous author's idea about science and warfare through a carefully crafted use of the name of 'America's most prominent scientist'. The appropriation of the cultural authority of science in this essay intrigues us but also directs us to the basic premise of the cultural history of popular science that the circulation and domestication of science in society takes place in numerous (intended or unintended) forms.

Similar deliberations and uses of science have already been explained on different occasions in the previous chapters. However, it was important to capture these discourses in the women's magazine to underscore that women were also part of these social imaginaries of science. It also suggests that women's magazines were significant agents of popularising and naturalising science in culture. Not only there were a large number of popular science articles, but other seemingly non-scientific essays on education or household were also couched in the discourse of science. The following discussion on health and domesticity further demonstrates it.

Femininity, Domesticity and Nationalism

We covered the popular science literature on health and medicine published in Malayalam periodicals in the previous chapter. The salience of

⁶⁶ Ibid p 64- 65.

⁶⁷ Marshall 1915, p 52.

themes like local medicine, general health care, food and nutrition, hygiene, first aid, diseases and exercise were discussed. Malayalam women's magazines also represented these varied themes.⁶⁸ Other popular topics in women's magazines were nursing, women's health and child health.⁶⁹ Under women's health, menstruation, pregnancy, and delivery are featured frequently.⁷⁰ Child health mainly deals with diet, nutrition and common ailments.⁷¹ As we saw in the literature in other periodicals in the previous chapters, popular science literature put forward the notion that scientific knowledge of the form and functions of the human body is essential to the awareness about health. For instance, C. Rammuni Menon's long serialised essay in *Sharada* on 'Arogyarakhsa' (Health Care) started as: "Before discussing the science of health care, it is important to explain the seat of health that is the body, its various organs and their functions".⁷² He then explained how cells made up the body and elaborated on the anatomy of the human body, basic principles of digestion, and blood circulation.

As we have already discussed different themes on health and medicine, I focus on the literature on women and children in this chapter. The following pages delineate three significant strands in the discussion on women, health, and medicine. The first one is based on the notions of femininity and the discourse of medicine. A second strand can be identified as the nationalisation of women's health, and a third one articulates ideas of modern domesticity.

⁶⁸ Anonymous (1909) Bhakshanapaakam, *Sharada*, 4(1); Dr K. Raman Thambi (1909) Aaharam, *Sharada*, 4(3); Anonymous (1918) Shareera Samrakshanam, *Lakshmibai*, 13(9); K. P. M. (1923) Aarogyam, *Lakshmibai*, 19(3); C. D. N. K. (1926) Prathama Sushroosha, *Lakshmibai*, 21(5); Anonymous (1916) Kshaya Rogam, *Sumangala*, 1(3); Anonymous (1905) Vyayamam, *Sharada*, 1(4); P. N. Moosath (1930) Kshathangalum Raktha Shraavanavum, *Mahila*, 10(8); K. Narayana Menon (1908) Shareera Sugham, *Lakshmibai* 2(6).

⁶⁹ M. R. Krishna Pillai (1909) Paricharikal Arinjirikenda Chila Sangathikal, *Sharada*, 4(7); L. A. Ravi Varma Koyi Thampuram (1916) Aathura Shushroosha, *Sumangala*, 1(2).

⁷⁰ K. Govindan Thambi (1916) Sugha Soothi, *Sumangala*, 1(1); P. K. Panikkar (1916) Sthreekalum Aarogyam Rakshayum, *Sumangala*, 1(9-10); Perunthazhiyathu Kamalakshi (n.d) Rajaswala Dharmangal, *Lakshmibai*; S. Narayanan Namboothiri (1907) Garbha Samrakshaneeyam, *Lakshmibai*, 2(5).

⁷¹ Dr K. Raman Thambi (1916) Vidyarthikalude Aaharakramam, *Sumangala*, 1(4); Ooru Sthree (1906) Balaparicharanam, *Sharada*, 2(9); B. Neelakandan (1927) Balaparicharanam, *Lakshmibai*, 22(12).

⁷² C. Rammuni Menon (1905) Aarogyam Raksha, *Sharada*, 1(1-6) p 3.

Notions of Femininity

We have seen above that the ideal of modern women constructed during the nineteenth and twentieth century put forward a notion of femininity derived largely from notions of Victorian social morals. Values like affection, altruism, nurturance, and patience formed the core of this idea of modern womanhood.⁷³ Such notions of femininity can be seen across different themes in women magazines. In this section, I have focused on the literature on caregiving as it represents these values in more explicit terms.

Essays on caregiving were a staple of women magazines. Such articles explain how to take care of the sick by attending to the patient's various needs and stress the importance of diet and rest, hygiene and sanitation of the patient, the caregiver, and the surroundings. Instructions were provided on the use of antiseptic liquid for cleaning and instruments like a thermometer.⁷⁴ Florence Nightingale was the role model of the altruistic nature of the activity. Essays on sick nursing suggested that feminine attributes qualify women for participation in the discourse and practice of medicine and health care. It was argued that women's particular physiological and psychological makeup naturally disposes them towards these matters. Shuttleworth, Dawson and Noakes have observed this trope in English women's periodicals in the nineteenth century. They point out that medical practice for women in this trope was seen as an "extension of the domestic, feminine role".⁷⁵

Dr L. A. Ravi Varma Koyi Thampuran starts his essay on sick nursing in *Sumangala* by stating that he chose to write on the topic because it is a women's magazine and the information on sick nursing will be useful to women.⁷⁶ He observes that women's patient, caring, and loving nature adds to their natural disposition for sick nursing. He lamented that women in the region have no knowledge about this topic as they think it is relevant only for those who work in the hospitals. Through his essay, he laid down the basic principles of sick nursing that would help women be better caregivers. Another author, M. R.

⁷³ Walsh 2004, Orsini 1999.

⁷⁴ M. R. Krishna Pillai (1909) Paricharikal Arinjirikenda Chila Sangathikal, *Sharada*, 4(7).

⁷⁵ Shuttleworth, Dawson and Noakes 2001 p 60.

⁷⁶ L. A. Ravi Varma Koyi Thampuran (1916) Aathura Shushroosha, *Sumangala*, 1(2).

Krishna Pillai, also thought an essay on sick nursing is important for women as 'women will have to do it at some point of time'.⁷⁷ Although they cannot replace a trained nurse, he argued that women could be good caregivers if they develop the following qualities- calm and patient demeanour, self-composure, health, keen observation skills, good memory, hygiene, and sanitation. Pillai suggested that these attributes can be gained through training and experience.

As we can see, ideas of caregiving presented in the popular literature were based on professional nursing, suggesting the importance of scientific understanding, systematic training, and experience through practice. It suggested that 'innate feminine qualities' were not enough unless honed through training, experience and reading didactic literature. Thus, femininity becomes both an innate quality and a skill to be acquired.⁷⁸ While femininity was innate, that very femininity needed to be cultivated to achieve the greater cultural goals. To borrow Prasad's words, "becoming an expert caregiver was possible when commensurate training was grafted onto the already existent tender core of women's nature".⁷⁹

Devika has noted that notions of womanly qualities enabled the participation of women in different occupations like teaching and healthcare.⁸⁰ She points out that by the second quarter of the twentieth century, as more professions opened up for women, such ideas were increasingly defined as 'womanly power'. Womanly power was articulated as soft power defined by the disciplining imperative of the discourse of self-fashioning of individuals. Devika explains that with the increasing application of notions of womanly qualities in different public realms, the distinction between the public and the domestic became blurred. Yet, it did not erase this distinction, as the continued emphasis on household responsibilities for women suggests.

Such readings help us to understand the underlying notions of gender in the articles that encouraged medical education for women. 'Sthreekalum

⁷⁷ M. R. Krishna Pillai (1909) Paricharikal Arinjirikenda Chila Sangathikal, *Sharada*, 4(7).

⁷⁸ Prasad (2015) discusses a similar discourse of care and caregiver in Bengali. Also see Hancock 2001, Walsh 2004, Shuttleworth, Dawson and Noakes 2001.

⁷⁹ Prasad (2015) makes this observation in the context of Bengali literature on hygiene and care (p 143).

⁸⁰ Devika 2007.

Vaidyavum' (Women and Medical Knowledge), published in *Sharada*, is a good example.⁸¹ The essay begins by examining the qualities desirable for a *vaidyan* (local medical practitioner) and sees if they are present in women. The author lists wisdom, ability to observe and understand things, tolerance, compassion, sympathy, and patience as necessary qualities of a *vaidyan* and observes that since all these qualities are innate in women, they are more suitable for this profession than men. According to the author, a patient's health lies in part in nursing and part in medicine. Women already know about one half, and they only have to learn the other half of the task. Both local and modern medical knowledge is deemed appropriate for women as long as training focuses on themes related to women and children. Women were represented as responsible for the prosperity and health of the nation, and medical know-how was supposed to equip them for their responsibilities.

Another article, 'Sthreekalum Vaidyam Padikanam' (Women Should Learn Medicine), goes like this-

"Even conservatives who argue against women's education are likely to agree upon the need for medical education for women. Medical education does not ensue in undesirable outcomes brought about by women's education".⁸²

The essay explained that a woman is the first person to treat a patient at home and thus knows more about the patient's conditions than any outsider. Since professional medical assistance is often sought only after the failure of home remedies, medical education for women was deemed highly desirable:

"...If we have mothers who know about health and medicine, nurturing children, then it will not be wrong to expect that soon our nation would be restored to its bygone glory. When disease-causing germs infect young bodies, it is difficult to treat them later in life. Similarly, a body nurtured healthily since childhood is also immune to diseases later on in life. Therefore, it seems that our health and longevity is in the hands of women who are primary caregivers for children. So, it becomes

⁸¹ Sharada (1905) Sthreekalum Vaidyavum, *Sharada*, 1 (9).

⁸² V. Narayanan Nair (n.d) Sthreekalum Vaidyam Padikyanam, *Lakshmibai*, p 505.

important that women have some basic knowledge of anatomy and physiology as well as about diseases, their symptoms and treatment”.⁸³

The argument for medical education for women was rationalised within her role as a mother and caregiver. Besides, the essay explained that specific physiological experiences of women such as menstruation, pregnancy, and delivery added to the necessity of medical knowledge. The author called for the compilation of textbooks on basic knowledge about health and medicine, including everyday habits, sanitation, and food habits. Inclusion of such textbooks in the school curriculum for girls is advised.⁸⁴

The history of women in India suggests that Victorian notions of motherhood and domesticity *recasts* women in a modern domestic role that is more suitable for the social and political needs of the local intelligentsia who were trying to negotiate a balance between tradition and modernity.⁸⁵ Thus, health science is advocated within the imagination of modern women as a well-informed, responsible mother who is eventually responsible for the nation’s health. Teena Antony draws attention to similar narratives in the debates on women’s education in Malayalam women’s magazines.⁸⁶ The need for women’s education and the appropriateness of the curriculum was extensively debated during the twentieth century in Kerala. These debates were centred on modern notions of femininity and the corresponding gender roles in society.⁸⁷ Antony points out that health science was suggested as a necessary subject in the curriculum for women in the discussion on education. Like the essays discussed above, health science was deemed essential as it equipped women for the role of homemakers, mothers, and nurses.⁸⁸

We will delve more into the domestic role of women in the following pages. For now, I will try to understand the politics of scientific knowledge behind the notions of femininity and corresponding social roles through the lens of the feminist history of science.

⁸³ Ibid p 507.

⁸⁴ Ibid.

⁸⁵ Hancock 1999, Sangri and Vaid 1989, Walsh 2004.

⁸⁶ Antony 2013.

⁸⁷ Devika 2007.

⁸⁸ Antony 2013.

Feminist history of science tells us that the notions about women's 'innate' qualities and her corresponding social role were determined and simultaneously validated by the Victorian scientific discourse. In her seminal work, *Nature's Body: Gender in the Making of Modern Science*, Schiebinger has argued that eighteenth-century natural history was deeply embedded in the cultural and political environment of Europe during the period.⁸⁹ She explained how plant and animal taxonomies and even racial categories were influenced by the prevalent social ideas about sex and gender. She thus presents a persuasive argument to read the history of the scientific revolution as the history of revolution in sexuality and gender. Particularly relevant for our discussion is her exploration of Linnaeus's choice of the term Mammals to refer to the zoological class earlier known as Quadrupedia.

Linnaeus introduced the term 'Mammalia' in 1758 in the tenth edition of his *Systema Naturae*. The term Mammalia was derived from the Latin term *Mammae*, which referred to milk-producing breasts. Schiebinger explains that breast was only one of the characteristics that define the class denoted as mammals and examined some of the alternatives available for Linnaeus. She argues that Linnaeus's focus on the breast as the defining feature of the class and the use of the term Mammalia is a product of the social context and gender politics of eighteenth-century Europe. Upper and middle-class gender values and roles were being debated and redefined during this period, and breastfeeding was a crucial point of contention. The anti-wet nursing movement, Schiebinger explained, was deeply rooted in the concerns of the state to address the declining population. Wet nursing was considered a significant cause of infant mortality. Women were urged to breastfeed their babies to ensure the children's physical health and good character. In this discussion, women's domestic roles acquired new cultural and political meanings. Linnaeus was very active in his support for the movement against wet nursing and, through his writings, propagated the Enlightenment values that underlined this discourse on gender. Schiebinger argues that Linnaeus' science cannot be separated from his social and political convictions. Not only did the contemporary social context influence Linnaeus'

⁸⁹ Schiebinger 1993 p 12.

nomenclature, but it also ensured the reception of that nomenclature. According to Schiebinger,

“Linnaeus’ term Mammalia helped to legitimise the sexual division of labour in European society by emphasising how natural it was for females –both human and non-human – to suckle and rear their own offspring. Linnaean systematics had sought to render nature universally comprehensible yet the categories he devised infuse nature with middle-class European notions of gender”.⁹⁰

The feminist critique of biology underlines that the social norms about sex and gender guide the representation of biological knowledge, resulting in a scientisation of these values.⁹¹ This, in turn, reinforces a gendered understanding of biology. In other words, social values are justified and reinforced as having a biological basis by science. Such gendered understandings of women are then used to rationalise women’s role in society. Smith-Rosenberg and Rosenberg sum it up best:

“Since at least the time of Hippocrates and Aristotle, the roles assigned women have attracted an elaborate body of medical and biological justification. This was especially true in the nineteenth century as the intellectual and emotional centrality of science increased steadily. Would-be scientific arguments were used in the rationalisation and legitimisation of almost every aspect of Victorian life and with particular vehemence in those areas in which social change implied stress in existing social arrangements....” “The Victorian woman’s ideal social characteristics-nurturance, intuitive morality, domesticity, passivity, and affection- were all assumed to have a deeply rooted biological basis. These medical and scientific arguments formed an ideological system rigid in its support of tradition, yet infinitely flexible in the particular mechanisms which could be made to explain and legitimate woman’s role”.⁹²

⁹⁰ Schiebinger 1993 p 72.

⁹¹ Fausto- Sterling 1987, 2000, Hubbard 1990, Schiebinger 1993.

⁹² Smith-Rosenberg and Rosenberg 1973 p 332- 334.

Smith-Rosenberg and Rosenberg's make these observations in the context of their examination of two primary debates on gender in America during the nineteenth century- the debates on women's education, birth control and abortion. They elaborate on the medical and biological arguments used to counter these demands made by women and argue that the outcome was a more rigid definition of the social role of women in which the ultimate marker of women's identity was domesticity and motherhood.

Reading the literature on sick nursing in Malayalam women's magazines in the light of these insights helps us situate the cultural politics of science in the history of the formation of gendered identities in colonial Kerala. We have already observed that the narrative of feminine values and women's participation in health care was framed within the language of science. The feminist history of science helps us deconstruct that scientific discourse further and uncover the embedded socio-political dynamics of sex and gender.

Women's Health and Nationalism

Women's health and childcare was a major constituent of the popular science literature in Malayalam women's magazines. The bulk of the literature pertained to topics like pregnancy, delivery and postnatal care, infant health and child-rearing and covered different traditions like homoeopathy, modern biomedicine, and Ayurveda.⁹³ The literature provided a detailed explanation of the process of gestation and the development of the foetus through pregnancy. Signs of pregnancy, pregnancy health care, common ailments during pregnancy, delivery, postnatal care for mother and child were all covered in numerous essays.⁹⁴ The use of hyoscine and morphine to help in painless delivery was explained.⁹⁵ Food that supplies essential nutrients necessary during pregnancy, food to avoid during pregnancy, timing, duration, and environment of sleep were

⁹³ V. Koman Menon (1906) Garbhinikal Ariyendava, *Sharada*, 1(12); Oru Midwife (1921) Garbhinikalodu, *Mahila*, 1(5); K. Govinda Menon (1930) Garbharaksha, *Lakshmibai*, 25(10); Dr Kaladi M. N. Pillai (1921) Mahilarogyam, *Mahila*, 1(12); T. C. K. (1929) Shishukkalude Aaharam, *Lakshmibai*, 24(5). K. G. M (1929) Arogyathinte Adisthanam, *Lakshmibai*, 24(11).

⁹⁴ V. Koman Menon (1906) Garbhinikal Ariyendava, *Sharada*, 1(12); Oru Midwife (1921) Garbhinikalodu, *Mahila*, 1(5); K. Govinda Menon (1930) Garbha Raksha, *Lakshmibai*, 25(10); S. Narayanan Namboothiri (1907) Garbha Samrakshaneeyam, *Lakshmibai*, 2(5-9); Pothujanarogya Prasadheekaranam (1932) Garbha Sooshrooksha, *Mahila*, 12(4-5).

⁹⁵ K. Govindan Thambi (1916) Sugha Soothi, *Sumangala*, 1(1).

explained. Dental hygiene was underlined as extremely important during pregnancy. Instructions also covered bodily hygiene and comfortable clothing. Physical exercise was deemed extremely important for safe and more comfortable delivery, and women were encouraged to continue their domestic chores as a form of exercise.⁹⁶ Mother's spiritual inclination and temperament were also counted as factors influencing infant health.⁹⁷

The extensive discussion on pregnancy and childbirth has to be situated in the discourse of medicalisation of pregnancy and reproduction.⁹⁸ Time and again, women were advised to seek professional medical care from a doctor or trained midwives.⁹⁹ Home treatment of ailments during pregnancy was strictly discouraged, and untrained midwives were criticised.¹⁰⁰ Popular literature argued that an awareness of the changes occurring in the body during pregnancy was vital to overcoming misconceptions about pregnancy and delivery.¹⁰¹ Terms like *vidhagdhopadhesham* (expert opinion) and *parisheelanam siddichavar* (trained persons) were common and portrayed the image of a group with specific skills and knowledge to handle reproductive health.¹⁰² The Travancore government's efforts to train midwives were appreciated and served as a model for other regional administrations.¹⁰³

Through these essays, popular science literature in women's magazines served the important function of legitimising the medicalisation of maternal health within the frames of modern biomedicine. Devika and following her Aparna Nair have observed that the popular and institutional medical discourse during the twentieth century in Kerala reduced the idea of women's health to

⁹⁶ P. K. Panikkar (1916) Sthreekalum Aarogya Rakshayum, *Sumangala*, 1(9-10).

⁹⁷ Thekke Ambadiyil Meenakshiyamma Thripunithura (1928) Sal Prasoothi Shastram, *Kairali*, 12(5-8); K. Govinda Menon (1889) Prasoothi, *Vidyavinodini*, 8(6); K. M. P (1905) Sthree Vyayamam, *Lakshmibai* 1(1).

⁹⁸ Burton 1996, Lal 1994, Forbes 1996, Ramanna 2008, Berger 2013, Arnold 1993.

⁹⁹ Training in midwifery started in Travancore as early as 1887. See section one in chapter five of this thesis.

¹⁰⁰ K. Govinda Menon (1889) Prasoothi, *Vidyavinodini*, 8(6); Oru Midwife (1921) Garbhinikalodu, *Mahila*, 1(5).

¹⁰¹ K. Govinda Menon (1889) Prasoothi, *Vidyavinodini*, 8(6).

¹⁰² K. Govinda Menon (1930) Garbha Raksha, *Lakshmibai*, 25(10); K. Govinda Menon (1889) Prasoothi, *Vidyavinodini*, 8(6).

¹⁰³ K. Govinda Menon (1889) Prasoothi, *Vidyavinodini*, 8(6).

maternal health.¹⁰⁴ From a Foucauldian perspective, Nair understands the increasing emphasis on maternal health as part of the biopolitical imperatives of the state.

We can see that women's health during pregnancy was articulated in terms of its significance for foetal health. The articles were framed within the concerns about the region's increasing infant mortality and child mortality rate.¹⁰⁵ Child marriage was cited as another major cause of maternal and infant death and illness, and the discussion delved into local practices of marriage.¹⁰⁶ Lack of proper health care and nutrition during pregnancy and carelessness of women in matters of maternal health were considered significant causes of sickness and death of the offspring.¹⁰⁷ Most of the articles on child care talk about various nutrients in different food items and offer advice on preparing a balanced meal for infants and children.¹⁰⁸ The nutritional properties of various food items and how each of the nutrients helps in the growth and functioning of various parts of the body were elaborated. Infant care, breastfeeding, weaning foods, exercise and sleep were other common topics.¹⁰⁹ Well built, healthy and handsome bodies were idealised, and nutritious food was suggested best for achieving that ideal.¹¹⁰

Nurturance was distinguished as a more cultured form of child-rearing juxtaposed against animalistic reproduction identified with the 'lower castes'.¹¹¹ Discipline and habits of hygiene and sanitation were considered the hallmark of good mothering. Children were portrayed as future citizens whose moral and physical health determined the future of an emerging nation. Mothers were thus

¹⁰⁴ Devika 2007, Nair 2012-2013.

¹⁰⁵ Oru Midwife (1921) Garbhinikalodu, *Mahila*, 1(5); T. C. K (1929) Shishukkalude Aaharam, *Lakshmibai*, 24(5).

¹⁰⁶ K. Govinda Menon (1889) Prasoothi, *Vidyavinodini*, 8(6).

¹⁰⁷ V. Koman Menon (1906) Garbhinikal Ariyendava, (*Sharada*) 1(12); Oru Midwife (1921) Garbhinikalodu, *Mahila*, 1(5); K. Govinda Menon (1930) Garbha Raksha, *Lakshmibai*, 25(10).

¹⁰⁸ T. C. K (1929) Shishukkalude Aaharam, *Lakshmibai*, 24(5); Oru Sthree (1906) Balaparicharanam, *Sharada*, 2(10); Dr K. Raman Thambi (1916) Vidyarthikalude Aaharakramam, *Sumangala*, 1(4).

¹⁰⁹ Oru Sthree (1906) Balaparicharanam, *Sharada*, 2(10).

¹¹⁰ C. Mariyamma Pootharayil Chambankulam (1927) Shishusamrakshanam, *Muslim Mahila*, 2(1); T. C. K (1929) Shishukkalude Aaharam, *Lakshmibai*, 24(5); Dr K. Raman Thambi (1916) Vidyarthikalude Aaharakramam, *Sumangala*, 1(4).

¹¹¹ C. Mariyamma Pootharayil Chambankulam (1927) Shishusamrakshanam, *Muslim Mahila*, 2(1).

responsible for nurturing the child and the nation.¹¹² Thus in popular science literature, we can see the forging of a modern idea of motherhood. An author, signed as K. G. M in an article on children's health, considers the discussion as a contribution towards *adhunika mathrumurakal* (modern maternal customs).¹¹³ The children's health and moral dispositions were also considered to be influenced by the sexual habits and practices of the parents. It was explained that children born to parents who are very active sexually would be weak. In this discourse of moral hygiene, the only purpose of sex was procreation.¹¹⁴ Male child preference was a striking feature in the literature on maternal and child health. It was explained that the human body becomes mature for reproduction at only a certain age, and conception at a very young age increases the chance of having a girl child and the offspring, in any case, will be very weak.¹¹⁵

One cannot miss the obvious references to the twentieth-century nationalist eugenics discourse in the literature discussed above. Focus on the physical and moral qualities of the citizens, discourse of discipline and hygiene, regulation of sexuality and the othering of 'lower castes' was among the major frames through which the eugenic ideas of the twentieth century were articulated.¹¹⁶ Towards the mid-twentieth century, as she points out, the eugenics and mothercraft movement was a pervasive influence in the discourse on women's health and childcare in India. In the context of Egypt, Abugidieri observes that all discussions on women's health were around the child's health, which ultimately ended up with reference to the eugenic health of the nation.¹¹⁷ Medicalisation and institutionalisation of women's health were major means for achieving the eugenic health of the nation. Thus, eugenics became intricately connected to the women's question in the latter part of the twentieth century.¹¹⁸ Zachariah and Hodges, in different contexts, have highlighted the use of science

¹¹²Ibid, T. C. K. (1929) Shishukkalude Aaharam, *Lakshmibai*, 24(5).

¹¹³ K. G. M (1929) Aarogyathinte Adisthanam, *Lakshmibai*, 24(11).

¹¹⁴Thekke Ambadiyil Meenakshiyamma Thripunithura (1928) Sal Prasoothi Shastram, *Kairali*, 12(8).

¹¹⁵ K. Govinda Menon (1889) Prasoothi, *Vidyavinodini*, 8(6).

¹¹⁶ Bashford 2004, Hodges 2008, Ahluwalia 2003, Sharma 2012, Gupta 2001, Nadkarni 2014.

¹¹⁷ Abugidieri 2010.

¹¹⁸ Bashford 2004, Ahluwalia 2003, Ramanna 2008, Hodge 2008, Hancock 2001, Nadkarni 2014.

by the intelligentsia to legitimise eugenic ideas in India.¹¹⁹ Drawing from these works, we can see that social imaginaries of health and medicine in Malayalam women's magazines were embroiled in the interconnected discourses of nationalism, gender, science and eugenics.

Women and Domesticity

As we have already discussed, domesticity is considered the primary site of negotiation of the women's question in the nineteenth and twentieth centuries. According to Walsh

“As a product of nineteenth-century bourgeois ideology, domesticity was a secular discourse, one deeply imprinted with Enlightenment themes of order, reason, and science. System, order, and efficiency were seen to be essential components of daily domestic life, elements that must of necessity inform all the practices to which that life gave rise. The proper ordering of home and family life would come from the application of science and scientific methodologies to the domestic sphere”.¹²⁰

Hancock places modern science as a rationalising factor of modern domesticity and the role of 'new women' in it.¹²¹ Based on her study of the institutionalisation and practice of home science in India, she explained that home science, through the curricula, textbooks, domestic manuals, and other mediums, brought modern science into the domestic realm and contributed to the feminisation and nationalisation of science. It offered an apolitical site legitimised by science and assembled the colonial, nationalist, and feminist ideals of modern women.

An overview of the discussion on everyday science in the women magazines indicates that most of the themes were directly related to the household. Be it the discussion on water purification, hygiene, sanitation, sewing or pests, popular science in women's magazines implicitly and explicitly implied the domestic. The literature on food, nutrition and cooking is one of the most

¹¹⁹ Zachariah 2001, Hodges 2008.

¹²⁰ Walsh 2004 p 12.

¹²¹ Hancock 2001.

explicit areas that brought together the discourse of science, hygiene, and domesticity.¹²² The socio-cultural significance of the popular science literature on food was discussed in the previous chapter and need not be elaborated here. Nevertheless, in the light of the reading of women's magazines, it is important to add that along with nationalist and regional cultural aspirations, domesticity and gender also framed the discussion on cuisine in crucial ways.

Ray, Prasad and Sengupta have underlined that discourse on food and cooking in colonial Bengal was embedded in the gendered notions of domesticity.¹²³ The literature on food in the textbooks for women, cookbooks, domestic manuals and popular literature presented an aestheticised and scientifically rationalised understanding of cooking.¹²⁴ This corpus of literature invariably situated cooking within the household and made women responsible for it.¹²⁵ In the context of colonial Kerala, Deepa has argued that cookbooks, women's associations and literature in women's magazines contributed to the gendering of food and cuisine in colonial Malabar.¹²⁶ Combining the insights from these studies with the discussion on the scientific understanding of food from the previous chapter of this thesis suggests that science was intricately implied in the imaginaries of food, gender and domesticity.

Another instance of the conflation of science, health and domesticity can be in essays on physical exercise for women. Chapter four showed that physical exercise was one of the major determinants of health in modern imaginaries. Physical exercise was suggested as an antidote to the sedentary lifestyle of the modern educated, westernised elites and middle class. While men were encouraged to engage in activities like sports, domestic chores were prescribed

¹²² Discussing Bengali popular literature Prasad (2015) points out that the discourse of hygiene encompassed food and nutrition, household cleanliness and management, personal cleanliness and extrapolated these on the nation. See Roy (2014) for a discussion of the hygiene and nutrition discourse in Tamil Women's Magazines. Roy observed that along with the modern scientific views on health and hygiene, Tamil women's magazines featured local home remedies based generally based on Ayurveda and Siddha. She sees this presence of eclectic views as a reflection of the ambivalence in the reception of modernity (p 95).

¹²³ Ray 2015, Prasad 2015, Sengupta 2010.

¹²⁴ Ray 2015, Deepa 2016, Hancock 2001.

¹²⁵ Ray 2015 presents an illuminating account of the process of the gendering of cooking in colonial Bengal. She explores how the discursive practices enabled a gendered distinction between the professional cook and the home cook.

¹²⁶ Deepa 2016.

for women. In women's magazines, dimensions of gender and domesticity in the literature on health and exercise can be observed more explicitly.

Consider the article 'Veetuvela' (Domestic Chores) by Sharada.¹²⁷ The article starts by ridiculing *parishkaari* (roughly translated as reformed and modern) women who are not interested in domestic chores.¹²⁸ The author writes that an educated woman becomes successful when she engages in housework and teaches her daughter to become a good homemaker. She then continues the essay by explaining the necessity of exercise for women's physical and emotional wellbeing. The essay described the benefits of exercise for various body organs, for blood circulation and strengthening the muscles. According to the author, games like tennis and badminton that western women play for recreation are unnecessary for 'our sisters' as they can get enough exercise doing domestic chores. The author writes:

"People may be confused on how domestic chores help in gaining good health. How can it lead to happiness? But what is happiness actually? It is the satisfaction of fulfilling one's desires, and a homemaker desires health and prosperity for her family. Anything that helps to attain these two desires brings happiness. I am telling you that this can be achieved by doing household work".¹²⁹

The author then describes an ideal domestic routine that will ensure all the benefits of exercise for women.

"It is good to get up early in the morning. One should get up before sunrise and open up all the doors and windows. While doing exercise, there should be plenty of fresh air in the room and opening the windows and doors ensures fresh air in the house where we do our exercise- our domestic work".¹³⁰

¹²⁷ Sharada (n.d) Veetuvela, *Sharada*.

¹²⁸ *Parishkaram* denotes change, and it is used in both positive and negative connotations depending upon the context. As suggested earlier, see Antony 2013 for a discussion on the nuances of the meanings and usages of the term *Parishkaaram* in colonial Kerala.

¹²⁹ Sharada (n. d) Veetuvela, *Sharada*. p 6.

¹³⁰ *Ibid* p 7.

Next comes cleaning chores like sweeping and mopping. These activities are explained as beneficial for the work out of different parts of the body and muscles. According to the author, a woman who finishes all these chores in the morning and follows it with a refreshing shower will be healthier than other women who abhor these tasks. Doing physical chores in the morning also provides a more toned and attractive body that pleases the husbands and removes the need for domestic help, thereby saving money and peace of mind. In the evening, after cleaning the house, women can engage in gardening.

The author suggests that *Malayalee* women like Shakuntala should also take an interest in gardening. The author contrasts Shakuntala to modern educated Malayalee women who do not do anything but sit comfortably in the living room reading and chatting and says that the latter will have pale skin and dull eyes compared to beautiful Shakuntala. The article explained that gardening adds beauty to the home, is an excellent recreation, and brings satisfaction and happiness. It further suggests,

“When women fetch water for the plants in the garden, it provides good workout also. Women who fetch water from the well regularly can avoid many health complications related to pregnancy and childbirth. Walking with a pail of water, especially climbing steps from a pond, is beneficial to women’s health, and this was suggested to me personally by an English doctor”.¹³¹

The author adds that singing while doing all these works gives extra amusement and happiness. For women who have taken to walking for exercise, the author suggests that they should walk to the temple every day. Visiting the temple every day on foot will provide physical and spiritual benefits. She further adds that working-class women (servants) have better toned and healthy bodies due to physical exertion.

Although seemingly not a popular science essay, this essay provides several vantage points to explore the interrelationship of the scientific discourse of health and gender and its interpenetrations in social imaginaries. To begin

¹³¹ Ibid p 8.

with, one of the most ridiculed images of women during the late nineteenth century is that of an educated Indian woman dressed in modern attire, reading a novel in her living room.¹³² This educated woman has forgotten her moral responsibilities towards her family, is too preoccupied with her looks and tries to imitate western ways of living. This image was almost ubiquitous across different genres of literature and was a product of the apprehensions regarding the appropriateness of women's education and her newly found sense of 'freedom'.¹³³ In other words, it was the manifestation of an arduous dilemma engendered by the women's question in colonial India: how to modernise women without threatening the patriarchal social order. As discussed above, the resolution was attained in the restructuring of the domestic. Women's role in the new domestic was articulated in a language that appealed to the modern sensibilities of an emerging educated elite, a representation of which can be seen in the article discussed here.

The author urges the educated Malayalee women to take up domestic chores and household responsibilities because it provides an excellent workout. The call to go back to the domestic is not justified in tradition or custom but rationalised by reference to a modern anatomical understanding of the human body and health. Also, note that the idea of health based on the traditional humoral theory is also absent. Domestic chores were prescribed as a workout, and to add that, it was suggested by an English doctor, appeals to the authority of modern medicine. This reference to 'English doctor' to bank on the authority of modern science was a common trope. Abugideiri has explained the growing authority of modern Egyptian doctors as a defining feature in the construction of modern women in Egypt during the nineteenth and twentieth century¹³⁴. According to her, the authority of modern medicine fueled a popular discourse "... that not only medically explained woman's roles and rationalised the domicile, but also 'scienticised' Egyptian culture".¹³⁵ Kashani- Sabet has also pointed out the references to modern medical authority in the discourse on

¹³² Padinjaremarathu Kamalamamma (1930) Sthreekalum Parsihkaravum, *Lakshmbai*, 25(11).

¹³³ See Devika 2007 for more on this.

¹³⁴ Abugidieri 2004.

¹³⁵ Ibid p 83.

maternalism in Iran. She points out that many topics on women health were already present in Classical Islamic medical discourse, but in the popular literature, modern medical assumed power of legitimacy.¹³⁶

The author suggests that doing household work on one's own also eliminates the need for servants. Several other articles on health and hygiene, child-rearing and home management discourage the dependence on domestic help. Antony sees this as a manifestation of politics of caste, as the helpers were from 'lower castes', and the article was addressed mainly to 'upper caste' Nair women.¹³⁷ We have discussed that the ideal of modern women was crafted by counterposing it against the stereotypical image of the 'lower caste' women who were considered lacking in values like physical and moral hygiene, education, sophistication, etc. Scholars like Banerjee, Walsh and Talwar have pointed out that 'lower caste' women were considered 'corrupting influences' on cultured middle-class women.¹³⁸

The article *Veetuvela* is only one example. Numerous articles suggested household work as an exercise for women for the maintenance of health and beauty.¹³⁹ It was also suggested for prenatal health, and safe delivery has already been observed in the previous section. Dancing was another activity considered a suitable exercise for women.¹⁴⁰ Mukkil Maruthoor Narayanan Menon argued that dancing engages the entire body, including the face. Thus, it enhances health and facial beauty, and so according to him, dance was the most suitable exercise for women. In 'Veetuvela' also, we see that the idea of feminine beauty was emphasised. Aestheticisation of the female body was a major preoccupation in the twentieth century.¹⁴¹ Devika explained that the discourse of aesthetics also implied that women acquire certain skills that will be useful in ensuring pleasure for the family. Within this context, dance, and music, which were earlier considered the domain of courtesans, became 'sanitised' and part of the

¹³⁶ Kashani- Sabet 2006.

¹³⁷ Antony 2013.

¹³⁸ Banerjee 1989, Walsh 2004, Talwar 1989.

¹³⁹ K. M. P (1905) *Sthree Vyayamam*, *Lakshmibai* 1(1); Mukkil Maruthoor Narayanan Menon (1930) *Nrithavum Aarogyavum*, *Lakshmibai*, 26(1).

¹⁴⁰ Mukkil Maruthoor Narayanan Menon (1930) *Nrithavum Aarogyavum*, *Lakshmibai*, 26(1).

¹⁴¹ Banerjee 1989, Devika 2007, Antony 2013.

repertoire of skills of modern women.¹⁴² The discussion above helps to further Devika's understanding of the aestheticisation of the female body by exploring the nuances of scientific legitimisation underlying the idea of women's health.

The preceding discussion shows that reading popular science literature within the background of gender provides a more nuanced account of cultural penetrations of modern science in the social imaginaries. As Walsh has pointed out in her study of domestic manuals, a narrative explaining the chemistry involved in everyday cooking and the natural history of plants and animals underlined the power and authority of the scientific method to achieve system and order at home and kitchen.¹⁴³ In the context of home science in India, Hancock argues that the garb of scientific knowledge adorned by home science helped to neutralise the interpenetration and implications of modernity in domestic life. As Shuttleworth, Dawson and Noakes point out in their study on Victorian women's magazines, while reading about various aspects of domestic life and gender, women were also reading about science. In their words,

"The sheer range of scientific ideas and debate available to the nineteenth-century woman reader has generally been wildly underestimated".¹⁴⁴

"Women reading such columns as 'The Flower and Fruit Garden', 'The Sick Room and the Nursery' and the 'Management of Household Pets' would undoubtedly have acquired a good deal of detailed practical advice, but they will also have gained a basic scientific knowledge of such topics as the natural habitats and histories of flowers, the classification of diseases and the breeding and dietary habits of pets."¹⁴⁵

These magazines not only instructed women in modern domesticity but also presented the scientific rationale for the instructions. These observations are useful for understanding the various layers of meanings underlying the popular science literature discussed in this chapter.

¹⁴² Devika 2007.

¹⁴³ Walsh 2004 p118.

¹⁴⁴ Shuttleworth, Dawson and Noakes 2001 p 58-59.

¹⁴⁵ Ibid p 63.

Conclusion

The chapter combines the insights from the feminist history of science, the history of popular science and the history of women in colonial India to offer a reading of the Malayalam women's magazines. By highlighting the presence of popular science literature in these magazines published in the twentieth century, it aims to situate science in the gendered public sphere of colonial Kerala. I have contextualised the social imaginaries of science within the broader discourse of gender, colonialism and nationalism represented in these magazines. Placing the problematic in this manner provides a more sophisticated account of women's history in colonial India. It simultaneously enriches our understanding of the legitimisation and domestication of science.

In *Sultana's Dream*, science offers a promise of women's empowerment. It is conceived as a part of the resources and strategies to counter and win over the social, economic, and political disadvantages that plagued the patriarchal society. In the popular literature on science in Malayalam, we see that science was used to legitimate the patriarchal notions of social life. At the same time, this literature informed women about the science behind the mundane and the sublime. The chapter does not intend to present these varying representations of science as contradictions or disjunctures. The aim was to highlight the co-existence and relevance of different social imaginaries of science in society. What we see here is an intermingling of imaginaries of science and imaginaries of gender.

CONCLUSION

Through an extensive discussion of the popular science literature and its production and circulation networks, the thesis has presented a vibrant social scene of the circulation of science in pre-independence Kerala. Approaching the question from a cultural perspective on the history of science, the thesis explored general periodicals as sites to understand the cultural conversations of science in society. It adopted a broadened definition of popular science that foregrounds variety in form, agents, and functions, to include popular writings on local knowledge forms in the ambit of the study. The study focused on the domestication, legitimation and appropriation entailed in the process of science popularisation. The context of production and circulation of popular science literature and the functions envisaged for it was explored. The framework of social imaginaries of science helped to extend the problematic of the thesis beyond the questions of reception of science to the exploration of myriad cultural symbolisations of science in society. The thesis underscored the relevance of Malayalam popular science writings in the mid-nineteenth and twentieth century for the history of science in India and the social history of Kerala. The following pages present a summary of the thesis highlighting its major contributions.

The discussion in the thesis begins by situating the development of popular science in Malayalam in the social history of the region. Various factors like modern education and associated socio-economic mobility, popularisation of print and emergence of a reading public facilitated the circulation of popular science writings from the mid-nineteenth century in Kerala. Chapter two suggested that the history

of popular science in the region acquires a different trajectory, one in which the princely state emerges as a prominent player. The local intelligentsia also actively popularised science through the popular print media. Primarily, the idea of modern science as the harbinger of social and economic development drove the vernacular science popularisation. The movement for the development and standardisation of Malayalam also added momentum to the circulation of popular science.

Chapter three laid down the methodological insights that guided the collection and analysis of the literature. It presented an overview of the primary sources and set a framework for the thesis by identifying the major themes in the popular literature. The abundance of science-related topics in the general periodicals suggests that there was an audience for science who may not have been devoted science readers but were interested in science as a source of entertainment and information for self/social improvement. Although the thesis could not present a prosopography or a detailed profile of individual science writers, it identified that the authors included practitioners of science associated with various government departments and educational institutions- teachers, lawyers, doctors, *vaidyans*, political and literary figures with science training or self-cultivated interest in science (autodidacts). The chapter highlighted that while a vernacular nomenclature for popular science and science popularisation was still in its infancy, there was a clearly defined idea of the forms and functions of popular science. However, the major contribution of the chapter lies in bringing to light the plethora of popular science writings in the general periodicals in Malayalam. It included didactic and polemical essays on modern science and local sciences, ranging across varied themes- almost half of which remains unexplored.

The following three chapters of the thesis focus on the major thematic areas of health and medicine, agriculture, and astronomy and astral sciences. The first part of each chapter presented a history of the institutional and social developments that configured the networks of production and circulation of popular science in the relevant area. The second part of the chapter discussed popular science literature.

In the context of health and medicine, the establishment of modern hospitals, vaccination drives, collection of vital statistics and public health education led to the circulation of ideas of modern science in the region. The concurrent movement for standardisation and institutionalisation of local medical traditions also contributed to growing public discussion on medicine and health. Both the princely state and the vernacular intelligentsia actively participated in the process. Chapter five traces almost a similar history of the development of popular literature on agriculture. Modern scientific agriculture in Travancore evolved through the Travancore Department of Agriculture. The department's programs influenced agricultural practices in the choice of crops, manures, use of implements and marketing prospects. The extension activities of the department laid the foundations of the popularisation of modern scientific agriculture through public lectures, pamphlets, and journals. A slightly different picture arises when it comes to the development of popular literature on astronomy and astral sciences. We see that the state's role was limited to the support extended to the setting up of the Trivandrum Observatory and the institutionalisation of Sanskrit education in the region. Within the confines of colonial science networks, the impact of the Observatory did not extend beyond opening it for the local visitors. The publication of astronomical texts by the Department for publication of Oriental Manuscripts is perhaps the most significant contribution by the state. As such, much of the momentum for the circulation of popular literature on astronomy and astral science came from the local intelligentsia.

The discussion on institutional and cultural networks of production and circulation of science demonstrates the varied contexts of the development of popular science literature. It shows that the princely state and the local intelligentsia contributed substantially to the popularisation of modern science. They also participated in the development and standardisation of local knowledges, further complicating the questions of agents and aims of science popularisation. Besides drawing attention to the institutionalisation of science in the princely state, the

discussion also highlighted the contributions of the local interlocutors, underlining the need for situating them in the history of science in India. Further, by indicating the interactions of the Department of Agriculture and Department of Health with various national and international institutions of science, the thesis made a case to explore the networks of production and circulation of science outside major centres of colonial knowledge production, to offer more connected histories of scientific research and education in colonial India.

The discussion on popular literature in different chapters highlighted the placement of thematic literature in various periodicals and identified significant points of discussion in popular science. The analysis of the literature shows that the narratives of popular science emphasised the method of inquiry. Modern science was perceived mainly as a body of knowledge perpetually evolving through observation, inquiry, and verification. Thus, compared to local knowledges that were understood as stagnant, it assumed a cultural authority of truth in society. The discussion on popular literature across chapters shows that 'there was a fluid balance between information and entertainment'.¹ It inspired awe, curiosity, amusement and was sometimes feared too. We see representations of deep conviction about the prospects of modern science. Science was seen as a vehicle of progress, as useful knowledge that propelled the advancement of Western societies. Adopting it in practice led to economic and social development through scientific agriculture and industry; its methods of inquiry offered a better understanding and utilisation of the natural world, including one's body. Moreover, it anticipated a rational world devoid of superstitions and misunderstandings. Side by side was a vehement rejection of scientific ideas and values as foreign, ensuing an ethnocentric discourse. The truth claims and cultural authority of modern science were countered through narratives of indigeneity and environmentalism, or sometimes by pointing out the difference in functions envisaged for knowledge production.

¹ Bowler 2009 p 4.

Material progress brought about by modern science was contrasted to the spiritual advancements made by the East.

Such cultural negotiations were more explicit in the literature on health and medicine and astronomy and astral sciences. The literature on local astronomical knowledge shared similarities with the narratives on medicine in its attempts to trace an archaic golden past. The reasons for the decline in the status of knowledge was situated in the cultural circumstances, and revival was contingent on the collective willpower of the local intelligentsia. The arguments favouring local medical traditions matured into demands for its standardisation and institutionalisation. The institutionalisation proceeded by either appropriating or folklorizing myriad local medical practices, a process embroiled in the dynamics of caste. The standardised Ayurveda was identified mainly with the dominant Hindu nation. But in the case of astral science, the discourse was restricted to pointing out the underlying logic and its relevance for society. The calls for revival and institutionalisation were not as successful as in the case of medicine. The chapter on health and medicine suggests that the cultural interaction between different systems of knowledge was entangled in a discourse of regional identity that did not always dissolve in the larger Indian identity. On the other hand, arguments for regional identity were not very evident in the literature on astral sciences and astronomy, despite having a rich corpus of traditional knowledge now identified as Kerala School of Astronomy and Mathematics.

The chapters on medicine, and astronomy and astral sciences also drew attention to the circulation of local knowledges through popular print. History of medicine in Kerala had earlier studied the circulation of local traditions of medical knowledges and its institutional and cultural implications. The thesis extended the discussion to the popularisation of astrology and astral sciences. The discussion on numerous articles rationalising astrology drew attention to a process of popularisation of astrology which is usually overlooked in the secular frames of modern history. Both in the case of medicine, and astronomy and astral sciences, the

discussion underlined the co-existence of multiple social imaginaries. In the dominant discourse of modern science, practices like ritualistic healing or astrology were attacked as unscientific and corrupting. Nevertheless, as history shows, they continued to be part of the social imaginaries, as examples of the resistances, negotiations, legitimisation and appropriation embedding popular science.

In agriculture, the cultural contestations between the western and the local traditions were almost absent. The popular science discourse on agriculture was centred around the idea of agricultural improvement. Although an idea of past prosperity informed the arguments for *krishi parishkaram*, the narratives of agricultural improvement were not built on the revival of Sanskritic textual traditions. The observations of such nuances in the thesis point out the selective use of available resources by the local intelligentsia and the varied imaginaries of the science underlying it. It underlines variety as a core notion in the understanding of popular science.

I have strived to keep the analysis attentive to the symbolisation of caste and gender in popular science discourse. As the various references to the Ezhava community in the thesis suggest, modern science and technology and Ayurveda were embraced for social and economic mobility by different castes. The complex caste dynamics involved in the appropriation of myriad local traditions into the crystallised identity of Ayurveda was discussed in the chapter on health and medicine. We saw that the narratives on health evaded the questions of caste by articulating mechanical-industrial imaginaries of health and exercise. In agriculture, while caste was conspicuous by its absence, imaginaries of gender framed agriculture as a domestic activity rather than a commercial one. In the chapter on health and medicine and astronomy and astral sciences, we noted that communities like Ezhavas welcomed the popularisation of Sanskrit education.

Besides these fragments of discussions in different chapters, the imaginaries of science and gender were explored in detail in chapter seven. The chapter discussed popular science literature in women's magazines. It situated the discourse

of science in the imaginaries of gender articulated in the nineteenth and twentieth-century Kerala. Drawing insights from the feminist history of science and the history of women in India, the chapter explained the complex interplay of science, gender, colonialism, nationalism, and patriarchy. The chapter underlined that focussing feminist lenses on popular science results in the illumination of new contours for understanding the imaginaries of science in society.

The thesis also explored the narrative styles and strategies used in popular science writings in Malayalam. The discussion shows that the local intellectuals were connected to different nodes in the colonial circulation of science and drew sources from both international and national locales. Consequently, the popular science in the region was embroiled in the dominant discourses at these source locations, simultaneously evolving a nuanced regional discourse. Across the various chapters, we saw that the local intelligentsia was aware of its role as interlocutors of science. They strived to write science in simple language, devoid of jargon. The profuse use of examples, experiments, analogies and even sarcasm and humour was observed. The chronological narration was one of the most preferred styles. It helped to present an evolutionary account of science that stressed the method of inquiry and validation. Using English technical terms or transliterating them helped the interlocutors to draw upon the cultural authority of modern science. In the popular literature on local knowledge, the interlocutors used the English terms in parenthesis to point out the translatability of knowledge, thus underscoring its parity with modern science. Popular literature on local knowledges also appealed to the authority of traditional Sanskrit texts through the liberal use of Sanskrit terms and excerpts from canonical texts. They borrowed the cultural authority of Orientalists to set forth their arguments for a golden age of Indian sciences.

The difference in the narrative styles of popular literature on modern science and local knowledges was observed more evidently in chapter six, which discussed astronomy and astral sciences. The chapter pointed out that the advocates of astral sciences, on the one hand, tried to defend the imaginative narratives as the difference in styles of representation. On the other hand, they underplayed the

imaginative aspect in popular literature in favour of more technical arguments. The discussion underlined how the varied aims of science popularisation influenced articulation styles. The different chapters in the thesis also drew attention to the popular literature that appropriated the cultural authority of modern science to justify arguments that were not always supported by science. Thus terms like 'scientist' or 'English doctor' were used as sources of legitimacy. The thesis highlights such narrative styles as strategies of situating science in the social imaginaries.

The closer readings of popular literature present in different thematic chapters and the chapter on women magazines show that the cultural conversations of science were not restricted to the epistemological or intellectual realm. They were part and parcel of the evolving social imaginaries and made their marks on the institutional as well as public engagement on science. They shaped the imaginaries of health, disease, exercise, food, hygiene, architecture, cosmos, agrarian and commercial practices, religious rituals, gender, caste, childhood, motherhood and many others. It offered different lenses to understand nature and human life and set new standards for authority and legitimacy in society. It implied changes in the ways people imagined and experienced their individual and social lives. In other words, the thesis extended the study of the circulation of science beyond its reception to its interpenetrations into social lives and its imaginations.

Thus the thesis contributes to the growing scholarship based on a cultural perspective on the history of popular science. It underscores the variety in domestication and appropriation of modern science in colonial cultures. The discussion on the cultural negotiations between modern science and local knowledges extends our understanding of the development of the ideas of legitimate knowledge in society. The thesis narrows an important lacuna in the history of science in India by drawing attention to the history of princely states. It also situates the questions of gender and caste in the history of popular science in India. Through a more detailed theoretical and methodological explication, social

imaginaries of science can be developed into a promising framework to study the cultural conversations of science in society. For regional history, it extends the social history of popular science in Kerala to the pre-independence period, that is, before the KSSP or the environmental movements and other critical discourses of the late twentieth century. The thesis shows that modern science and the varied intellectual and cultural interactions it ensued was gaining ground in the region from the mid-nineteenth century onwards. It was visible in the development of scientific institutions and in the cultural discourses articulated in the popular periodicals of the period.

Several questions are left unexplored or half-answered in the thesis. Firstly, the varied social imaginaries of science and their development discussed in the thesis were primarily concentrated among a section of the population who have historically been the beneficiaries of social and economic capital. Such cultural experiences were not available to a large section of the population. It is a limitation of this study, based entirely on printed texts, that the social imaginaries science of such marginalised sections remains elusive. Secondly, as described earlier, a portion of the archival sources collected for this study had to be set aside within the limitations of a Ph D thesis. In hindsight, though, I think that the literature on perspectives on science would have been immensely resourceful to further the understanding of social imaginaries. As listed in chapter three, under the category of perspectives on sciences, I have included articles on themes like science, religion, war, superstitions, etc. Reading such articles would have brought out social imaginaries of science more explicitly. Similarly, the thesis could have offered a more rounded study of science popularisation in Malayalam by elaborating on the questions of translation of science (hinted in chapter three). The failure to incorporate insights from such literature remains a major limitation of this thesis. Lastly, the thesis could not demonstrate the theoretical significance of the idea of social imaginaries of science as convincingly as intended. It remains a loose

framework and needs more explication in terms of its theoretical and methodological significance.

Before ending this thesis, it is important to clarify that situating modern science in the social imaginary of the region does not in any way comment on the development of scientific temper among the people of Kerala. The general discussion on science popularisation in Kerala often gets reduced to its impact or lack of it on social life.² It is generally lamented that despite the appreciable achievements in terms of literacy and fostering a popular people's science movement and a rationalist movement, the Kerala society has failed to develop a 'desirable' scientific attitude. Thus, following religious rituals, belief in the horoscope, or the continuing atrocities in the name of caste or religion is seen as a failure of the functions of popular science. Seeking an explanation for this 'paradox' is not the purpose of this study. Nonetheless, as this thesis has repeatedly underlined, such arguments based on the positivist goals of popular science reduce the audience of popular science to passive consumers. It ignores the complexities of contestations and negotiations embedded in the process of domestication and appropriation of science.

The central question of this thesis- situating social imaginaries of science- was equally a personal quest for me. Growing up in the 1990s and early 2000 in Kerala, the imaginaries of science discussed throughout this thesis were very much part of my imaginaries of social life. My grandfather, who cultivated various crops, relied heavily on his wisdom gained through long years of experience. I also witnessed him ardently reading *Karshakasree*- a Malayalam monthly on agriculture. When he got interested in something new in the magazine, be it a new crop, a new fertiliser or a new variety of fowl, he would go to the block agriculture office or to the not-so-distant Agricultural University to find out more about it. Almost everyone in my rural town practised agriculture on similar lines.

² Venu 2011, Neelakandan 2011.

Further, many religious, cultural, and even some literary fairs I visited as a kid had 'science exhibitions' that exhibited preserved specimens of various animals and human organs, along with models of solar systems and spacecraft. When we returned home from such crowded fairs, we were instructed to thoroughly wash our hands and feet before entering the house to protect against germs. To this day, my mother is committed to doing all the household chores early in the morning, all by herself, as she firmly believes that it is 'scientifically proven' to benefit her health and fitness.

I never gave a second thought to any of these activities. It all seemed 'natural'. Until history of popular science would nudge me to question the dynamics of science and modernities underlying such cultural notions. As this thesis has highlighted at various points, popular science, through the influential medium of general periodicals, paved the way for construction, legitimation, and naturalisation of several social imaginaries that each one of us inhabits. Understanding the shaping of such imaginaries defines the personal relevance of this thesis to me. There may not be a direct continuity between the ideas in the early twentieth century and the late twentieth century or twenty-first century. The public discourse of science in Kerala matured through different phases in these years. It implied changes in social imaginaries of science too. However, there are continuities as there are changes, and social imaginaries helps us to explore both.

As a researcher, I have tried to be attentive to the fact that the central question of this thesis evolved through the social imaginaries of science I inhabit. It is a product of a dynamic process of cultural imagination and meaning-making that includes my situated reading of the history of science and Kerala history. The process of exploration and analysis will also bear its marks. Nonetheless, I hope the reader will find that this thesis has strived towards a robust account.

Bibliography

Malayalam Periodicals

<i>Arunodayam</i>	1927- 1931
<i>Bhaashaposhini</i>	1890, 1896- 1938
<i>Bharathi</i>	1933- 1934
<i>Bhoosurakesari</i>	1926
<i>Catholica Doothan</i>	1912- 1914
<i>Chandrika</i>	1899- 1900
<i>Dakshina Deepam</i>	1912- 1913
<i>Deepam</i>	1930- 1931
<i>Dhanwanthiri</i>	1905- 1906, 1909, 1911- 1917, 1919-1921, 1923
<i>Dharma Prakasham</i>	1951
<i>Gurunathan</i>	1937
<i>Hitavadi</i>	1929
<i>Industrial Mirror</i>	1913- 1914
<i>Jenmi</i>	1908- 1910
<i>Jayabharatham</i>	1949, 1950, 1954
<i>Jayakeralam</i>	1949
<i>Kairali</i>	1916-1918, 1920, 1922- 1945, 1950- 1952, 1955
<i>Kairali Kauthukam</i>	1933- 1935
<i>Kerala Chintamani</i>	1908 -1912, 1916
<i>Kerala Kesari</i>	1915- 1916, 1918- 1919
<i>Kerala Nandini</i>	1928- 1929
<i>Keralam</i>	1914- 1915, 1919, 1922- 1925, 1929, 1930- 1933

<i>Keraleeya Yuvajan Mithram</i>	1920- 1921
<i>Lakshmibai</i>	1905- 1912, 1916- 1924, 1926- 1934, 1936, 1938- 1940
<i>Mahila</i>	1921- 1924, 1926- 1928, 1930, 1932, 1934- 1937
<i>Mahila Mitram</i>	1933
<i>Malayala Harijan</i>	1946- 1951
<i>Malayala Maasika</i>	1930- 1931
<i>Malaysia</i>	1931
<i>Mangalodayam</i>	1909- 1921, 1923, 1930, 1942- 1952
<i>Mitavadi</i>	1915- 1916, 1918
<i>Muslim Mahila</i>	1927
<i>Navajeevan</i>	1938
<i>Paurasthya Doothan</i>	1929- 1932, 1934- 1935
<i>Prabuddha Bharatham</i>	1936- 1939
<i>Pulari</i>	1951
<i>Rajarshi</i>	1935- 1937, 1939- 1941
<i>Ramanujan</i>	1906
<i>Rasika Ranjini</i>	1902- 1907
<i>Sahitya Chandrika</i>	1928
<i>Sahodaran</i>	1918
<i>Samabhavini</i>	1924
<i>Sanathana Dharmam</i>	1918
<i>Sharada</i>	1905- 1906, 1908- 1909
<i>Shivayogi Vilasam</i>	1914
<i>Sthree</i>	1933
<i>Sughashamsi</i>	1923
<i>Sumangala</i>	1916
<i>Thozhilali</i>	1922
<i>Thunjathezhuthachan</i>	1950, 1953- 1954, 1956-1957
<i>Vidyavinodini</i>	1885, 1889- 1902

<i>Vidyabhivardhini</i>	1933- 1934, 1950- 1952
<i>Vijnana Ratnakaram</i>	1913- 1914
<i>Vijnana Sagaram</i>	1931
<i>Viswa Kairalee</i>	1940
<i>Vivekavaani</i>	1936-1939
<i>Unni Namboothiri</i>	1925- 1929

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Appendix

List of Lectures Conducted by The Public Lecture Committee of Travancore

Year	Subject	Speaker
1890	Books and How to Read Them	Rev. V. Moses
1890	The Malayalam Language	Ven. Archdeacon K. Koshi
1890	The Origin of Our Domesticated Animals	H. S. Ferguson
1890	England and India	M. R. Krishna Rao
1890	Familiar Facts in Physiology	E. Poonen
1890	Female Education	E. Raman Pillai
1890	Flame	Dr E. Sargood Fry
1890	The Coconut Palm	S. Swamy Iyengar
1890	The Organ that Rules the World	H. J. Marston
1890	The Brain	H. J. Marston
1890	Health and Wealth	N. Sesha Iyengar
1890	Electricity	H. N. Read
1890	Eloquence	A. K. Krishna Iyengar
1890	Comparison of Tamil and Malayalam Languages	Rev. S. Mateer
1890	The Vital Organs	P. Sundaram Pillay
1890	Silk and its Producers	H. S. Ferguson
1897	Some Interesting Plants	M. LaBouchardiere
1897	On Tamil Dramatic Literature	R. S. Vedachalam Pillai
1897	Radicalism in English Poetry	K. G. Sesha Aiyer
1897	The Industrial Arts in Travancore	K. Narayana Aiyer
1897	On Travancore Inscriptions	P. Sundaram Pillay
1897	Solar Eclipse	S. Thanu Pillai
1897	On Arts	H. S. Ferguson
1897	Two Painter Poets	C. S. Boyle

1897	The Beginning of English Church	Miss S. B. Williams MA
1898	Kamba Ramayanam	M. Moothuramalingam Pillai
1898	The Chemistry of Plant Life	A. W. Bishop
1898	The Fertilization of Plants	H. S. Ferguson
1898	Some Popular Myths in Astronomy	R. Rajaraja Varma
1898	Ecclesiastical Statesmen	Miss S. B. Williams MA
1898	Some Factors Influencing Health	B. Krishna Rao
1898	A Journey in Ladakh and Western Tibet	J. A. Douglas
1898	The Eye	E. Poonen
1898	The Ear	E. Poonen
1898	Personal Hygiene	N. Soobromony Aiyer
1898	Citizenship, Its Rights and Duties	R. Viraragava Aiyengar
1898	The Vedantic Philosophy	M. Moothuramalingam Pillai
1898	Forestry	T. F. Bourdillen
1898	Ramalingom Pillay, The Poet	T. Lakshmana Pillay
1915	Milk in Relation to Public Health	Dr K. Raman Thampi BA MD
1915	Consumption- Its Prevention and Treatment	Dr K. Raman Thampi BA MD
1915	Smallpox and Its Prevention	Dr K. Raman Thampi BA MD
1915	Malaria and Its Prevention	Dr K. Raman Thampi BA MD
1915	First Aid to the Injured	Dr K. Raman Thampi BA MD
1915	Some of Our Important Insect Friends and Foes	R. Madhavan Pillai, Entomologist
1915	Silk Culture	R. K. Parameswaran Pillai, Manager Govt Silk Farm
1916	The Possibilities of Co-Operative Movement in Travancore	C. Govinda Pillai, Registrar of Co-Operative Credit Societies
1916	The Possibilities of Scientific Agriculture	Dr N. Kunjan Pillai, Director of Agriculture and Fisheries
1916	The Water We Drink	Dr L. A. Ravi Varma MB & CM, Assi. Surgeon

1916	Direct Process of Sugar Making Out of Sweet Toddy Drawn from Olattipana	K. Govinda Pillai, Manager Sugar Mills Ettumanur
1916	Air We Breath	Dr L. A. Ravi Varma MB & CM, Assi. Surgeon
1916	Impurities of Drinking Water	S. Badarayanachari MA LT, Headmaster HGS School Mavelikara
1916	Feeding of Infants	Dr K. Raman Thampi BA MD
1916	Dysentery and Its Prevention	Dr K. Raman Thampi BA MD
1916	Silk Culture	R. K. Parameswaran Pillai Inspector of Sericulture
1916	The Care and Management of Domesticated Animals	S. Ramaswamy Assi. Veterinary Surgeon
1916	Co-Operation	Dr Slater, Prof. of Economics, University of Madras
1917	Malayalam Almanac and Its Defects 1917	A. R. Raja Raja Varma
1917	Some Practical Uses of Electricity	I. C. Chacko BA BSc, Geologist
1917	Typhoid Fever and Its Prevention	Dr K. Raman Thampi BA MD
1917	Insect Pests and Diseases of Crops	Dr N. Kunjan Pillai, Director of Agriculture and Fisheries
1917	Sericulture	Dr N. Kunjan Pillai, Director of Agriculture and Fisheries
1917	Industrial Co-Operation	A. Krishna Pillai, Inspector of Co-Operative Societies
1918	Sericulture	R. K. Parameswaran Pillai, Inspector of Sericulture Trivandrum
1918	Economic Mollusca of Travancore	N. Padmanabha Panikkar, Inspector of Fisheries
1918	Fish Curing	K. M. Pothan, Inspector of Fisheries Alleppy
1918	Sugar Cultivation	K. Govinda Pillai, Manager Sugar Mills Ettumanur
1918	Vernacular Education in Travancore	P. Ramaswamy Iyer, Deputy Director of Public Instruction

1918	Digestive Disorders of Children and Their Prevention	Dr K. Raman Thampi, BA MD
1918	The Improved Method of Gur or Rab Making Out of Cane Juice	K. Govinda Pillai, Manager Sugar Mills Ettumanur
1918	Manurial Value of Different Species of Green Leaves Available in Travancore	K. Paramesware Pillai BA, Agriculture Chemist
1918	The Shell Industries of Travancore and The Possibilities of Developing Them	N. Padmanabha Panikkar, Inspector of Fisheries
1918	University life in Austria	E. Parker Esq., MA, Prof of English, Wilson College Bombay
1918	Co operation in Relation to Agriculture	N. Kunjan Pillai
1919	The Inside and Outside of An Indian Home	Dr L. A. Ravi Varma MB & CM, Assi. Surgeon
1919	Improvement of Milk Supply	K. Krishna Pillai, Agricultural Sub Inspector Cattle Farm Trivandrum
1919	Manurial Value of Different Species of Green Leaves Available in Travancore	K. Paramesware Pillai BA, Agriculture Chemist
1919	The Punja Lands of Kuttanad with Suggestions of Improvement of Punja Cultivation	K. Paramesware Pillai BA, Agriculture Chemist
1919	Waste Ginger and Its Economical Uses	K. Govinda Pillai, Manager Sugar Mills Ettumanur
1919	Cholera and Its Prevention	Dr K. Raman Thampi, BA MD
1919	Common Manures, Their Composition, Preservation and Application	K. Paramesware Pillai BA, Agriculture Chemist
1920	Cholera and Its Prevention	P. V. Jacob, Ass. Sanitary Officer Trivandrum Circle
1920	Smallpox and Its Prevention	N. Neelakandan Thampi, Ass. Sanitary Officer Kuzhithura Circle
1920	Cholera and Its Prevention	N. Neelakandan Thampi, Ass. Sanitary Officer Kuzhithura Circle
1920	Cholera and Its Prevention	S. T. Ponnu Swami Pillai, Deputy Surgeon

1920	Shellac Industry	Narayana Aiyar BA, Shellac Assistant.
1920	Management of Farm Live Stock For Work and Milk	K. Krishna Pillai, Agriculture Sub-inspector Cattle Farm Trivandrum
1920	Anti Rinderpest Inoculation and Its Advantages	M. Velupillai, Office Veterinary Assistant Quilon
1920	Manures and Manuring	K. Subramania Pillai, Agriculture Sub Inspector Paddy Farm Nagercoil
1920	Use of Improved Plough and Artificial Manure	R. Subramania Iyer, Agriculture Sub Inspector Manure Depot Nagercoil
1920	Smallpox and Its Prevention	P. V. Jacob, Assi. Sanitary Inspector
1920	The Punja Lands of Kuttanad with Suggestion of Improvement of Punja Cultivation	K. Paramesware Pillai BA, Agriculture Chemist
1920	Cholera and Its Prevention	V. Madhavan Pillai, Assi. Sanitary Officer
1920	Sericulture	R. K. Parameswaran Pillai, Inspector of Sericulture
1920	Smallpox and Its Prevention	S. Ragaswamy Aiyengar, Assi. Sanitary Officer
1920	Cotton- Its Varieties and Cultivation	R. Ananthanarayana Iyer, Agriculture Inspector
1920	Cholera and Its Prevention	S. Ragaswamy Aiyengar, Assi. Sanitary Officer
1920	Aims and Objectives of Health and Welfare Association	Dr K. Raman Thampi BA MD
1920	Chitties and Co-Operative Rural Credit in Travancore	P. J. Thomas BA, History Tutor HH Maharajas College
1920	Factory and Industries Awaiting Development in Travancore- Some Suggestions to New Companies- Facts and Figures Relating Thereto	S. G. Barker, Director of Industries

1920	Essential Oils and Their Distillation in Travancore	P. N. Vrindachalam, Oil Expert, Dept of Industries
1920	Advice to Those Opening Out New Rubber Estates	J. R. Vincent Mundakayam
1921	Migrations of Fish and Their Importance to Fisheries 1921	N. Padmanabha Panikkar Inspector of Fisheries
1921	Paddy and Its Culture	K. Subramania Pillai, Agriculture Sub- Inspector Paddy Farm Nagercoil
1921	Suggestions for Obtaining a Larger Share of Foreign Trade for Travancore	M. L. Janardhana Pillai General Supplies Agency Alleppy
1921	Rabies	A. Krishna Pillai Veterinary Sub-Inspector
1921	Economic Future of Travancore- A Ryots View	K. I. Kochiepan Mappila SMPA Member
1921	Some South Indian Birds with Special Reference to Their Habits	C. Lekshminarayana Esq., MA Ag. Prof of Zoology Christian College Madras
1921	Sugar Cane and Its Culture	K. Subramania Pillai, Agriculture Sub Inspector Paddy Farm Nagercoil
1921	The House We Live In	C. Jacob John Assi. Sanitary Officer
1921	Personal Hygiene	C. Jacob John Assi. Sanitary Officer
1921	Epidemics and Their Prevention	C. Jacob John Assi. Sanitary Officer
1921	Smallpox, Vaccination and Cholera	C. Jacob John Assi. Sanitary Officer
1921	Cattle Feeding on Scientific Lines	K. Subramania Pillai, Agriculture Sub-Inspector Paddy Farm Nagercoil
1921	Adaptations in Plant Life	A. Narayanan Nair MA
1921	Mosquito and Man	Dr J. Alexander MB CHB, Bacteriological Laboratory Trivandrum

1921	Fruit Culture	R. Ananthanarayana Iyer, Agriculture Inspector
1921	Cultivation of Pepper Wines	K. P. Thannu Pillai, Agriculture Sub-inspector
1921	Cultivation of Ginger	K. P. Thannu Pillai, Agriculture Sub-inspector
1921	Cotton- Its Varieties and Cultivation	R. Ananthanarayana Iyer, Agriculture Inspector
1921	Facts and Figures Relating to New Industries In Travancore	S. G. Barker, Director of Industries
1921	The Mosquito Problem and The Fish Useful In Destroying Mosquito Larvae	N. Padmanabha Panikkar, Inspector of Fisheries
1921	Rural Sanitation	R. Subramania Iyer, Assi. Sanitary Officer
1921	Diabetes and Its Prevention	Dr K. Raman Thampi, BA MD
1922	Agriculture	Dr N. Kunjan Pillai, Director of Agriculture and Fisheries
1922	Economic Minerals of Travancore	I. C. Chacko BA BSc, Geologist
1922	Trade Conditions in Travancore and Suggestions for Their Improvement	M. L. Janardhana Pillai, Merchant Alleppy
1922	Consumption- Its Prevention and Treatment	Dr K. Raman Thampi BA MD
1922	Co-Operation	Vaidyalingam Pillai BA BL, Registrar of Cooperative Societies

Compiled from Travancore Administration Reports and Travancore Government Gazette, various issues (1887-1923)