

Trends in Science Writing in Assamese Periodicals
- With special reference to four major periodicals of the 19th Century

A thesis
Submitted to
Krishna Kanta Handiqui State Open University
For the degree of
Doctor of Philosophy (Ph. D.) in Mass Communication



By
Suryya Kumar Chetia
Bhupen Hazarika School of Mass Communication
Krishna Kanta Handiqui State Open University
Patgaon, Rani Gate, Guwahati -781017
2020



কৃষ্ণকান্ত হান্দিকৈ ৰাজ্যিক মুক্ত বিশ্ববিদ্যালয়

KRISHNA KANTA HANDIQUI STATE OPEN UNIVERSITY

Dr. Arupjyoti Choudhury

Registrar

Phone : +91-0361 2235642 (O), +91-9864038946

Head Office : Patgaon, Rani, Guwahati - 781 017, Assam, India

City Office : NH 37, Resham Nagar, Khanapara.

Guwahati-781 022, Assam, India

CERTIFICATE FROM THE GUIDE

This is to certify that Sri Suryya Kumar Chetia has carried out his research work entitled “**Trends in Science Writing in Assamese Periodicals - With special reference to four major periodicals of the 19th century**” for the Degree of Doctor of Philosophy (Ph. D.) in the Department of Mass Communication under Bhupen Hazarika School of Mass Communication at Krishna Kanta Handiqui State Open University, under my guidance and supervision.

I here certify that the candidate has fulfilled the conditions of the Regulations for Doctor of Philosophy (Ph. D.), 2016 of Krishna Kanta Handiqui State Open University and that the candidate is qualified to submit this thesis. The thesis has been checked for plagiarism through Urkund ID- D85643612.

Date: 19/11/2020

(Arupjyoti Choudhury)

DECLARATION BY THE CANDIDATE

I, Sri Suryya Kumar Chetia solemnly declare that the research work presented in this thesis entitled “**Trends in Science Writing in Assamese Periodicals - *With special reference to four major periodicals of the 19th century***” has been completed under the supervision of Dr. Arupjyoti Choudhury, KKHSOU. I have fulfilled all the requirements laid down in the regulation for Doctor of Philosophy (Ph. D.) 2016 of Krishna Kanta Handiqui State Open University. This thesis is my own original investigation, work and understanding except where due acknowledgements have been made. To the best of my knowledge, no part of the research work has been submitted anywhere in part or whole for such degree.

Date: 19/4/2020


(Suryya Kumar Chetia)

ACKNOWLEDGEMENT

First of all, I would like to express my sincere gratitude to my supervisor Dr. Arupjyoti Choudhury for the continuous support during my study and research for the Ph. D. degree. His patience, motivation, enthusiasm, and immense knowledge helped me to carry on the research work towards the right direction. His guidance helped me all the time of my research and writing of this thesis.

Besides my supervisor, I would like to thank the Krishna Kanta Handiqui State Open University (KKHSOU) authority for making all the necessary arrangements to conduct the research work smoothly. I would like to offer my gratitude to all the faculty members of KKHSOU for their valuable comments and suggestions from time to time. I also thankfully acknowledge the co-operation I received from the library and other staff of KKHSOU.

My sincere thanks also go to Dr. Chandan Goswami, Dr. Dhrubajyoti Goswami, Dr. Bipul Gogoi, Mr. Aziz-ul Haque, Mr. Bhaskar Kiran Bora and Mr. Jitu Changmai for their support in different stages of my research.

I thank my fellow researchers Mrs. Devajani Duarah, Mr. Ranjit Bikash Chetia and Mrs. Manisha Sharma for their constant help and support during the entire course of research.

Last but not the least; I would like to thank my family, my parents Mr. Ruhit Chandra Chetia and Mrs. Gulapi Senchowa Chetia and my brother Dr. Chandra Kamal Chetia for their moral support while carrying out this research work.

Date: 19/11/2020


(Suryya Kumar Chetia)

LIST OF CONTENTS

Title	Page Number
Certificate from the Guide	i
Declaration from the Candidate	ii
Acknowledgement	iii
List of Tables	v-vi
List of Illustrations/Photos	Vii
Chapter 1: Introduction	1-15
Chapter 2: History of Assamese Periodicals in the 19 th Century	16-29
Chapter 3: History of Science Writing in the Assamese Periodicals	30-57
Chapter 4: Data Analysis	58-127
Chapter 5: Conclusions	128-133
Bibliography	134-138
Appendix	139-143

List of Tables

Particulars of Tables	Page No.
Table: 1: Branches of Science	59
Table 2: Division of Science Writing in the 19 th Century Assamese periodicals according to the subject matter.	60
Table: 3 Writings about Mathematics in Orunodoi	61
Table: 4 Writings on Mathematics in Jonaki	62
Table: 5 Writings on Statistics published in Orunodoi	62
Table: 6 Writings on Physics in Orunodoi	63
Table: 7 Writings on Physics in Assam Bandhu	64-65
Table: 8 Writings on Physics in Jonaki	65-66
Table: 9 Writings on Chemistry in Assam Bandhu	67
Table: 10 Writings on Earth Science in Orunodoi	68-71
Table :11 Writings on Earth Science in Assam Bandhu	71
Table: 12 Writings on Earth Science in Mau	72-75
Table: 13 Writings on Earth Science in Jonaki	74
Table: 14 Writings on Astronomy in Orunodoi	75-76
Table: 15 Writings on Astronomy in the Jonaki	78
Table: 16 Zoological writings in Orunodoi	88-93
Table: 17 Zoological writings in Assam Bandhu	94
Table: 18 Zoological writings in Jonaki	96-97
Table: 19 Writings on Botany in Orunodoi	97

Table: 20 Writings on Botany in Jonaki	99
Table: 21 Writings on Social Science in Orunodoi	100-101
Table: 22 Writings on Social Science in Assam Bandhu	102
Table: 23 Medicinal and Health science writings in Orunodoi	103
Table: 24 Writings on Technology in Orunodoi	104-106
Table: 25 Writings on Technology in Assam Bandhu	107
Table: 26 Formats of Science Writings in Orunodoi	109
Table: 27 Formats of Science Writings in Jonaki	111
Table: 28 Use of Assamese Synonyms in Orunodoi for Foreign Words	113-116
Table: 29 Assamese words coined by Orunodoi still in use	116
Table: 30 Words used by Orunodoi and replaced in later period	117-118
Table: 31 Coining of words in Assam Bandhu	119

LIST OF ILLUSTRATIONS/PHOTOS

Illustration/Photo	Page Number
(1) Dr Nathan Brown	139
(2) Eliza Brown	139
(3) Dr Miles Bronson	140
(4) The gun gifted by Robert Bruce to Bisa Gam in 1823	141
(5) Robert Bruce	141
(6) N. Brown's book on Assamese Grammar	142
(7) M. Bronson's book on vocabulary	143

CHAPTER-1

Introduction

1.1 ‘Science Writing’ is defined as writing about scientific subject matter, often in a non-technical manner for an audience of non-scientists. Science writings are generally written for the lay public. Robert Gannon in the preface of the book ‘Best Science Writing: Readings and Insight writes, “The science writer must make complex theories and systems clear to a large, diverse readership and must do so with utmost clarity, accuracy and excitement” (Gennon, 1991, p. v). The science writings should be interesting enough to win and hold the attention of the readers. This is done with pleasing styles, colourful anecdotes, sparkling quotes, clever descriptions and other devices that dramatize the information. There is always confusion among science writing, technical writing and scientific writing. But science writing is neither technical writing nor scientific writing. Technical writers write reports, prepare brochures, memos for a group of target readers, who may be a client, an organization, a colleague etc. Likewise, scientific writings are targeted to the people who are in need of the information, particularly who are involved in that particular field of science. For science writing, vernacular is the convenient medium of writing as it is easily intelligible for the common people. So, science writers always try to capture the readers by using the most common language and vocabularies used by the readers.

In Assam, the contents of traditional science have passed through generations in oral forms. The knowledge of one generation goes to the next so that it would guide the next generation without experimenting the same. The creativity and skill of composition of such ancient forms of writing have imparted both scientific and technical value to those pieces. Such compositions took the written form in the hands of Daka. The period of creation of these ‘Dakar Bachan’ (sayings of Daka) was in between fourth and sixth century. But according to some scholars those were created before 15th century AD (Sarma, 2018). The controversy regarding this is still prevailing. However, the scientific statements are found in most of the maxims of Daka through which experience of a

nation during the several hundred years appeared in written form. There lies science in the writings of Dakka about agriculture, health medicine, cooking, astronomy and environment. These are still the faithful guidelines for the cultivators in the rural areas of Assam which instruct them to carry on different work in the whole year. Since that time, several writings in the form of poetry and prose came into existence on some topics of applied science. But the periodicals in the 19th century gave a shape to the science writings in true sense.

1.2 Objectives of the study:

- To trace the background of science writing in Assamese periodicals in the 19th century
- To study the subject matters published in 19th century Assamese periodicals
- To study the format of science writings published in 19th century Assamese periodicals
- To study the use of language and vocabulary in the science writings published in 19th century Assamese periodicals

1.3 Significance of the study:

At a time when popularizing science has gained momentum in the country, the scenario in Assam being one of the north eastern states of India is quite important subject to be studied. It requires a systematic study of the tradition of such attempts in Assam from the earliest time. Being the first mass media, the print media has contributed a lot towards this direction during 19th century. It is because the writings about scientific discoveries and activities in the periodicals of that time introduced a new tradition in Assamese that was the tradition of Science Writing in true sense. So, anyone who studies about the science communication in Assam should have some knowledge about the science-writings in Assamese periodicals in the 19th century. A

systematic study of the trends in Science Writings in Assamese periodicals can unveil some hidden aspects of the proposed subject.

1.4 Limitations:

A large number of the 19th century Assamese periodicals are not found in present times. Due to the adverse weather condition of Assam and lack of proper preservation of those copies, a considerable portion of the periodicals are not available in present times. So, during the collection of data, the researcher has to face lot of problems to collect from primary sources. Whenever such kind of data is not available, the researcher has to depend on secondary sources. That is why, lack of availability of all the copies of the periodicals has set some limitations in the research work. There is always scope if anybody can recover more copies of the periodicals, then the research work may be extended to include those.

1.5 Review of Literature:

A number of related books and research papers have been studied while carrying out the research work. Some of those earlier writings have enabled the researcher to formulate the theoretical framework of this research. At the same time some earlier writings have provided numerous points of view on the 19th century Assamese periodicals. So, review of related literature is important from both theoretical and analytical point of view. The review of literature also tries to discover the research gap for which this present research is conducted.

It may be noted that the history of science writing dates back to the Sumerian and Mesopotamian civilization in Egypt. Science and technology were developed during the Uruk Period (4100 – 2900 BC) and Early Dynastic Period (2900-1750 BC) of the Sumerian Culture of Southern Mesopotamia. The Sumerian civilization was the stepping stone for the development of science and technology in the later Mesopotamian

civilization. The Sumerians first developed the basics of science like formulating scientific hypothesis, making technological innovations, using written language, developing mathematics, astronomy etc. Sumerians were the first to develop the concept of calculating time (https://www.ancient.eu/Mesopotamian_Science/).

The writings found in cuneiform recorded the ancient usage of science during that time. In the History begins at Sumer – Thirty Nine Firsts in Recorded History, Samuel Noah Kramer (1956) talks about the cuneiform records on ‘Medicine: The first Pharmacopoeia’, ‘Agriculture: The First Farmer’s Almanac’, ‘Horticulture: The First Experiment in Shade-Tree Gardening’, ‘Home of the Fish: The First Aquarium’. In his research work he tries to decipher the meanings of the cuneiform symbols and discovers that science writings existed in the Sumerian Civilization for the first time in the world.

The evidence of scientific practices are found in Egyptian Civilization too. For example, Ebers Papyrus (c. 1550 BCE), the Edwin Smith Papyrus (c. 1600 BCE), and the London Medical Papyrus (c. 1629 BCE) are some writings on treatment of diseases with a considerable degree of remedial knowledge.

In the Ancient History Encyclopedia Joshua J. Mark (2016) writes in an article entitled ‘Ancient Egyptian Science and Technology’ that the remedies for different illness such as trauma, cardiac disease, cancer, depression, gastric, dermatology and several others are mentioned in the Ebers Papyrus in 110 pages. Edwing Smith Papyrus includes the techniques of small surgery. Extensive knowledge of anatomy and physiology is reflected in this work. Medical knowledge is seen amalgamated with the magical skills in the London Medical Papyrus. (https://www.ancient.eu/Mesopotamian_Science).

Herodotus and Pliny too mentioned that ancient Egyptians were the source of theoretical mathematics. The ancient Egyptians used a numeral system for counting and solving written mathematical problems, often involving multiplication and fractions. Only a few existing papyrus are the evidence of Egyptian mathematics.

Following the path of Egyptians, the Greeks and Romans started the experimentations in science writing. Liba Taub, in her *Science Writing in Greco-Roman*

Antiquity discusses about the science writings in that time. After that the European Renaissance introduced almost all the nations of Europe with the latest development of the scientific knowledge. From that time onwards, writing about science are found in almost all the European languages.

Taub, L. (2017). *Science Writing in Greco-Roman Antiquity*, London: Cambridge University Press is an important book on science writing in Greek and Roman era in Europe. According to Taub, the texts of the science writings in the ancient Greece and Rome appeared in different formats. She also points out that the authors found out suitable format for their writings aiming at their intended readership. In this well researched work she divides the science writings in ancient Greek and Roman era according to the genres the science writers used. In this book she devotes one chapter for each genre. The chapters are on Poetry, Letter, Encyclopedia, Commentary and Biography. In a review Bryn Mawr writes that Liba Taub tries to point out the heterogeneity of the ancient science writings by categorizing these in five genres—poetry, letter, encyclopedia, commentary, and biography. She selected one text or set of texts as case study for each type. She has selected interesting texts which are not commonly studied by the scholars (<https://bmc.brynmawr.edu/2017/2017.08.07/>).

Along with the textual analysis, Liba Taub discusses about the formal features of the science writings along with their Cultural connotations. According to her the history of science is closely tied to its textual forms and cultural contexts. Her study also emphasizes on the historiographical context. According to her, the way in which technical texts are studied has begun to change in present time. Science writings can be evaluated from the point of view of the literal form and authorial choice. First the classicists and the literary scholars ignored the technical or scientific writings of that period. They were busy with the literary texts only. But later, the trend of analyzing the technical or scientific texts like the literary text emerged. The techniques applied by the literary scholars have been used to analyze those texts too. So, a new method of science writing emerged along with the consideration of scientific, mathematical and technical texts as ‘texts’. Taub’s research work has provided a guideline to this research work too. The approach to the Assamese Science writings in the 19th century Assamese

periodicals has several similarities. Therefore, the method of categorizing the science writings according to genres is adopted in this research work too as used by Liba Taub in her book. So, her book has become a guideline to analyze data in this present research work.

The new approach to look at the texts of science writings like any other literary texts, the vocabulary and the language has got much importance in their study. In the 19th century, the science writings used a lot of words used by the Assamese people in their conversation. The colloquial quality of the written language reflects the simplicity of the language. At the same time the use of the vocabulary of the day to day conversation of the people lend familiarity to the writings, for which those appeared attractive to the people. On the other hand the vocabulary can be observed as a socio cultural indication too. The vocabulary in a language represents the stage of growth of a language too. In science writing it is one of the most important aspects to observe.

Bronson. M. (1839), *Spelling Book and Vocabulary in English*. Assamese, Singpho and Naga. Jaipur: American Baptist Mission Press is a book in which the author first collected around 800 Assamese words. He also provided the English, Singpho and Naga synonyms of the words. Till 1839, they used Roman Script to write Assamese scripts. It is important to note that they were not sure of using Assamese script in the early years of their stay in Sadiya and Jaipur. The Assamese words used as meanings of English words are simple, colloquial and based on their pronunciation. This tradition of vocabulary are used in Orunodoi. The sample structure of Assamese sentences shown in this book has the similarity with the sentences used in the first Assamese periodical. Therefore, this book helps to analyze the writings in Orunodoi especially in the use of language and vocabulary.

Brown, N. (1848), *Grammatical Notices of the Assamese Language*. Sibsagor: American Baptist Mission Press is a book in which the rules of Assamese language are written. The first editor of the first Assamese periodical Orunodoi is the author of the book. So, the rules of Assamese language including sentence structures are included in the book. This book can be treated as the theory behind using the Assamese language used in Orunodoi before 1860. The use of the rules mentioned by Jaduram Dekabaruah is reflected in this book. This book too views the Assamese language as Bronson did in

Spelling Book and Vocabulary in English, Assamese, Singpho and Naga. So, while studying the language of the Assamese periodicals of 19th century, this book points out the different features of the Assamese language used at that time. But later the Assamese scholars abandoned some rules used by Brown and started following Sanskrit rules for the Assamese language.

Baruah H. K. (Ed.). (2003) *Panindra Nath Gogoi Rachanawali* [Collection of writings of Panindra Nath Gogoi]. Guwahati: Bani Mandir, is a compilation of writings of the 19th century Assamese writer Late Panindra Nath Gogoi. In this book his writings in various periodicals along with his books for students entitled 'Lora Sikshya' are included. But unfortunately one of his major writings 'Asomiya Lorar Bhugul' is not included due to the unavailability of the text. However, from the writings in the book we get a picture of the then socio-economic condition. At the same time, his endeavour to teach Assamese language through his textbooks shows the early attempt to enrich it. His science writings, though dealing with the basic ideas are the preliminary sources for the students at that time to have an idea about science and mathematics.

Goswami, D.C. (2007, July), Science Popularisation Activities in Assamese, *Indian Journal of Science Communication* 6 (2), pp 3-8 is a well researched work, first of its kind to give a comprehensive account of the activities performed to popularize science in Assam through the ages. It includes the history of science communication in Assam from fourth century AD to the modern period. The use of various references indicates the writer's wide range of study and scholastic knowledge. Likewise, the use of startling examples from the texts and the related information further indicates the writer's clear perception of the subject matter. The paper encompasses all the activities of science communication including science writing as a part of it. So, very little amount of the entire paper is devoted on the science writings of the 19th century Assamese periodicals. Therefore, it cannot be treated as a comprehensive study of the science writings published in Assamese periodicals.

Mahanta, P. (Ed.). (2006). *Prak-Swadhinata Kalor Asomiya Bigyan Sahitya* [Assamese Science Literature during pre-independence period]. Guwahati: Publication Board Assam is a compilation of some selected science writings published in various Assamese periodicals till 1947. The preface of the book which is written by Dr.

Mahanta himself is quite informative and it may be a great help to the researcher in this field to find a rough outline of the practice of science writings in 19th century Assamese periodicals. In the preface he points out the various aspects of science writings available before 1947. It also devotes very little space to discuss about the science writings in 19th Century. However, this book helps a lot while analyzing the science writings in the Assamese periodicals.

Majumdar, P. (Ed.). (2007). *Asomot Bigyan Charchar Dhara* [Trends in the study of science in Assamese] Guwahati: Publication Board of Assam is a book containing articles on the various practices in the field of science in Assam. It is a comprehensive book to provide information about the activities related to science in the state during the ages. Renowned writers like Dr. Sivanath Barman, Dr. Dhrubajyoti Bora, Khiradhar Boruah, Rathindranath Goswami and Dr. Kulendu Pathak wrote about various practices of teaching different branches of science in Assam. It is indeed a good reference book to trace the origin of the practices of teaching different branches of science in Assam. But it does not provide any specific study of science writings in the 19th century Assamese periodicals.

Saikia, C. (Ed). (1998). *Asomor Batorikakot-Alochanir Dersha Basariya Itihas*. [150 years history of Assamese Newspapers and Magazines]. Guwahati: Celebration Committee of the 150 years of Assamese Newspaper, discusses the origin and development of the newspapers in Assam from 1846 to 1996. It is a comprehensive history of Assamese newspapers. Renowned writers of Assam and noted journalists contributed the chapters on the basis of their research work on the certain topics. This book can be used as a reference book in any research related to newspaper in Assam. Though there is a chapter on Science Writing in Assamese newspapers, it is not a comprehensive study on the topic. So, this book has provided some required information to carry forward the present research.

White, M. A. (1932) *A Memoir of the Late David Scott*, Guwahati: Department of Historical and Antiquarian Studies in Assam, throws light on the historical aspects of the first quarter of 19th Century Assam. David Scott was the Governor-General of the NE Frontier of Bengal and Commissioner of revenue and Curcuit in Assam. So, his written communications with various officials and other people are faithful sources of

history which reveal the picture of the socio-economic condition of Assam in that period. This compilation of written communications helps the researcher to do the background research of this present study.

Mishra, P. (2011, December). Eta Dashakr Gariyasir Patat Bigyan Charcha (from 1993 to 2003) [Study of science in Gariyasi during one decade], *Bigyan Jeuti*, 26 - 34, in this chapter of the magazine the writer adopted the content analysis technique to discuss various aspects related to the science writings found in Goriyasi, an Assamese Magazine during 1993 to 2003. The writer employed both quantitative and qualitative analysis in his study. He prepared several tables to make his analysis easier. The analysis is done on the basis of the subject matters, their writers and date of publication. As the topic of this current research is quite similar with this paper, the method applied by Dr. Mishra is also applied in this research with certain modifications. So, this paper can be treated as the model for analyzing data in this research work too.

1.6 Area of the study (Universe):

In this research work, the area of the study is the Assamese periodicals of 19th century (from 1801 to 1900). The first periodical in Assamese language the Orunodoi was published in 1846. In fact, the history of Assamese periodicals began from that year. Since that time as many as 20 periodicals were published in Assam till 1900. Those are

1. Orunodoi (1846 -1882)
2. Assam Bilasinee (1871 – 1883)
3. Assam Mihir (1872)
4. Assam Darpan (1874)
5. Assam Dipak (1876)

6. Chandrodoi (1876)
7. Gyanodoi (1876)
8. Goalpara Hit Sadhini (1876)
9. Paridarshak (1880)
10. Assam News (1882)
11. Assam Bandhu (1885-86)
12. Mau (1886-87)
13. Asom Tora (1886-90)
14. Lora Bandhu (1888)
15. Jonaki (1888-1898) (Published from Calcutta)
16. Bijuli (1890-93)
17. Silchar (1889)
18. Srihatta Mihir (1889)
19. Paridarshak aru Srihatta Basi (1893)
20. Assam (1894)
21. Times of Assam (1895)

Among these 21 periodicals, Orunodoi, Assam Bilasinee, Assam Darpan, Assam Dipak, Chandrodoi, Gyanodoi, Assam Bandhu, Mau, Asom Tora, Lora Bandhu, Junaki, and Bijuli were the Assamese periodicals published in the 19th century. Though there are only twelve Assamese periodicals, most of the copies of those are not available in present times. In this research work, the twelve Assamese periodicals are considered to be the universe.

The periodicals like Assam Mihir, Goalpara Hit Sadhini, Silchar, Srihatta Mihir, Paridarshak, Paridarshak aru Srihatta Basi are published in Bengali language. So, these periodicals do not come to the purview of this study. Likewise, Assam News and Assam

were bilingual periodicals in which both Assamese and English languages were used. The Times of Assam was an English newspaper published in 1895 from Dibrugarh. So, these periodicals too are not included in the universe of this study.

1.6 Population:

The population of the research is the Assamese periodicals published in the 19th century. There are as many as twelve Assamese periodicals published in that period. So, the universe of the research is the population for this research.

But unfortunately most of the copies of the periodicals are not available in present time. Due to the adverse weather in Assam or lack of proper consciousness of the people or for any other reason, the copies of all the periodicals are not available anywhere.

Orunodoi the first periodical was a monthly magazine. It was published from 1846. Though it is a debatable matter, most of the scholars agreed that it was published till 1880. As many as 168 issues of Orunodoi are available till date. These were published from 1846 till 1868.

Though Assam Bilasinee was published from 1871 to 1883, only one copy of it is available now. It is preserved in the British Museum.

Assam Darpan, a monthly magazine was published in Darang district in 1874. The circulation of the newspaper was confined to the district only. Lakhikanta Mahanta was the publisher of the newspaper. It also lasted for one year only. Two other monthly periodicals namely Chandrodoi and Gyanodoi were also published from Nagaon in 1876. But these periodicals, mainly dealing with religious subject matters, remained confined amidst the religious disciples of the Satras in Nagaon. Assam Dipak was also published from Aauniati Satra, Majuli in 1876. It also published for one year only.

One of the remarkable periodicals published in 1885 was Assam Bandhu. Only 14 issues of the periodical were published. But, compared to other Assamese periodicals, this encompasses variety of subjects including a number of science writings. It stopped publishing in 1886.

Another important periodical which recorded its name in the history of Assamese periodicals was Mau published in 1886. Balinarayan Bora was the editor of the periodical. Though only four issues of the periodical was published, those hold the evidence of interest in publishing the writings on science.

Lora Bandhu, a children magazine edited by Karunabhiram Baruah was published from Nagaon in 1888. It was very short lived one. But it paved the way for numerous children magazines published in later period in Assam.

Published from Calcutta in 1889, Jonaki was a periodical which brought several new trends to Assamese language and literature. At the same time it included several science writings too. It lasted 1898. Later though it was published from Guwahati in 1901 edited by Satyanath Bora, this second time publication is not counted in this research work.

In 1890 Assamese Literary Club published another periodical Bijuli from Calcutta. It engaged in a competition with the Jonaki. This too aimed at enriching the Assamese literature with its valued writings.

1.8 Sample:

In this research, the researcher applied purposive sampling. The samples are taken on the basis of the frequency of publication of science writings published in the periodicals. Among the eleven Assamese periodicals published in the 19th century, the researcher has selected four periodicals for discussion in this research. These are – Orunodoi, The Assam Bandhu, Mau and Jonaki.

The periodicals like Assam Bilasinee, Assam Dipak, Chandrodoi, Gyanodoi and Asom Tora are basically devoted to religious writings. The target readers of these periodicals were the disciples of some Satras of particular religious sects. So, these periodicals hardly published a single science writing. Therefore, these periodicals are not selected as samples for this research. Assam Darpan, which was published in Darang district, was not a widely circulated paper. It was published for a very short period of time only. As it is circulated in a small area and without any significant science writing in it, it is excluded from the sample for this research. The target readers of Lora Bandhu were the children. So, no science writing in true sense was included in the magazine too. Bijuli, which was published simultaneously with Jonaki have published less number of science writings than Jonaki. So, Jonaki was selected for sampling instead of Bijuli.

To sum up, the present research has taken following issues of four major periodicals as the sample:

- a) 168 issues of Orunodoi from 1846 to 1868
- b) 14 issues of Assam Bandhu from 1885 to 1886
- c) 4 issues of Mau published in 1886
- d) 68 issues of Jonaki from 1889 to 1898

1.9 Data Collection tools:

The present research is basically based on the mass media texts. So, textual analysis is the main technique of data analysis. Before that the data are presented in the form of tables and charts for the convenience of analyzing these. At the same time, to analyze the history of science writing, information from several histories and historical writings were taken into account.

1.10 Research questions:

1. What was the backdrop of science writing in Assam?
2. What were the subject matters of the Science writings in 19th Century Assamese periodicals?
3. What were the formats and techniques applied in the Science Writings in 19th century Assamese Periodicals?
4. What was the language and vocabulary pattern in the science Writings of 19th century Assamese periodicals?

1.11 Analysis techniques and data analysis:

The research is based on descriptive and analytical method. The researcher applies content analysis to find out the solutions of the research questions. The content analysis covers the science writings published in four Assamese periodicals namely Orunodoi, Assam Bandhu, Mau and Jonaki published before 1900. The analysis tries to find out the nature of subject matters of the science writings, format and techniques of science writings and use of vocabulary in those writings. While to trace the origin of science writing, a historiographical study is also carried out in the research. Therefore, it can be summed up by saying that the research employs an interdisciplinary approach.

References:

- Baruah H. K. (Ed.). (2003) *Panindra Nath Gogoi Rachanawali* [Collection of writings of Panindra Nath Gogoi]. Guwahati: Bani Mandir
- Bronson. M. (1839), *Spelling Book and Vocabulary in English*. Assamese, Singpho and Naga. Jaipur: American Baptist Mission Press
- Brown, N. (1848), *Grammatical Notices of the Assamese Language*. Sibsagor: American Baptist Mission Press
- Gannon, R. (Ed). (1991). *Best Science Writing: Readings and insight*. Hyderabad: Universities Press Pvt. Ltd.
- Goswami, D.C. (2007, July), Science Popularisation Activities in Assamese, *Indian Journal of Science Communication* 6 (2), pp 3-8
- Kramer, S. N. (1981). *History begins at Sumer – Thirty Nine Firsts in Recorded History*. USA: University of Pennsylvania Press
- Mahanta, P. (Ed.). (2006). *Prak-Swadhinata Kalor Asomiya Bigyan Sahitya* [Assamese Science Literature during pre-independence period]. Guwahati: Publication Board Assam
- Majumdar, P. (Ed.). (2007). *Asomot Bigyan Charchar Dhara* [Trends in the study of science in Assamese] Guwahati: Publication Board of Assam
- Mishra, P. (2011, December). Eta Dashakr Gariyasir Patat Bigyan Charcha (from 1993 to 2003) [Study of science in Gariyasi during one decade], *Bigyan Jeuti*, 26 - 34
- Saikia, C. (Ed). (1998). *Asomor Batorikakot-Alochanir Dersha Basariya Itihas*. [150 years history of Assamese Newspapers and Magazines]. Guwahati: Celebration Committee of the 150 years of Assamese Newspaper
- Sarma, S. (2017). *Asomiya Sahityar Samikhiyatmak Itibritta* [Comprehensive history of Assamese literature]. Guwahati: Soumar Prakash
- Taub, L. (2017). *Science Writing in Greco-Roman Antiquity*, London: Cambridge University Press
- White, M. A. (1932) *A Memoir of the Late David Scott*, Guwahati: Department of Historical and Antiquarian Studies in Assam

CHAPTER - 2

History of Assamese periodicals in the 19th Century

2.1 Socio-economic and political condition of Assam in the 19th Century

Just before the treaty of Yandaboo in 1826, the East-India Company declared that they would go back after establishing peace in Assam. But after the treaty with the King of Ava, British stayed back in Assam with its colonial activities. Later, Maniram Dewan rightly said, “We are just now, as it were, in the belly of a tiger”. (Saikia, 2003. p.02)

The new administrative system introduced in Assam by the colonial and capitalist government was quite unfamiliar for the people and former aristocrats in Assam. After the mutiny under Gomdhar Konwar in 1828 and Piyali Phukan in 1830, the British Government appointed Assamese people in various jobs to appease the Assamese aristocrats. But Soon the British government dismissed them as they were inefficient in work and appointed efficient persons brought from Bengal. As the traditional Paik System and Barter System were replaced in the British rule with new revenue system and money based economy, people of Assam faced inconvenience. People faced problem to pay land revenue in terms of money. The lives of the officials of former Ahom administration who lost domestic helps and their land for not being able to pay tax, the general public failing to pay the increasing tax in the form of money became very problematic. At the same time, the use of opium among the people made the entire nation subdued. The capitalist government earned a huge amount of revenue from opium trade. (Barpujari, 2007.[V]. pp- 6-7)

British saved Assam from the Burmese invasion. But just after that the new administrative and revenue policy shattered the traditional society of Assam. The Bengali people who were brought to help British in administrative works became their

associates. This new administration and the new revenue system gave birth to a new class system in Assam.

In the new administrative system high level posts like Commissioner, senior assistant, sub assistants, principal Sadar-Amin, Sadar-Amin, Munsif etc. and low level posts from office assistant to the peon were created.

The new revenue system created the posts of Mouzadar, Choudhuri, Talukdar, Tehsildar, Kakati, Chamuwa, mandal and Tekela. These officials' endeavour to collect revenue from the people almost broke the economy of the Assamese society. After the Burmese invasion, the population of Assam was very few. In 1835 the population was only 7,99,519. There was no formal education system in Assam. So, Assamese people had little chance to get appointed in those posts. The national or cultural consciousness in modern sense was also not there at that time. In such a situation Assamese people suffered from inferiority complex. Though in Satras and in some other places there were practices of traditional book writing, during the first two decades of British rule, the dignity of Assamese language and literature suffered a lot. (Saikia, 2003)

In 1813 the British Missionary of Srirampur Dr. William Carry published the first Assamese version of Bible entitled 'Dharmapustak'. But it failed to attract the Assamese people. On the other hand Assamese people thought British and Bengali people engaged in administration superior to them. So, they had inferiority complex about their own culture and language. The learned Assamese people tried to write books in Bengali. For example, Haliram Dhekial Phukan wrote 'Assam Buranji' in 1829 in Bengali. The 'Buranji Bibek Ratna' written by Maniram Dewan was also in Bengali language.

The first school was established in Guwahati by James Rae in 1830. There were 12 students at first. But apart from the bible there was no Assamese book to teach in the school. So Bangla language was taught instead of mother tongue Assamese. Though in 1839 the first Assamese Grammar was published by William Robinson, he tried to prove that Assamese is a different form of Bangla. He emphasized that the medium in the schools of Assam should be Bengali. No provision of teaching Assamese was in the Guwahati Seminari established in 1835.

2.1.1 Baptist Missionaries:

A new era in Assam began when the American Baptist Missionaries arrived in Assam. On 23rd March, 1836 Nathan Brown and Oliver T. Cutter with their families arrived at Sadiya. They brought with them the printing press which later revolutionized in Assam with the publication of the Orunodoi. On 5th July, 1836 Miles Bronson arrived at Sadiya. They at first thought to reach Shan State learning Shan State. Thus they planned to enter China. But as they reached Sadiya, they realized that Assamese is different from Shan language. In 1839 they came to Joyrampur after Khamti people attacked their camp. In 1841 they came to Sibsagar. Simultaneously they started working in Nagaon and Guwahati (Neog. 2008)

In 1836 the East India Company included Assam in India. The administration of Assam was controlled from Fort William from Calcutta. During that time, Bengali language was the medium of education in the schools of Assam.

2.1.2 Role of Missionaries in reviving Assamese language

In 1840 Mrs. Cutter published the Assamese Vocabulary and Phrases. With this book she paved the way for the study of modern Assamese literature. Two other books entitled 'Gananar Katha' and 'Sadhu Katha' were also published by Eliza Brown from the same press in the same year. Apart from the textbooks, the missionaries published 'Assam Buranji' written by Kashinath Tamuli Phukan. In 1848 Dr. Nathan Brown published the second Assamese grammar, which was a great help for the students. Though the Baptist missionaries came to propagate Christianity in Assam, they started their attempt to recover Assamese language from the dominance of Bangla.

In 1846 the missionaries published the first Assamese newspaper the 'Orunodoi Sambadpatra'. This paper created a consciousness in the mind of Assamese people towards the Assamese language. This paper created a bridge between the Assamese people and the outside world. Journalism in Assamese, modern prose style in Assamese, consciousness towards Assamese language, study of history and culture, popularizing

science, social responsibility etc. for the first time started with the publication of the Orunodoi Sambadpatra.

The nationalistic consciousness in Assam was first originated with the consciousness towards Assamese language. They shaped the Modern Assamese language, on the basis of which later Assamese scholars started their works. In 1859 Hemchandra Baruah published his Assamese Grammar and emphasized that Assamese was originated from Sanskrit. In 1861 the missionaries too followed the rules set by the modern Assamese scholars. It can be said that the missionaries like Brown and Bronson first made the Assamese people aware of the Assamese language and Assamese nation. The contribution of Miles Bronson in 1873 to recover and restore Assamese language is also remarkable.

On March 6, 1872 Calcutta High Court directed that the language of court and revenue department would be Assamese for Assam (Saikia, 2003). After that on April 19, 1873 the Education Department of the Bengal Government decided to teach Assamese in the schools of Assam replacing Bengali language. Then a handful of Assamese scholars started writing textbooks for the students of Assam.

The period between the publications of the two periodicals namely Orunodoi and Junaki, the activities of two Assamese scholars are remarkable. They were Hemchandra Baruah and Gunabhiram Baruah. The characteristics of that time were:

1. The Assamese language and vocabulary transformed its form from those of Orunodoi. The foundation of modern Assamese language was built in that period.
2. Various textbooks were written and published in the period.
3. The Renaissance in Bengal caused by Brahma Samaj influenced Assamese people.
4. The nationalistic thinking was strengthened in that period.
5. Critical thinking also started among the educated youths of Assam in that period.

2.2 History of Assamese periodicals in the 19th Century

The history of printing press in India dates back to 16th century. The Portuguese Missionaries published the first book in 1557 from a printing press established in Goa. The language of the book was Portuguese. The printing press in Calcutta was established in 1717, almost two hundred years later of the earlier. The press was established by Sir Charles Wilkins, an American Baptist Missionary. The Bengali fonts used in the press were prepared by one Panchanan Karmakar. The first newspaper in India, the Bengal Gazette was printed in this press on 29th January, 1780. The editor of the newspaper was James Augustus Hicky. The newspaper was consisted of only two pages. The length and breadth of each page was twelve and eight inches respectively. Personal stories, summary of the news published in English newspapers and news from local reporters were got published in the newspaper. A considerable numbers of advertisements were also published in the newspaper. So, it was also known as ‘Calcutta General Advertiser’. The motto of the newspaper was “A weekly political and commercial paper, open to all parties, but influenced by none”. (<https://www.latest-news.today/first-english-newspaper-in-india/>)

The East India Company was against this paper right from the beginning as it criticized several officials of the company. So, during Warren Hastings, the paper it was closed down for ever. This was published in English language. The first newspaper in regional language of India was published in the month of May, 1818. It was the ‘Digdarshan’, published from Shrirampur Press in Bengali language. It was quite short lived. After one month of the publication of Digdarshan, another weekly paper namely ‘Samachar Darpan’ was published from the same press under the editorship of J.C. Marchman. This newspaper contributed a lot to the Bengali literature and society.

Some Bengali newspapers of that time were – Sanbad Koumudi (1821) edited by Raja Rammohan Rai, Sangbad Timir Nashak (1826), Bangadoot (1830), Sangbad Sudhakar (1831), Sangbad Ratnakar (1831), Onubadika (1831), Sangbad Sur Rajendra (1835), Purnachandrodaya (1835), Gyaneshwar (1831), Bhaskar (1837), Rasaraj (1838) etc. It is worthy to be noted here that the first Assamese periodical ‘Orunodoi’ owed a lot to these Bengali newspapers (Saikia, 1998).

Though 'Orunodoi' has been recognized as the first Assamese newspaper, the tradition of disseminating news was prevailing in different ways even before it. In earlier times, the kings used to inform some important news to the public by sending a drummer along with a person who read out the information. The drum attracted attention of the people. Apart from it the stone edicts and copper edicts were also used frequently to inform the people about some important incidents.

During 15th century, there was another way of collecting and disseminating news in Assam. It was the tradition of 'Batori Sodha' (Asking for news) introduced by the exponent of neo-Vaishnavite movement in Assam Srimanta Sankardeva. In this process the news were noted down from the conversation with the wandering devotees and then those were made public for common people. Lack of good communication system, scarcity of educated persons at that time and as it required much toil and time; the process could not gain popularity. Yet, this created a sense of news among the people in those days.

Writing history is the one of the remarkable contribution of Ahom rule in Assam. Right from 1228, the first Ahom king Chao-lung Siu-Ka-Pha ordered the officials to write down everything seen and heard. That was the preliminary stage of History of Assam popularly known as 'Buranji' (Bakatial, 2000). The seed of newspaper in later centuries lied in those Buranjis. Later, the Buranjis carried the information for other people and the next generation. The burning of Buranjis by Kirtichandra Borboruah, an official of Ahom court is a remarkable incident during that period. But some Buranjis escaped from the wrath of Borboruah. The histories written in that time played the role of media. The hand written histories slowly disseminated the information among the people at that time.

Till the first half of the 19th century, there was no newspaper published in Assam. Moreover, the decision to introduce Bengali as medium of education in school level in Assam too attracted a few literate people towards Bengali literature and newspapers. As a result, a readership of Bengali newspaper was created in Assam. The newspaper published from Calcutta, The Friend of India, Samachar Darpan, Samachar Chandrika, Sanjivani Kakat etc. covered news from Assam. For example, the appointment of Haliram Dhekial Phukan as magistrate of Guwahati district was

published in Samachar Chandrika in 1832. The death of his news was published in Samachar Darpan in 1832 (Saikia, 1998).

Some Assamese writers too contributed to the Bengali newspapers. Jaduram Dekabaruah was one such writer who wrote for Samachar Darpan and Samachar Chandrika.

The attempt of Maniram Dewan to bringing back Kandarpeswar Singha, the dethroned king of Assam into power and the contemporary political scenario was discussed in some articles of Bhaskar and Samachar Chandrika published from Calcutta.

In the first half of the 19th century the Baptist missionaries from America started their mission of propagating Christianity in Assam. According to the treaty of Yandaboo, Assam went to the hands of British. But even after that the Khamtis and Singphos were in constant clash with the British in Sadiya. British government invited the Baptist missionaries to teach the principles of Christianity to those warring tribes so that peace prevails in that region. On 10th March, 1835 Agent of Assam appointed by the Governor General Captain Jenkins wrote a letter to the then Civil Service Official E.C. Trevelyan inviting the Baptist missionaries. In the letter he wrote that he was willing to subscribe Rs. 1000 to the family if they settle as a mission at Sadiya. He also said that he would double the amount if the family spends six months working there, publishing books from a press and if he remains in charge of Assam (Neog, 2008).

This was the catalyst which brought the missionaries to work in Assam. It may be mentioned here that since 1833, only British missionaries were conducting their activities under the Territory of East India Company in India. But in 1833, all the territories under British Empire were opened for all the Christian missionaries by a charter. After this decision, the American Baptist missionaries were invited to Sadiya. Accordingly, a group of American Baptist missionaries reached Assam crossing a long hazardous way. The American Missionaries had a dream to propagate Christianity in China. For that they made several desperate attempts. They thought that the languages of Khamti and Singpho communities are similar to the language of the people of South China known as Shan. They had the notion that if they could learn languages of both the tribes in Sadiya, then it would have been easier to proselyte Chinese people.

Significantly, the American Baptist missionaries christened the mission as ‘Mission to Shan’. On December 16, 1834 the American Baptist Board accepted the invitation Jenkins officially. According to the decision of the Board, Nathan Brown with an associate Oliver T. Cutter started the journey through the river Brahmaputra. After a long tedious journey by boat, on 23rd March, 1836 they entered Sadiya (Neog, 2008).

In the same year 1836, the British government set a rule that in the schools and in the courts Bengali language would be used instead of Assamese language. On the other hand, due to the adverse situation the missionaries had to transfer their mission at first to Jayrampur and in 1841 to Sibsagar. They understood that it is impossible to convert the Assamese people without knowing their knowledge. So, they started learning the Assamese language and with a few Assamese literate persons they struggled to reestablish it. After setting up a centre at Sibsagar, the missionaries started collecting hand written books. A press was also brought by them and established at Sibsagar. They started publishing Assamese books. A meeting was held in December 1845 in which the remarkable decision of publishing a newspaper in Assam was taken. According to the decision of the meeting the first Assamese periodical ‘Orunodoi’ started publishing from the month of January 1846. They had the notion that the periodical would become a permanent link between them and the people of Assam. If they could give the impression that they were working for the welfare of Assamese society, the path of propagating Christianity in Assam would be much easier for them.

The objective of the publication of the periodical ‘Orunodoi’ is clear in the statement in the print line that it is a monthly paper dedicated to science, religion and general intelligence (Neog, 2008)

The print line of Orunodoi reflected that the aim was to propagate Christianity, science and general knowledge. They designed it in such a way that it became the mouthpiece of the missionaries in Assam.

The meaning of ‘Orunodoi’ is ‘sunrise’. There was controversy regarding the spelling of the title of the paper ‘Orunodoi’. Hemchandra Boruah criticized the use of certain letters for which in 1861 the spelling was changed. Samachar Darpan (1818) a Bengali newspaper was the ideal followed by Orudodoi.

According to Dimbeswar Neog, Orunodoi stopped publishing in 1882. On the other hand, Benudhar Sharma had the opinion that it lasted for 37 years, that means till 1883. According to Banikanta Kakati, the Sibsagar Mission Press was sold to Assam Tea Company in 1882. So, the paper was published till 1880. But Mrs. S. R. Ward in her 'Glimpse of Assam' mentioned that, "The useful sheet came to an end in December 1880". In such a situation most of the critics acknowledged that Orunodoi was being published till 1880 as mentioned by Mrs. Ward in her book in 1884.

Before the publication of Orunodoi, the medium of writing in newspapers and magazines by Assamese writers was Bengali language. But after the publication of Orunodoi, they had the opportunity to express their thinking in their own mother tongue. As a result of their writing a new group of people emerged as writers. Moreover, a few Assamese persons educated in the western education system received inspiration to publish newspaper like Orunodoi. Thus it prepared the ground so that a number of Assamese newspapers would follow the first one.

On the other hand some people started thinking to publish newspaper to propagate Hinduism like the Christian missionaries. As a result several such periodicals got published in the course of time.

Orunodoi created a favourable atmosphere to publish newspapers in Assam. Even during the lifespan of Orunodoi till 1880, as many as eight periodicals got published from different places of Assam. Those were 'Asam Bilasinee', 'Assam Mihir', 'Assam Darpan', 'Assam Deepak', 'Chandrodaya', 'Gyanodaya', 'Paridarshak' and 'Gowalpara Hit Sadhini'. Places of publication of those papers were Majuli, Guwahati, Darang, Majuli, Guwahati, Nagaon, Surama Valley and Goalpara. It is needless to say that publication of Orunodoi encouraged the local entrepreneurs to publish number of newspapers and periodicals in 19th century.

Since the publication of Orunodoi in 1846 to 1871 there was only one newspaper published in Assam. In 1871, the Satradhikar of Aauniati Satra, Sri Sri Duttadeva Goswami bought a printing press from Calcutta and set it up in Aauniati Satra, Majuli. He christened the press as 'Dharma Prakash Yantra', meaning the machine to publish religious texts. On that very year, the second Assamese newspaper

got published from that press. It was Assam Bisasini. Sri Sri Duttadeva Goswami was the editor. Publisher was Sridhar Baruah (Saikia, 1998).

When Sri Sri Duttadeva Goswami was 33 years old, he visited the Sibsagor Mission Press and dared to establish a press in Majuli inspired by Orunodoi. The Assam Bilasinee was published till 1883. As the Satra was shifted to another place the publication of Assam Bilasinee was closed down. Later in 1913, Assam Bilasinee was published from Jorhat. It lasted till 1918.

The first weekly newspaper 'Assam Mihir' was published in 1872 from Guwahati. Chidananda Das was the editor of the newspaper. It was first published in Bengali and then in English language. The publication of it came to a halt in the next year.

Another newspaper entitled 'Assam Darpan' was published in 1874. Lakhikanta Mahanta from Darang district published it from Calcutta. The circulation of this paper was confined in Darang district only. 'Assam Darpan' was also lasted for one year.

In the history of newspaper in Assam, 1876 was a remarkable year. Though short lived, as many as four newspapers from various places of Assam got published in that year. In 1876, 'Assam Dipak' was published from Dharma Prakash Yantra of Auniati Satra, Majuli. After one year this ceased to be published. In that same year Dihingiya Gosai of Nagaon published one monthly newspaper namely 'Chandrodaya' from Chidananda Press, Guwahati. Padmahansh Goswami edited another newspaper entitled 'Gyanodaya' in the same year. The circulation of the two papers remained confined among the disciples of the Satras. Both tried to propagate religious ideologies. Another newspaper published from Goalpara in 1876 was 'Goalpara Hit Sadhini'. It was a weekly paper published in Bengali language. After publication of a few issues of this paper it ceased to get published.

A fortnightly newspaper entitled 'Paridarshak' was published from Surama Valley in 1880. Later in 1886, it became a weekly newspaper. It was published till 1889. In 1890 this paper was amalgamated with another paper 'Srihattabasi' and came to known as 'Paridarshak Oo Srihattabasi'. It remained in circulation till 1898.

The bilingual 'Assam News' was published from Assam Printing Corporation, Guwahati in 1882. The editor was Hemchandra Barua. It was an important newspaper of that time in creating public opinion about various social problems. William Ward, the Chief Commissioner remarked that this paper did not do anything against the government. So, in fact, it can be said that it was a pro-establishment newspaper (Barpujari, 2007. [V], 232). This paper too did not last long. Publication of Assam News came to an end in 1885. The number of subscribers of the paper was 900.

In 1885, under the editorship of Gunaviram Barua from Nagaon another monthly newspaper came out. Barua wrote: "we do not want to interfere in politics, because we are inexperienced in it". So, he attempted to widen the mental horizon of Assamese by publishing articles on arts, science and subjects of general interests. As many as 14 issues of Assam Bandhu got published from January 1885 to April 1886. Among the regular contributors of write-ups, Ratneswar Mahanta, Satyanath Bora, Bholanath Das, Lambodar Bora, Lakshminath Bezbaruah, Hemchandra Goswami, kanaklal Barua, Krishnaprasad Duara, Padmawati Devi Phukanani, Purnakanta Sarma, Kamalakanta Bhattacharyya were remarkable. It was the precursor of Assamese neo-romantic movement in literature.

In 1886, another newspaper namely 'Assam Tara' was published from Dharma Prakash Yantra of Aauniati Satra, Majuli. It was edited by Sridhar Barua. It lasted till 1890.

Another remarkable newspaper in the 19th century was 'Mau'. It was published in 1886 from Calcutta. Harinarayan Bora was the editor of the newspaper. It stopped publishing after publication of four issues as a group of Assamese students in Calcutta opposed its writings. Balinarayan Bora took the entire responsibility of the newspaper. As he was a government employee, he published the paper in the name of his brother.

The proprietor and editor of the periodical was in reality Balinarayan Bora, an Assistant Engineer at Nagaon. A government servant as he was, the Mau was published under editorship of his brother harnarayan bora. Most of the articles were of course contributed by Balinarayan Bora. (Barpujari, 2007, [V]. p. 232).

Fearless approach to any subject-matter was one of the characteristics of Mau. The 'Englishman' a newspaper published from Calcutta praised Mau for this approach. But the group of Assamese students in Calcutta could not understand the need of such a newspaper for Assam and tried to stop its publication. Most of them were the exponents of 'Jonaki Era'. According to Lakshminath Bezbaruah (as cited in Sarma, 2008):

Then Assam Bandhu was disappearing from the firmament of Assamese magazine and Mau came out. Mau was the monthly paper of the engineer Balinarayan Bora, who had his education in Coopers Hill College, England. It was published from a press situated in No. 100 Bahubazar Street. In the able editorship of Balinarayan Barua, Mau paved an independent path unlike the Bengali newspaper in Calcutta. Then we were the students as if a bag full of knowledge found in Bengali newspapers. If untied the end, our knowledge comes out almost like corns coming out of sacks. We were highly impressed by the idealism of newly constituted Congress. We got angry at Mau for its new path. We had seen the statement written in praise of Mau in the Englishman, which was ideologically against Congress. Then we conducted meeting after meeting to stop the publication of the newspaper... (Sarma, 2008. p.0.3)

The first Assamese children magazine entitled 'Lora Bandhu' was published in 1888 from Nagaon. Karunaviram Barua, son of Gunaviram Barua was the editor of the magazine. Though this magazine was quite short lived, it paved the way for children magazine in Assam.

On 25th of August, 1888, the Assamese students in Calcutta started 'Asomiya Bhasar Unnati Sadhini Sabha', an organization dedicated to work for the development of Assamese language. They published 'Jonaki' on 13th January, 1889. With the publication of Jonaki, a new trend came in to the Assamese literature. It introduced the western literary trends to the Assamese literature. Romanticism entered Assamese literature through Jonaki. In the first year, the editor of Jonaki was Chandrakumar (Gupta) Agarwala. The editor of Jonaki in the second year was Hemchandra Goswami. In the third and fourth year Lakshminath Bezbaruah was the editor. In the fifth and sixth year Kanaklal Baruah and Ramakanta Borkakati were the editors of Jonaki. Jonaki was alive till 1896. For the second time it was published from Guwahati under the editorship of Satyanath Bora. It came to an end after three years.

In 1889, two newspapers namely ‘Silchar’ and ‘Srihatta Mihir’ were published in Surama Valley. Both published in Bengali language were weekly papers. Bidhubhushan Sen edited the ‘Silchar’. It was the only newspaper which was successful in creating opinion among the people in regarding social and political issues in Kachar district. On the other hand the Srihatta Mihir was attached with the ‘Paridarshak’ later (Saikia, 1998).

As a result of dispute among the members of ‘Asomiya Bhasar Unnati Sadhini Sabha’, a section of Assamese students in Calcutta came out of it and formed ‘Assamese Literary Club’. In 1890 they published another newspaper named ‘Bijuli’. In the first year the editors of Bijuli were Nilakanta Barua and Krishnaprasad Duara respectively. In the first year of Bijuli, the first novel of Padmanath Gohainbaruah ‘Bhanumati’ got published in it. Gohainbaruah was the editor of Bijuli in the second and third year. There was always a competition between Jonaki and Bijuli. It ceased to get published before three years of the date of first publication.

Another weekly newspaper namely ‘Assam’ was published in 1894. Editor of the paper was Kaliram Bora. There were news, letters, and advertisements published in English language too.

The last newspaper of 19th Century was the ‘Times of Assam’. It was published on 5th of January, 1895 from the upper Assam town, Dibrugarh. It lasted for glorious 52 years, till 1947. The language of it was English.

Since 1846, the year of publication of first Assamese newspaper Orunodoi, till the last decade of 19th Century, there were 21 published newspapers in Assam. It is difficult to find copies of most of those newspapers. The names of some newspapers were found out from different sources. Though, most of those newspapers were short lived, they contributed a lot to the contemporary Assamese literature and society. At a time when the ruling British government tried to impose Bengali in the schools and courts of Assam, the newspapers and periodicals played an important role to regain the glory of the Assamese language.

References:

- Barpujari, H.K. (Ed.). (2007). *A Comprehensive History of Assam* [Vol-5], Guwahati: Publication Board Assam
- Neog, M. (Ed.). (2008). *Orunodoi* [Sunrise]. Guwahati: Publication Board Assam
- Saikia, C. (Ed.). (1998). *Asomor Batri Kakot-Alochanir dersha Bosoriya Itihash* [150 years history of Assamese Newspapers and Magazines]. Guwahati: Celebration Committee of 150 years of newspapers in Assam
- Saikia, N. (Ed.). (2003). *Assam Bandhu* [Friend of Assam]. Guwahati: Publication Board Assam
- Sarma, S. N. (Ed.). (2008) . *Mau* [The bee]. Guwahati: Publication Board Assam

CHAPTER - 3

Science Writings in Assamese Periodicals

3.1 Introduction to Science Writing:

Science writing basically refers to the writings on science or scientific topics for mass medium. The target readers for those writings are the common people. These writings are not written only for specialists on specific topic with difficult scientific jargons.

Robert Gannon (2007) in the Introduction of his book ‘Best Science Writing’ said that science writing is different from technical and scientific writing. The difference is based on the target readers of those writings. The technical writers write for a definite audience who are in need of the information on the specific subject. These may be in the form of reports, brochures and memos. The targets of those writings may be a colleague, a client or an organization.

But science writings have a different kind of readership. It addresses the public as a whole. So the target readers are not homogeneous. Science writings have to turn complicated theories and systems easier for understanding of the common public. It should be done with accuracy and clarity. The writings should generate excitement in the minds of the readers so that they pay attention to the writing. If they do not find the science writing interesting, they will abandon it and go to other articles. In order to make interesting, the science writers use the devices like sparkling quotes, pleasing style, interesting anecdotes and crafty descriptions (Gannon, 2007).

In the article entitled ‘Science Writing vs. Scientific Writing’ in Duke Graduate School Scientific Writing Resource it is mentioned that it is writing about science for popular media. The audience of the science writings is general readers having some interests in science. (<https://sites.duke.edu/scientificwriting/science-writing-vs-scientific-writing/>).

Carl Zimmer a successful science writer in the essay ‘A Note to Beginning Science Writers’ published in the website of National Geographic writes that he had no degree in science. But he loved science classes in the college. Though he did not have the aim to be a science writer in his early life, due to his love for science he became a successful science writer. It is a job which gives him utmost satisfaction. So, it can be said that to be a science writer one does not need to be a scientist or a formal student of science. (<https://www.nationalgeographic.com/science/phenomena/2013/06/24/a-note-to-beginning-science-writers/>).

From the above definitions, we may find some characteristics of science writing. Those are, accuracy, using appropriate expression intelligible for common people, important information for the common people etc. These may be summed up these in the following points:

1. Science writings are the bridge between scientific knowledge and common people
2. Aim of scientists is precision, but the aim of science writers is simplicity
3. Science writing is about the ‘science’s human application’.
4. Science writing is about interesting facts to enrich knowledge of the common people presented in an attractive manner.

In most cases scientists are some people who remain isolated from the common people devoting their time in research. They have special training and knowledge on particular subjects that common people can hardly understand. Writings by the scientists are technical writings meant for the fellow scientists. Their specialized knowledge, not readily intelligible for common folk has created a gap between them and the society. So, it is the earnest duty of the science writer to bridge the gap. He has to understand the complex theories of science and interpret in a way so that a layman can understand those. So, he serves as a bridge between scientific knowledge and the common people in the society.

Likewise, a scientist aims at to acquire precision in his research, observation and even in his writings. Precision is the quality, condition, or fact of being exact and accurate. To obtain scientists use mathematical expressions, scientific jargons etc. But on the other hand the science writer always aim at acquiring simplicity in his writing so that common people can easily understand what he is trying to say. The success of a science writer lies in the process of successful communication. In the book *The Social Function of Science* John D. Bernal (1939) argued that science should contribute to satisfy the material needs of ordinary human life and that it should be centrally controlled by the state to maximise its utility. It is the utilitarian approach to science. There lies the interest of the common people towards science. So, a science writer can obtain attention of the reader by telling about the science's human application. The science writer has to generate curiosity in the minds of the readers pointing out the importance of the subject. Anything related to the lives of the people attracts their attention. So, science's human application has a universal appeal, which attracts the readers to go through the science writing till the end. Human mind is always after knowledge. The curiosity of human mind has created the human civilization throughout the centuries. The science writings have to aim at this basic characteristic of human mind and try to provide new knowledge to the readers. So, science writers always try to provide information about the interesting facts to the readers to enrich their knowledge.

3.2 Science writing in Assamese language

The Assamese society before the advent of British was a tribal-feudal society. There was little scope for growth and development of modern science and technology. Yet, mathematics, astronomy, health sciences were practiced in ancient Assam.

3.2.1 Mathematics:

The practice of primary mathematics has been practiced in Assam since the ancient era. The level of it was not very high. In the schools, then locally known as 'Tool' or 'Chatuspathi' it was a core subject. The person whose name comes first

regarding mathematics in Assam was Bakul Kayastha. He was a scholar in the court of king Naranarayan (1540–1587). King Naranarayan assigned him to translate the portion known as ‘Leelawati’ of Bhaskaracharya’s second famous book ‘Sidhanta Siromoni’. This was mentioned in ‘Darang Rajbanshwali’. The book of Bakul Kayastha which is now available is the ‘Kitawat Manjari’. This book has elaborate descriptions of keeping records of various items of royal treasury, to add, deduct, multiply and subtract, to measure the area of land etc. In his book Bakul Kayastha mentioned the name of four scholars in Mathematics of earlier times. They were Narayan Das, Umapati Siddha, Hridayananda Kayastha and Durgadas. This indicates that there was a trend of practicing mathematics in Assam since ancient times. It is worthy to be mentioned here that on the basis of the book of Bakul Kayastha, Eliza Brown in 1845 with assistance of her husband Nathan Brown wrote and published a book entitled ‘Ganitar Kitap’.

The ‘Leelawati’ of Bhaskaracharyya was translated into Assamese by Kabiratna Dwija. Apart from Addition-deduction and multiplication-subtraction, this book included equation of algebra and the rules of taking roots. Another book on mathematics written by Kashinath was ‘Onkor Arjya’. Churamoni Dwija in his book on mathematics entitled ‘Churamoni’ mentioned Bakul Kayastha as his teacher. Several stanzas were also found in Assam and Bengal attributed to one Subhankar.

It is noteworthy that in ancient Assam mathematics was practiced by the Kayastha community. Because their main profession was to keep records, take measurement of land etc. So, a trend of mathematics in Assam was known as ‘Kaitheli Onka’ in that time. The profession was known as ‘Kayasthika’. Madhabdeva, one of the neo-Vaishnavite exponents went to his forefather’s land Banduka and learnt this under Rajendra Adhyapak. Sankardeva also sent his elder son to learn this from a teacher named Chakrapani.

3.2.2 Astrology:

Astrology was the initial form of today’s astronomy. Since the ancient times, it has been studied in Assam. The Nabagraha temple of Guwahati and Suryya Temple of Goalpara etc. are some example of it. The ancient name of Guwahati, the capital city of

Assam was 'Pragjyotishpur'. The meaning of it is 'the town of the East to study astronomy'. The 'Daibagya Brahmins' or 'Suryabripas' were at home in astrology. They were known as 'Ganak'. A number of books were written in ancient Assam on astrology. 'Kamrupiyo Nibandhaniya Khandasadhya', a Sanskrit book was the first of its kind in Assam. The book discussed the worship of planets and stars and was written in 7th century AD. For several centuries there were no such book written in Assam. In 14th century Damodar Bipra wrote 'Jyotish Sar Sangrah'. Ahom and Koch kings appointed several Daibagyas to count date and day of the year. According to 'Darang Rajbanshawali' one such scholar in the court of King Biswasingha was Sribar, who wrote 'Rashi Jora Grantha'. During the reign of King Naranarayan, several books on astrology were written in Sanskrit and Assamese languages. The teacher of Naranarayan and Chilarai, Pitambar Siddhantabagish wrote two such books in Sanskrit namely 'Grahan Koumudi' and 'Siddhanta Koumudi'. Some other contemporary books were 'Jyotirmuktawali' by Banshibadan Sarma, 'Samayamrit' by Mathuradas Bidyalankar, 'Adbhut Sar' by Mahadev Sarma and 'Sambatsar Ganana' by Krishnadeva Mishra. In 1643, Kabiraj Chakrabarty wrote a Sanskrit book on astrology entitled 'Din Kiranawali'. Another book he translated to Assamese was 'Bhaswati', which was originally written by Pandit Satyananda in Sanskrit. In 1691, Lakhmipati Sarma wrote another book in Sanskrit language namely 'Jyotirmala'. Some other Sanskrit books on astrology written in ancient Assam were 'Jyotish Tatwa' by Raghunandan Bhattacharyya, 'Jyotirmuktawali' by Baishnav Diwja, 'Graha Nirnaya' by Garga Acharyya, 'Jatchandrika' by Jagadiswar and 'Grahbijgyan' by an unknown author. Some books of astrology written in Assamese language by some unknown authors were 'Jyotish Ganana', 'Jyotish Parichaya', 'Jyotish Arjya', 'Jyotish Shastra', and 'Grahajan Ganana'. These books are preserved in the department of Historical and Antiquarian Studies, Assam, Guwahati.

3.2.3 Medical Science:

The tradition of study and practice of medical science in Assam has been continuing since ancient times. The names of two experts of medical science Madhabkar and Sarangadhar were found in two stone inscriptions of 7th and 12th century

AD respectively. Nagarjun, a noted scholar of Brajajan sect of Buddhism wrote a book named 'Jogshatak'. Another such scholar of 14th – 15th century was Chakrapani Dutta.

The Koch kings appointed 'Rajbaidya', a physician in the court. According to Darang Rajbanshawali, King Biswasingha had good knowledge of medical science. Even his chief cook was an expert in medicine (Baidyashastra Bisharad).

On the other hand the trend of appointing of royal physician in Ahom kingdom started during the King Jaydhvaj Singha (1646-63). He brought a person named Kalicharan Sarma from Knouj and gave him the title 'Bezbaruah'. The famous Sanskrit book of medicine in medieval India 'Bhavaprakash' written by Bhaba Mishra was the handbook of the Bezbaruahs. Father of Sahityarathi Lakshminath Bezbaruah, Late Dinanath Bezbaruah was an expert physician. The most remarkable book on medical science in Ahom era was 'Baidyakalpataru', written by Ananga Kabiraj. It was written under the patronage of Swargadeu Lakshmingha (1769-80). In 1850, Brajanath Sarma wrote a book on medicine entitled 'Baidya Saroddhar'. Some other books on medical science were 'Chikitcha Sanghita' by Sridamodar and 'Baidyakalpadruma', 'Nidan Sangrah' and 'Chikitsarnav' by unknown author.

3.2.4 Veterinary science:

In the first half of 18th Century, Queen Madambika, wife of Swargadeu Sivasingha (1714–1744) ordered Sukumar Borkath to write 'Hastividyanava'. This was written on the basis of another Sanskrit book entitled 'Gajendra Chintamani'.

The kings of Koch community also put emphasis on veterinary science. Ralph Fitts, a European traveler wrote that there were a kind of veterinary hospital during the King Naranarayan to offer treatment to the sheep, goat, dog and cat. In 18th century Sagarkhari Daibagya wrote 'Ghora Nidan' on treatment of horses. His successor Suryyakhari Daibagya wrote another book on the same subject namely 'Ashwa Nidan'. It is worthy to be mentioned here that in ancient and Medieval Assam, books were written on elephant and horses. To look after the elephants and horses there were two kinds of officers in the kingdom of Ahoms namely Hati Baruah and Gohra Baruah. But

there was not a single book written on domestic cows and buffalos. Cows and buffalos were very important domestic animal of the people in that time. From this point it can be derived that the Kings only asked the writers to write books for their own needs. They did not pay much attention to the needs of their subjects.

3.2.5 Architecture:

The temples and structures and remnants of ancient monuments scattered in various places of Assam indicates the high level of architectural knowledge of that time. Due to the damp atmosphere of Assam, frequent flood and earthquake several monuments disappeared permanently. Some of the stone inscriptions inform that most temples, palaces, forts and towns were constructed in ancient and medieval Assam. The monuments of Da-Parbatiya at Tezpur, Dabaka of Nagaon, Dimapur, Deo-Pahar in Golaghat, Madan Kamdev in North Guwahati, Tamreswari Temple at Sadiya, Kamakhya Temple, Nabagraha, Ugratara in Guwahati, Hoygrib Madhab at Hajo are some examples of ancient architecture in Assam.

Koch kings were enthusiastic in constructions of temples. The Kamakhya temple destructed by Kalapahar, a general of Sulaiman Karrani (1566–1572) was reconstructed by King Naranarayan (1540–1587). In the writings of Sihabuddin Talis who came with Mirjumla to Assam in 16th Century, it is known that the palace of Ahom king in Gargaon was made up of wood. In 1694, the Umananda Temple was constructed in Guwahati under the instruction of Swargadeu Gadadhar Singha (1681–1696). The tradition of building palace and houses started during Swargadeu Rudrasingha (1696-1714). He brought one Muslim architect from Kochbihar named Ghanasyamuddin, popularly known as Ghanasyam. The palace in Sibsagar known as Talatal Ghar was built by him.

Apart from the temples and houses made of bricks, Ahoms constructed several stone bridges in different places. Among these the bridges in Namdang and North Guwahati are remarkable. In 18th century, Kaliya Bhomora Borphukan aimed at connecting both banks of Brahmaputra with a bridge. For that he set up some stone pillars too. But his dream did not come true.

3.2.6 Other technologies:

Some other technologies were also prevalent in Assam in Medieval era. One of such is extracting iron from ores. As the iron ores were found in Tiru Hills near Tiru River in Charaideu, Ahom kings appointed a group of people known as Tirual to extract iron from ores and make different equipments. Following the advice of Maniram Dewan, Swargadeu Purandar Singha set up as many as 40 such furnaces to melt iron. The name of the Tirual Kakati at that time was Jagannath (1795-1895). On his request, the king brought Gendhela Gariya, an expert from Goura province. He made cannons (Hiloi, Bortup etc.) for Ahom military. It is noteworthy that Ahoms learnt the art of making cannons from the Muslims. Swargadeu Chuhungmung found some cannons after he defeated Chutiya kingdom. Those cannons belonged to the father in law of Chutiya King Dhirmarayan. He brought those cannons from the West. Most of those who made cannons were Muslims. Later they were included in the Hiloidari sect in Ahom kingdom. The Koch King Biswasingha defeated the Bhuyans with sword made of Bamboo and shield made of barks of betel nut tree. From this it can be said that, in medieval Assam no cannons and firearms were used in battles. During the war with Muamoriya it is said that Radha-Rukmini, the wife of Raghav Moran caught the cannon balls coming out of cannon fires from Ahom army with their 'Chadar' they wore. It may be because, the cannons did not work properly. In several others arts, Muslim artisans contributed a lot during medieval Assam. For example, the Mariya people who were expert in brass works were Muslims. The painters and artists were mostly from Muslim community. The 'Hastdoyarnava' was illustrated with colourful pictures drawn by Dilbor and Dosai, two Muslim persons. The inscription on pillars and walls was also done by the Muslim people. Swargadeu Rudrasingha brought several goldsmiths and blacksmiths from outside Assam. Most of them were Muslims. Extracting gold from the sands of river was another most important trade in Assam. Gold was extracted from some rivers of upper Assam namely Dihing, Dichang, Subanshiri, Dissoi. Those people engaged in extraction of Gold were known as 'Sonowal's. In 1853, a European named Henne wrote, "The procedure of gold washing in Assam, particularly in Upper Assam, formed a very considerable source of revenue to the Assam Government in those days." Maniram Dewan also wrote a note on extraction of gold and he gave it to British government. In 1838, it was published in the Mauthpiece of Royal Society.

3.3 Barriers in the development of science in ancient Assam:

In the pre-British era, people were dependent on nature. They did not think of harnessing the natural forces. The geographical location of Assam was also not favourable for the development of science. The land was surrounded by hills and covered almost by forests. Though there were natural resources, the experts from outside Assam hesitated to come due to unhealthy atmosphere.

The caste system also created a gap between theory and practice of science. The high caste people knew the theories. But due to their superiority complex, they were indifferent of the practice. On the other hand the low caste people were devoid of theory. Though they did practical works, due to lack of theoretical knowledge they could not have a holistic approach. For example, the high caste people knew about medical science. But they disliked cutting animals. So, they did not know properly about anatomy. Without practical knowledge, their skills and knowledge remained imperfect. On the other hand, people born in low caste are accustomed to cut the bodies of birds and animals for meat. But they were devoid of theoretical knowledge. So, medical science could not flourish properly in that time. (Majumdar, 2007)

3.4 Science writings in vernacular in the 19th century:

Modern science was introduced to the colonial India by the British colonizers. The first periodical Orunodoi was published in 1846, after 18 years of the Treaty of Yandaboo. Before the British came to Assam, the study of western science and technology was going on in different places of mainland India. Some Indians had the opportunity to learn about western philosophy, literature, history, science and technology through English language taught in various institutes at that time. They also learnt that science and technology were the foundation of the modern western civilization. The Indians were aware of the two aspects of science. One was the visual

aspect which we may term as technology or applied science like steam boat, ship, printing press, electricity, telegraph etc. Secondly, science is viewed as a means to unveil the mystery of nature. Attracted by both the aspects of science, a section of some literate people started writing about science in vernacular in different parts of India. It started during the second decade of the 19th century with the publication of the *Digdarshan*, from Shrirampur in Bengal. This periodical published science writings with illustrations. Rajendralal Mitra (1822-1891) was the pioneers of science writing in Bengali language. To popularize science among the common people he edited 'Bdohartha Sangrah' and 'Rahasya Sandarbha' (1863-68). He published news related to the latest scientific discoveries in the western world as soon as possible. He was also conscious about creating and composing suitable technical terms in vernacular and wrote a booklet entitled 'A scheme for the rendering of European scientific terms into Vernaculars of India'. Famous novelist Bankimchandra also wrote some articles on scientific subjects in the booklet. During the last two decades of 19th century gave the science writing a new dimension with his writings in different contemporary periodicals. The writings were compiled in two books entitled 'Prakriti' and 'Jigyasa'. The subject matter of his writings was the contemporary scientific inventions. His style of writing made the complex scientific subjects intelligible to the common people. In the 20th century there was a strong trend of science writing in Bengali language. Litterateur like Rabindranath Thakur, Scientists like Acharyya Prafulla Chandra Rai, Acharyya Jagdish Chandra Basu, Satyandranath Basu, Meghnad Saha contributed a lot to the trend of science writing to popularize science among the common people in Bengal.

Likewise, Master Ramchandra (1821 – 1880) was the exponent of science writing in Urdu in Delhi. He wrote in a newspaper entitled 'Fawaid-ul-Najrin' under the aegis of Vernacular Translation Society established in Delhi College. He was also the editor of a weekly Urdu paper entitled 'Kiran-Us-Sadain' since 1846 and wrote numerous articles on science. He wrote against superstition in the society. His writings encompassed Mathematics, Astronomy, Chemistry, Physics along with biology, agriculture, Railway etc. Ramchandra was succeeded by his disciple Munchi Jaka Ulla (1832 - 1910). Thus, the writings in two languages created a favourable atmosphere for other native languages in India too. Ruchiram Sahani (1863 - ?), father of Balraj Sahani

started a strong movement in Punjab to popularize science. He was an enthusiastic speaker on various aspects of science and delivered along with demonstration of different scientific equipments in public. He was invited to deliver speech in Lahor and other towns. Through interaction with the listeners, he had prepared some appropriate vocabulary of scientific terms in vernacular. It is worthy to mention here that most of the subject matters of the speeches of Ruchiram Sahani was like process of producing soap, electroplating, glass making etc. In the same way, Rajendralal Mitra too wrote as many as 18 writings on establishing industries. The applied quality dealt by these writings was the reason of their popularity.

3.4.1 Orunodoi:

It is noticed that the attempt to popularize science through mother tongue in different parts of India during the years of publication of Orunodoi in Assam was going on. To make people aware about scientific facts and create scientific mentality among them, science writing in newspapers and periodicals were the best means at that time. Orunodoi too published various news and science writings on modern science and technology. Orunodoi pioneered in this direction in such a way with publishing very short news, introductory note, discussion through conversation, descriptive account, long essay and news of new scientific inventions and discoveries, for almost next 100 years, those have become ideal for Assamese newspapers and magazines. Orunodoi selected the subject matters of the science writings skillfully. Every subject related to nature and society were covered in the writings of Orunodoi. But, surprisingly, there was not writing on agriculture in Orunodoi. The lion's share was from geography and geology. Short news on Earthquake, Volcano, Flood etc. were there in almost every issue. The description of the continents of the world also occupied a considerable space in Orunodoi. The description of discovery of America by Columbus and the voyage of Vasco da Gama also may be considered as writing on geography.

Next to the natural geography, writings on zoology were in large numbers.

The writings on astronomy were also published in Orunodoi. Besides the description of solar and lunar eclipses with illustration, news forecasting the eclipses

was published in Orunodoi. The description of planets and satellites in the solar system were also published in Orunodoi. News of establishment of different telescope in different places in the world was also published in the periodical.

The anthropological writings included the various tribes dwelling in the hills and dales in Assam and its adjacent areas. Besides, Orunodoi criticized the superstition prevailing in Assam. Though small in number, writings on health and industry were published on Orunodoi. The building of the tunnel under the river Thames was considered by Orunodoi as great technological success. Likewise, the invention of modern time was also informed to the people through the news items on Telegraph, Printing press etc. Orunodoi also published writings on pure science on the topics like Mass of Air, Thermometer, Attraction of the Earth, Telescope, Microscope etc.

Science is undoubtedly a pillar of Western civilization. In the first issue of Orunodoi the aim of the paper was mentioned as ‘The Orunodoi, A monthly paper devoted to Religion, Science and General Intelligence.’ The Orunodoi had two parallel currents of emphasis, which the missionaries considered to be the same in one way or the other. If the writings glorify the various developments in the scientific world, it is again clubbed with the beliefs of Christianity, with the view that all these occurs due to the western faith in Christianity. In the writings of natural and earth science Orunodoi tried to introduce the Assamese readers to a vast world. Likewise the writings on applied science like steam ship, train, electricity tries to portray man’s attempts to harness the natural force through science. It also warned repeatedly to get rid of superstition.

It is said that the modern Assamese language is shaped by Orunodoi. The short, simple sentences laden with information and knowledge are the contribution of Orunodoi, which was influenced by the English literature (Mahanta, 2006, p. 0.13). Orunodoi tried to use appropriate words in the writings on science. It was always conscious for not using words carrying ambiguous meanings. Orunodoi mentioned the lack of appropriate words for writing about science. In the essay on Train (Neog, 2008. pp. 219-20) it is said that limitation of writing about the train lies in the lack of appropriate words in Assamese language. At the same time the writer acknowledge his

lack of complete knowledge about the train too. In these two sentences it becomes clear that during the constraints of science writing during the days of Orunodoi were:

1. Shortcomings of knowledge about science
2. Lack of appropriate Assamese words for the scientific and technical terms

Orunodoi was conscious about these problems while writing about science. In order to overcome these problems, Orunodoi tried to express things in simple expressions. Sometimes, it coined some words for unfamiliar things to the Assamese people. For example, it coined the words like Lota Ponial, Nag Mati, Dhuwar Roth etc. for the words grapes, coal and the train.

Another important fact noticed in the writings of Orunodoi is the writers ignored the subjects related to locally available knowledge and resources. There is hardly any writing about the contemporary tea industry in Assam in Orunodoi. Likewise, it did not pay attention to any local knowledge prevailing in Assam. Everything of the western world was considered to be superior. That might be reason of negligence in writing about the locally available resources and knowledge. On the other hand, there might be the possibility that the newspaper did not want to make people aware about the local resources, so that the colonizers, who were to some extent their patrons, could take away the available resources without being noticed by the local people. But the reason is yet to be ascertained.

The perspective of Orunodoi towards the colonized people was also nearer to the views of the colonizers. The superiority complex of the writers is reflected when they compare the East with Western countries and praises the western civilization. Though the missionaries were fighting for Assamese language and literature, they were not attracted by the knowledge found in the ancient Assamese books and writings. Even if they paid attention to those writings, they never expressed any admiration about those. Christianity and the progress of western world may be the reason behind this perspective of Orunodoi.

3.4.2 Assam Bilasinee

The second newspaper in Assam was the Assam Bilasinee. Dr. Herambakanta Borpujari said, “The Assam Bilasinee published in 1871 from the Dharmaprakash Press, Auniati Satra, District of Sibsagar, though devoted to religious matters contained useful knowledge and information” (Saikia, 1998, p 140). Assam Bilasinee newspaper consisted of eight pages. Every page consisted of three columns. Only one issue of Assam Bilasinee is available now (Saikia, 1998. p. 133).

Though Assam Bilasinee was confined in the religious subject matters, sometimes it included news of knowledge and information under the column ‘Sambadawali’. There we find the news of epidemic killing a huge population in Sibsagar district. It was published in the issue of March, 1876. However, at the concluding part of the news it was summed up as the happenings like epidemic, loss of crops and cattles and earthquake were the cause of the heavenly bodies namely Sani and Rahu. It indicates that the writer was a believer of astrology, not proper science. So, the newspaper could not contribute much to the field of Science Writing in Assamese.

The background of the publication of Assam Bilasinee is quite interesting. Orunodoi declared that it was devoted to religion, science and general intelligence. Here ‘religion’ refers to no other religion except Christianity. The aim of Orunodoi was to propagate Christianity in simple expressions among the common people. At first several Assamese writers converted themselves into Christianity. But the high caste Hindu community and the people of Satras did not show any enthusiasm towards Christianity. A considerable portion of those people doubted the role of Orunodoi and feared that Hindus would be minority if they were converted to Christianity. As a reaction against the spread of Christianity through the monthly paper, the Satradhikar of Auniati Satra, Duttadeva Goswami established the second printing press in Assam in 1871. The printing press was called ‘Dharma Prakash Jantra’ (Machine to propagate religion). The name indicates that unlike Orunodoi, the aim of the publications from the press was to propagate the ‘Eksaharan Dharma’ or ‘Vaishnavism’. Assam Bilasinee, which was published from this printing press was indirect reaction against the ‘agenda’ of Orunodoi to propagate Christianity. Therefore, it can be argued that the paper was

solely devoted to the local religion, upholding it to counter the spread of Christianity in Assam (Saikia, 1998).

3.4.3 Assam Bandhu and Mau

Assam Bandhu was published from January 1885. It was edited by Gunabhiram Baruah. As many as 14 issues of this monthly publication were published during 16 month's span. Unlike Orunodoi and Assam Bilasinee. Assam Bandhu is not a newspaper. It is a monthly literary paper. So, it is called as the first Assamese literary magazine (Saikia, 2003)

In the first editorial of Assam Bandhu it is mentioned that the magazine would not discuss subjects related to politics, grammatical rules in language, morality and religion. But it will devote its space for entertainment and discussion about knowledge. The editor of Assam Bandhu, Gunabhiram Baruah was a member of Brahma Samaj. He could have made Assam Bandhu as the Mauthpiece of Brahma Dharma in Assam. But instead, he never mentioned a single word about Brahma Dharma in this magazine. He on the other hand tried to highlight the ancient values prevailing in Assamese society and need of modern education among the Assamese people (Saikia, 1998, p. 158). The life span of Assam Bandhu was only 16 months. If it would have been a little longer, there was the possibility that a society of new writers would come up through it. Kamalakanta Bhattacharyya, Bholanath Das and Lambodar Bora were the renowned contributors of Assam Bandhu. Likewise, the writings of the two forerunners of the later period (Jonaki Jug) Lakshminath Bezbaruah and Hemchandra Goswami appeared regularly in Assam Bandhu. The noted writer on anthropology Ratneswar Mahanta was also the product of Assam Bandhu. Assam Bandhu was also a keen observer of the social changes at that time. It criticized the Assamese people for being reluctant to engage in the tea plantation and work in the construction railway tracks. The professionals like washer man, barber, blacksmith and carpenter came to suffice the need in the Assamese society from outside Assam. It also had the opinion that Assamese people are not ready to walk with the changing time, for which Assamese

society needed professionals from outside Assam (Saikia, 1998, p. 163). The attitude of Assamese people towards the outsiders was also studied by Assam Bandhu.

Assam Bandhu, Mau and Jonaki have major contribution in science writing in Assamese language. In the first editorial of Assam Bandhu it was written as: “In this periodical we shall discuss about literature, science and industry”. The Assam Bandhu took the responsibility to develop knowledge of the people through discussions. Unlike in other countries, in Assam there were no meeting on science, no exhibition of arts and science and no periodical devoted to publish only science news, Assam Bandhu took the responsibility to do so. Love for the country was the driving force behind this periodical.

The subjects related to science published in Assam Bandhu were quite limited. It included writings about health, anthropology, zoology and natural science only (Mahanta, 2006). It tried to justify the traditional behaviors in the light of modern science. In the second issue, there appeared some articles on chemistry and physics. Those articles were full of examples taken from the day-to-day life. The aim of those articles was to introduce the readers to the primary concepts of science and importance of science in human life. In the article ‘Samajik’ published in Assam Bandhu it is said that no god shows the future course of happenings in the dream. By this statement it tried to eradicate superstition related to dreams. The series of five articles under the title ‘Garobritanta’ were the primary writings of anthropology in Assamese language. The most remarkable essay on agriculture entitled ‘Khyeti’ discussing different aspect related to it. No such article on agriculture was published in the earlier periodicals.

Only four issues of Mau, another periodical edited by Haranarayan Bora were published in 19th century. Behind the publication of Mau, there was the famous engineer Balinarayan Bora. According to Dr. Satyendra Nath Sarma, “The aim of these issues of Mau is to show the path of development to the Assamese society” (Mahanta, 2006. p. 0.16). But unlike Orunodoi or Assam Bandhu, Mau encompassed only two subjects related to science. One is health and hygiene and another natural geography. In the essay ‘Asamor Swasthyarakhya’ it is mentioned that the cause of cholera is the contaminated water. So, it requested the government to set up wells for safe drinking water for the people of Assam. The articles on the topic of natural geography too were

the examples of successful science writings. Objectivity was the main characteristic of all those writings.

3.4.4 Jonaki, Bijuli

Published in the last decade of the 19th century, Jonaki considered science as a part of education. In the first editorial of Jonaki entitled 'Atmakatha' it was made clear that it would discuss topics related to Literature, Science and Society (Saikia, 2001). It also claimed, "We are out to fight against darkness: our aim is the development of the country, that is light." (Saikia, 2001, p. 4). The students in Calcutta at that time witnessed the development in Calcutta due to the influence of the western knowledge and science and compared it with the then condition of Assam. The periodical welcomed science and technology for the development of the Assamese society.

The science writings in Jonaki were of two types – long essay type and short writings in the form of Miscellaneous notes. The number of Science writing in Jonaki is less than Orunodoi. The subject matters were very common and limited. There were writings on natural geography, anthropology, zoology, health, physics and technology in Jonaki. The essay 'Pranitatwa' by Kanaklall Baruah discussed the origin of creatures on earth and the theory of Darwin for the first time in Assamese language. In another essay Satyanath Borah advocated that the hoot of an owl is not a bad omen. It is a superstitious belief only. Satynath Bora in his article 'Bhabishyagyan' criticized the superstitious beliefs among Assamese people. He wrote, "It is a false conception that the owl hooted as he knew that the person will die. Likewise it is also a misconception that the man died because of the hooting of the owl. There is no direct relation between hooting of owl and dying of a person. The owls hoot every day, but man do not die every day" (Mahanta, 2006, p. 0.18). The same author in another essay entitled 'Amar Kopal' argued that it is not good to acknowledge everything is predestined. It indicates that at a time when there was no institutional education of science, this essay tried to enlighten the minds of Assamese readers and make them free from superstition (Mahanta, 2006).

The increasing credibility of science was also reflected in some writings of Junaki. In the news of connection of Mars and Jupiter the two planets of the Solar System it was revealed that the phenomenon is not impossible according to science. But, people who do not have the knowledge of science would consider that incident as bad omen.

The coining of new words for the words of other languages continued in the Junaki too. This trend was started with the publication of Orunodoi. The newly coined words in Junaki were capable of carrying proper meaning. But in terms of the charm of the writings, the density of thought and clear meaning, the science writings in Junaki were inferior to those found in Orunodoi.

Likewise, another periodical Bijuli only completed three years. So, the numbers of science writings in it were very few. In 1891 three persons namely Krishnaprasad Duwara, Padmanath Gohainbaruah and Benudhar Rajkhowa started publishing Bijuli from Calcutta (Saikia, 1998). This is basically a magazine published by these Assamese students studying in Calcutta. The trio had to face grave financial crisis while publishing Bijuli. But they were determined to maintain the quality of the writings. Apart from the literary pieces, there were writings on health issues and the Solar System. There was another essay on the life of Isaac Newton too.

Bijuli tried to discuss various problems prevailing in the then Assamese society. It advocated for all-round development of Assam and Assamese people. In the first issue of the second year of its publication it is mentioned in the editorial of the periodical that the objective of the magazine is to wipe out poverty and troubles from the country (Saikia, 1998). The social responsibility is seen in the writings against opium published in Bijuli. There was a competition between Jonaki and Bijuli. Still, they were the two mouthpieces of Assamese language and literature. Compared to Jonaki, Bijuli was much vocal in discussing the problems prevailing in the Assamese society.

It is also worthy to be mentioned here that Jonaki and Bijuli were rivals. There were numerous disputes regarding language and literature between the two periodicals. The rivalry between Lakshminath Bezbaruah and Padmanath Gohainbaruah reflected in

the writings of both the periodicals. However, the disputes enriched the Assamese language and literature (Saikia, 1998). Though science writings were published in both the periodicals, it can be said that both the periodicals engaged in disputes not for the science writings, but for the literary writings. It is obvious that both the periodicals put much emphasis on literature and language rather than the scientific subject matters.

3.5 Science writing in the 20th century:

Four important Assamese periodicals were published in the first decade of the 20th century. These were Usha (1906), Alochani (1909), Assam Bandhav (1909) and Banhi (1909). All were monthly magazines. Usha lasted for three years. Assam Bandhav was being published for almost nine years. Alochani completed eight years before it stopped publishing. Banhi was published irregularly till 1938. The science writings published in Assam Bandhav and Alochani bore high watermark than the science writings published in Banhi. But the number of such writing in Banhi surpassed the numbers of science writings in both the periodicals as Banhi survived for a comparatively long period. In Alochani, writings on science, and the debate about the superiority of religion vs science pointed out the importance of science as well as its limitations.

Agriculture was a most widely discussed topic at that time. The tradition of writing on agriculture started with the first writing in Assam Bandhu in the 19th Century. But in the first decade of the 20th century it had been an important subject covered by the periodicals. The treatment of the domestic cattle, rearing of Eri and Muga etc. were the common subjects to discuss. But the writings observed that people neglected agriculture at that time.

Among the writers Kaliram Medhi contributed a considerable number of science writings. Harikrishna Das and Lakshiprasad Chaliha too wrote on health and hygiene issues. Bhudhar Choudhary was another notable writer who wrote about the agriculture. Two doctors, Dr. Mahendra Baruah and Dr. Lalit Kumar Baruah wrote in both Alochani

and Usha. Rajanikanta Bordoloi's writing on psychology was first of its kind (Mahanta, 2006).

Bijuli stopped publishing in 1906. After one year of it, Usha was published from Tezpur in 1907. Padmanath Gohainbaruah was the man behind this periodical. Gohainbaruah mention the objective of Usha as to develop the Assamese literature. To do this, he knew that the discussion related to the society, science, agriculture, culture and business are also important. But, topics of politics and religion did not have any space in Usha (Saikia, 2006). Bhudhar Choudhury in Usha mentioned that a farmer from Golaghat prepared sugar in a traditional method and displayed it in the agricultural fair in Guwahati in 1905. He also mentioned that the quality of sugar was very good.

Usha was dedicated to the upliftment of the nation. Gohainbaruah was driven by the nationalistic fervor for which he never hesitated to criticize the bad habits of the Assamese people. So, the science writings published in Usha aimed at betterment of a particular sphere. The utilitarian motive was found in almost all the science writings published in it.

In Alochani there were several important science writings on the Earth, the Sun, the atom, equipments to write, and digits. The description of the theory of Darwin found in it is undoubtedly a milestone in the science writing in Assamese language. Saifuddin Ahmed wrote an article on 'drinking tea'.

The dispute between Lakshminath Bezbaruah and Padmanath Gohainbaruah triggered the publication of Banhi in 1909 from Calcutta. Banhi insisted on writing about health and hygiene than any other kind of science writing. Saifuddin Ahmed wrote a remarkable article on the adverse effect of chewing betel nut. Sushil Kumar Baruah's writing on Geological subject is another important article. The words used by him in Assamese language to mean different geological entities are still in use in Assamese language. Birinchi Kumar Baruah wrote an article on Radio. Girish Chandra Baruah wrote on the mass of light, Damodar Hazarika wrote about the different portions of an eye, Nalini Kumar Mishra wrote about sugar and the chemistry involved in it. The book review on 'Frustration of Science' gave an insight with the problems involved

with science. Eradicate superstition in the Assamese society was also a major attempt made by the magazine through the science writing.

After the first decade of the 20th century there appeared several periodicals in Assamese language. Among those Chetana (1918), Milan (1922), Assam Hitoishi (1926), Awahan (1929) and Jayanti (1938) were remarkable. In Chetana there were two essays on 'listening to the sound' and 'earthquake'. Scientific observation is apparent in both the writings. In the essay on earthquake, it dismisses the concept of the ancient myth that the earth is on the back of a turtle. It urged the readers to keep an eye to the scientific explanation of earthquake too.

The translated science writings were appeared in Milan. One important article published in it is 'water and its chemistry'. Most remarkable writing in this magazine was on the opinion of the scientists that one day man would go to the moon. Though, at that time it was just an imagination, later this came true. So, this magazine carried a note of optimism towards the future development in the field of science and technology.

In Assam Hitoishi too there were some science writings on the solar system, milky way and numbers.

Awahan created a new era in the history of Assamese magazine. In this magazine, the scientific subjects were attempted to present to the readers with respective illustrations. It introduced the readers with the illustrations of airplane, radio etc. in the years just before the world war II. Apart from that the magazine published writings on health, food and astronomy. Sometimes, it is seen that it fused the sentiment of nationalism with the science writings. In the two writings, 'Jatir Unntir Sate Bigyanor Sambandha Kot' and 'Asomot Lur Khani' it is analysed that why people of Assam were lagging behind the British even though they had a glorious past.

In Jayanti too it is seen that the writings tried to inspire the Assamese people to work for a revival through agriculture, business and science and technology. The writings on the disease among the cattle and Malaria were the reflection of scientific mentality of the writers.

Another magazine published just after the independence of India was Ramdhenu. In this magazine, there was a column entitled 'Bigyan Boichitrya'. In this magazine, there was an essay on the tribes and communities of Assam. Noted anthropologist Bhuban Mohan Das was the writer of that essay .

During 60s, another remarkable Assamese periodical Amar Pratinidhi was published a column entitled 'Bigyanstambha'. The news of sending the satellite Aryabhata was also covered by the periodical. Writings on environmental pollution and the biographies of several scientists were some notable contributions of the periodical towards science writing in Assamese.

The year 1961 is remarkable because the first Assamese Science Magazine Bigyan Jeuti was published in that year. Earlier it was published as quarterly magazine. Then it was turned into a bimonthly magazine. The contribution of Bigyan Jeuti to the science writing in Assamese is remarkable.

Another contemporary weekly periodical Sadiniya Nawajug encompassed the subjects like Bacteria, Senselessness, Coronary Thrombosis etc. writings on health sciences. The descriptions of the spacecrafts of Soviet Russia were also available in the periodical. In an article there was discussion about the flood in Assam and how to control it.

3.6 The Magazines:

The Assam Bigyan Samiti has been publishing the Bigyan Jeuti since 1961. This is the only science magazine in Assamese which has been published for such a long period. First it was a quarterly magazine. Later it was transformed into a bi monthly magazine. Addressing to the science writers it is written in the magazine:

“All the articles, discussions, theoretical scientific analysis, news, translation works sent for publication in Bigyan Jeuti should be intelligible to the common people. In the writings related to contemporary scientific discoveries and inventions should

contain enough illustrations and designs. The vocabulary used in the articles should preferably be the Assamese.” (Saikia, 1998, p. 545)

The magazine also published a series of writings introducing Assamese words for the scientific terms. So, it has become a help for both the writers and readers in Assamese language.

The evidence of the popularity of such science writings is found in the last lines of the editorial of the second issue of Bigyan Jeuti. It is written as “we started from zero. But this vacuum of science writing has been fulfilled with all those writings from different writers heaped up on the editor’s table.”

In Bigyan Jeuti is the science writing attained in culmination. The trend of publishing science writings in Assamese in Orunodoi has been still continuing through the writings of Bigyan Jeuti.

After Sadiniya Nabajug, another remarkable periodical published during the 70s of the 20th century. In the beginning of the 80s there appeared another magazine namely Prantik. During the last 80s another magazine namely Sutradhar got published. The science writings in the three magazines can be divided into three categories. Firstly, the writings on pure and applied science, secondly, the descriptive writings and thirdly, the science reporting. However, these writings have added new dimension in the firmament of science writing in Assamese language.

There are some children magazines which included science writing for the children. For example Akash (1979), Safura, Mukuta (1987), Natun Awiskar (1988), Gyan Bigyan, Kishor etc. These magazines have introduced the children with the various scientific discoveries of the contemporary period.

Since Orunodoi to Bigyan Jeuti, it is a giant leap. The Assamese periodicals have successfully crossed this gap till date. But the trend of education through English medium has become a challenge in front of the science writers in present times. Because, the new generation is mostly attracted by the writings in English. At the same time the use of internet also work as catalyst in this direction. Still, science writing in Assamese has been surviving through the writings in various periodicals in present time.

3.7 Science Writing in Bengali as Model for Science Writing in Assamese in the 19th century:

In the earlier chapter it is discussed how the Bengali magazines and newspapers worked as a model for the first Assamese newspaper Orunodoi. Before coming to Assam, the missionaries started publishing periodicals in Bengali in Bengal. William Carry (1761-1834) and his associates John Clerk Marchman (1768-1837) and William Ward (1769-1823) established the Mission centre at Srirampur near Calcutta. In 1818 they published the first Bengali periodical entitled Digidarshan. It was a monthly periodical. The editor was Marchman. In the same year another newspaper entitled Samachar Darpan was published from the same press. Samachar Darpan was published till 1841. Orunodoi mentioned the name of Samachar Darpan as synonym Maus to newspaper (Saikia, 1998).

On the other hand science communication in its modern sense started with publication of a scientific journal, Asiatick Researches, a quarterly journal published by the Asiatick Society, Calcutta in 1788. Later, scientific publications also started appearing in Indian languages by the end of eighteenth century. The publication of ancient scientific literature and textbooks in large numbers started in the beginning of nineteenth century. The scientific and technical terms, however, had been a great difficulty for a long time for popular science writing.

Science writing in Bengali started in the early 19th century. The first science book published in Bengali language was named 'May Ganit'. It was first published in 1817. From that time onwards science writing in Bengali started flourishing and later on a number of Bengali science magazines got published.

Another popular science magazine in Bengali was Pashyavall (the Animals). It was first published in 1822. Father Lawson was its compiler and designer. Every issue contained an account of a particular animal. The first six issues contained descriptions about the lion, bear, elephant, rhino, hippo, tiger and cat. All of these were later published in the form of books by the Calcutta School book Society. This magazine continued for about six years. From this magazine, the first Assamese newspaper Orunodoi imitated the style of writing about an animal in detail in every issue. In

Orunodoi it is noticed that there are as many as 41 types of animals described in the recovered pages of the periodical. These were :

1. The Lion
2. Pangolin
3. The Tiger
4. The Elephant
5. The Rhinoceros
6. The whale
7. The Buffallo
8. The Ox
9. The Cow
10. The horse
11. The Alpaca or Peruvian Sheep
12. Giraffe
13. The Beaver
14. The Hippopotamus
15. Kangaroo
16. Platypus
17. Wolves
18. Pangolin
19. The Zebra
20. Marmoset
21. Apes, Gibbon and Monkey
22. The Porcupine

23. The Ibex or Mountain goat
24. Armadillo
25. The Chlamyphorus or Piehiciaage
26. The Seal
27. The Black Tiger
28. The polar or white bear
29. The Walrus
30. The gnoo or horned horse
31. Wild sheep of Punjab
32. The Elk
33. The four horned sheep
34. The Tapir
35. The Alpaca or Peruvian sheep
36. The Opossum
37. The Wild cat
38. The Capybara
39. The Oryx
40. The River Porpoise
41. The Bear

It is undoubtedly the influence of the Bengali magazine Pashyavall on the Orunodoi to design the writings on those animals.

In 1832, another magazine Bijnan Sevadhi was published from Calcutta by the Society for Translating European Science. After five issues, it stopped publishing. In 1833, the fortnightly Bengali periodical Vigyan Sar Sangraha appeared but survived for

one year only. This was a bilingual publication. In it, in the column on the left used to be in English and the column on the right was the Bengali version.

About 65 Bengali science magazines were published in undivided Bengal during 19th century. These magazines covered a wide range of science topics. This revolutionary effort of Bengal in popularizing science among readers is the ideal for the newspapers and magazines published in Assam too. The educated Assamese people like Jaduram Deka Baruah, Haliram Dhekial Phukan, Jagyram Kharghariya Phukan and Indibor Baruah were familiar with the Bengali newspapers. They even wrote to those Bengali newspapers on various topics. (Saikia, 1998, p-130). So, when the Assamese people at that time had some idea what the newspaper should look like. And it is indeed the newspapers of Bengal which worked behind the preparation of the Assamese newspapers in the 19th century. Therefore, the science writings published in the Orunodoi and later Assamese magazines owe a lot from their predecessors, the Bengali periodicals.

The scientific discoveries and inventions of that time and their role in human life, Bengali science writers wrote various popular-sciences and science fiction books in the later half of the 19th century. 'Sahitya Samrat' Bankim Chandra Chattertopadhyaya's writing on science in Bengali was also remarkable. His book entitled Vigyan Rahasya (1875) was a wonderful piece of work on science and science popularization. In fact it was compilation of several articles on different scientific topics. He wrote all those articles in simple language acquiring scientific knowledge through extensive studies of the European science. The same thing was done by the science writers of Assam in the 19th century too. Most of the news and description of the newly invented or discovered things were learnt from the writings of the western writers. Therefore, the influence of the European writings were seen in the science writings of both Bengali and Assamese language.

References:

Bernal, J. D. (1939) *The Social Function of Science*. London: George Routledge & Sons Limited.

Gannon, R. (Ed.). (1991). *Best Science Writing: Readings and insight*. Hyderabad: Universities Press Pvt. Ltd.

Mahanta, P. (Ed.). (2006). *Prak-Swadhinata Kalor Asomiya Bigyan Sahitya* [Assamese science literature in the pre-independence period]. Guwahati: Publication Board Assam.

Majumdar, P. (Ed.). (2007). *Asomot Bigyan Charchar Dhara* [The tradition of study of science in Assam]. Guwahati: Publication Board Assam

Saikia, C. (Ed.). (1998). *Asomor Batri Kakot-Alochanir dersha Bosoriya Itihash* [150 years history of Assamese Newspapers and Magazines]. Guwahati: Celebration Committee of 150 years of newspapers in Assam

Saikia, N. (Ed.). (2003). *Assam Bandhu* [Friend of Assam]. Guwahati: Publication Board Assam

Saikia, N. (Ed.). (2001). *Jonaki* [The firefly]. Jorhat: Asom Sahitya Sabha

CHAPTER - 4

Data Analysis

4.1 Introduction:

In mass media research, content analysis is one of the best procedures devised to examine recorded data. It is a research technique for making replicable and valid references from data to their context. Bernard Berelson says that Content Analysis is a research technique for the objective, systematic and quantitative description of any content of communication (Berelson, 1952). It is a research device that is pointed to the actual content and internal features of media. Content Analysis is used to establish the presence of certain words, themes, concepts, characters, phrases or sentences within a certain text. It counts this presence in an objective manner. The text may be any media content like books, essays, articles, newspaper reports, conversations, speeches, and historical documents. In order to conduct a content analysis the researcher has to break down the text into manageable classes on various levels and then examine them. The results of the analysis are then used to draw conclusions. Here in this research the content analysis defined by Bernard Berelson has been used to attain the conclusions.

Content analysis examines the course of communication through texts. It can provide important historical and cultural insights over time through analyzing the texts. It allows both quantitative and qualitative procedures. Content analysis provides insight into complicated human thought and language used.

The qualitative content analysis in this present research includes the study of the language and vocabulary used in the science writings in the four Assamese periodicals of the 19th century.

Content analysis can also be used to find out the intention, focus or the trends in communication of a group, institution or individual. Here in this research, the content writing is used to find out the trends in science writings in 19th century Assamese periodicals.

To comply with the requirements of the research questions, the science writings are categorized according to their subject matters and the writing formats. The quantification of the data imparts objectivity to this research work.

4.2 Data analysis (quantitative content analysis)

For convenience of categorizing the science writings according to the subject matters in the periodicals ‘science’ has been divided into four major groups or branches, namely formal science, natural science, social science and applied science.

Table: 1: Branches of Science

Branches of Science	Sub branches of Science	Science	
Formal	Pure Science	Mathematics Logic	
Natural	Physical Science	Physics Chemistry Earth Science Astronomy	
	Science of Living Beings	Biology	Zoology Botany
Social		Sociology	
		Anthropology	
Applied		Engineering	
		Healthcare	
		Agriculture	

Table 2: Division of Science Writing in the 19th Century Assamese periodicals according to the subject matters.

Name of the periodicals	Formal Science		Natural Science				Life Science		Social Science	Applied Science	Total
	Math	Statistics	Physics	Chemistry	Earth Science	Astronomy	Zoology	Botany	Social Science	Applied Science	
Orunod oi	3	4	7	0	53	12	97	5	19	47	247
Assam Bandhu	0	0	8	2	1	0	3	0	9	6	29
Mau	0	0	0	0	3	0	0	0	0	1	4
Jonaki	3	0	12	0		8	11	4	1	0	43

4.2.1 Formal Science

Compared with other science writings in the periodicals in 19th Century, the number of writings on formal science was relatively small. There were three writings on mathematics in Orunodoi. One of those is written in the form of a poem.

4.2.1.1 Writings about Mathematics in Orunodoi:

Sl. No.	Topic	Page	Writer	Source	Remarks
1	Arithmetical Questions	634		(Neog, Maheswar, 2008)	
2	Area of circular field	634	Har govinda Dutta+	Do	Poem
3	Curious Calculation 10^{14}	815	জ.চ.	Do	

Table: 3 Writings about Mathematics in Orunodoi

But after Orunodoi, no writings on mathematics were found in Assam Bandhu and Mau. It was Jonaki which published mathematical writings again in the form of riddles.

4.2.1.2 Writings on Mathematics in Jonaki:

Sl. No.	Topic	Page	Writer	Remarks
1	Riddle of Math	49	Baneswar Gupta	
2	Riddle of Math	432		
3	Riddle	143		

Table: 4 Writings on Mathematics in Jonaki

In Jonaki all mathematical writings were in the form of riddle.

4.2.2 Writings on Statistics

4.2.2.1 Writings on Statistics published in the Orunodoi

Sl. No.	Topic	Page	Writer	Source
1	Area of the Earth and Population	305-308	.	(Neog, Maheswar, 2008)
2	Census in Calcutta	459		Do
3	Population of London	628	.	Do
4	Population of India	1855 Oct		Do

Table: 5 Writings on Statistics published in the Orunodoi

For the first time in Assamese, Orunodoi published the population and census data. There were four statistical writings in Orunodoi. No statistical record (writings) was found in the periodicals of the later period of 19th century including Assam Bandhu, Mau and Jonaki.

4.2.3 Natural Science

4.2.3.1 Writing on Physics in Orunodoi:

Sl No.	topic	Page	Writer	Remark	Source
1	Description of iron	78-79	ৰ		(Neog, 2008)
2	Cause of Rain	99	দ	Conversational style dialogue	Do
3	Attraction of Earth (Newton's Principle)	191-192	জোৰ	Conversational style dialogue	Do
4	Diamonds in the Great Exhibition (ruby, sapphire, emerald etc.)	687-688	॥		Do
5	Attraction and Heat	843	জ.ট.		Do
6	Cause of rain	1005-1006	ছ	Conversational style dialogue	Do
7	The Air	178			Goswami, 2018

Table: 6 Writings on Physics in Orunodoi

There were as many as seven articles on physics published in Orunodoi. All are writings on preliminary physics. Most interestingly, the Orunodoi first introduced the people of Assam with the Newton's principle regarding the attraction of the Earth (Neog, 2008 p.191-192). It also discussed about the natural properties of elements like attraction and heat (843). The cause of rain was discussed in two articles (Neog, 2008, pp 99 & 1005-1006). There was another article on air with discussion of different properties of air. Likewise, another article discussed about the diamonds in the great exhibition (Neog, 2008, pp. 687-688) including ruby, sapphire, emerald etc.

4.2.3.2 Writing on Physics in Assam Bandhu:

Compared to Orunodoi, Assam Bandhu had a shorter life. And during that period eight writings were published in the periodical. Articles on physics in Assam Bandhu discussed fundamental principles of science. It covered the topics like 'Energy Science', 'Water', 'Capillary action', 'Attraction of magnet', 'Attraction of Electricity', 'Centre of gravity', 'Characteristics of non-living things' etc. The discussion in Assam Bandhu is more detailed than those found in the Orunodoi.

Sl. No.	Topic	Page	writer	Source
1	Energy Science	417	K. B.	Saikia, Nagen, 2003
2	Water	511-514	A. S.	Do
3	Water	556		Do
4	Capillary Action	612-613		Do
5	Attraction of magnet	614-615		Do
6	Attraction of Electricity			Do

7	Centre of gravity	617		Do
8	Characteristics of non-living things	639		Do

Table: 7 Writings on Physics in Assam Bandhu

There was not a single writing about physics in the Mau.

4.2.3.3 Writing on physics in Jonaki:

Jonaki showed the interest of publishing notes and writings on different subjects of physics till the end of 19th century. As many as twelve such writings were found in the pages of Jonaki. Some of the topics in Jonaki were the same with those of Orunodoi and Assam Bandhu. Those were on ‘Water’, ‘Magnet’, ‘Mass of Air’ etc. On the other hand for the first time an article on ‘light’ was published in Jonaki. In Miscellaneous Notes there were descriptions of ‘artificial rain’, ‘phonograph in a clock’ and ‘mass of matter in water’. In three conversations between the Teacher and the Disciple covered the subjects like ‘magnet compass’, ‘electricity’ and ‘electroscope’. Here is the list of science writings in Jonaki (Saikia, 2001):

Sl. No.	Topic	Page	Writer	Remarks
1	Water	202-203	Upendra Nath Baruah	
2	Miscellaneous note	314		
3	Magnet - Iron	322	Sri Bijayram Baruah	
4	Miscellaneous note	386		Writing about artificial rain

5	Mass of Air	392-393	Sri Chandradhar Baruah	
6	Miscellaneous note	411-412		Phonograph in a clock
7	Light	511		
8	Miscellaneous note	520		
9	Miscellaneous note	577		Mass of matter in water
10	Teacher and disciple	585	Sri Laksheswar Sarmah	Magnet – Compass
11	Teacher and disciple	614	Sri Laksheswar Sarmah	Electricity
12	Teacher and disciple	633	Sri Laksheswar Sarmah	Electroscope

Table: 8 Writings on physics in Jonaki

4.2.3.4 Writings on Chemistry

In Orunodoi, there was not a single writing about chemistry or any such related subject.

4.2.3.5 Writing on Chemistry in Assam Bandhu:

Only two articles on Chemistry were found in Assam Bandhu. One is on the process of fire. It includes the importance of oxygen to set anything into fire. Another discussed the process of ‘chemical reaction’. When two elements found in nature are

combined together, a completely new element emerges from that. It is due to the chemical reaction between the two.

Only two articles were published in the Assam Bandhu (Saikia, 2003):

Sl. No.	Topic	Page	Writer	Remarks
1	Fire	290		
2	Chemical Reaction	613-614		

Table: 9 Writings on Chemistry in Assam Bandhu

It was only Assam Bandhu which published writings on chemistry. The other two periodicals Mau and Jonaki did not publish any such articles in the 19th century. So it can be said that the trend of writing about the subjects of chemistry in the 19th century was started in the Assam Bandhu. But the later periodicals failed to continue this trend.

4.2.4 Writings on Earth Science

Orunodoi contained as many as fifty three writings on Earth Science. Most of those were geographical description of various countries in the world. There were only eight articles dealing with the description apart from geography of a place. Those were on 'Lava on Hecla Mountain', 'Shape of the Earth', 'Petified buffalo', 'Niagra Falls', 'Volcano', 'Variation of climate in different latitude' and 'measurement of the earth'.

On the other hand all other articles on earth science are related to geography of different places across the globe.

4.2.4.1 Writing on Earth Science in Orunodoi:

Sl. No.	Topic	Page	Writer	Source of Writng
1	Lava on Hecla Mauntain (Volcano)	4-5		(Neog, 2008)
2	Shape of earth	13-14		Do
3	Discovery of America	20-23		Do
4	Description on Earth	28-30		Do
5	Petrified buffalo	37		Do
6	The Northern Hemisphere	38		Do
7	Coming to India from Europe via Cape of Good hope	69-71		Do
8	Coming to India from Europe via Cape of Good hope	79-81		Do
9	Geography of Southern Africa	480-481		Do
10	Niagara falls (Account of celebrated Cataracts)	535-537		Do
11	Northern countries of Asia	551		Do
12	Portion of Turkey in Asia	567-570		Do
13	Syria and Palestine	579-581		Do
14	Geography of Arabia	595-598		Do
15	Geography of Africa- Account of Egypt	611-614		Do

16	Description of Persis	627-628		Do
17	Midland of America: the valley of the Mississippi	643-646		Do
18	Geography of the Atlantic States	659		Do
19	Western States of North America (anthropological- flat head)	675-678		Do
20	Account of Kashmir	691		Do
21	Geography of British North America	707-710		Do
22	Geography of Maxico	723-725		Do
23	Discovery of Antiquity at Nimroud	725-726		Do
24	Central America (Guatemala)	739		Do
25	Discovery of Western Hemisphere (Columbus' Expedition)	740-741		Do
26	Western Africa	755-757		Do
27	Description of Burma	787-789		Do
28	Geography of Hindustan	803-806		Do
29	Division of Hindustan	835-838		Do
30	Description of Tartary	867-869		Do
31	The new possession in Burma	883-884		Do

32	General account of Mauntains	909-910		Do
33	Expedition to Japan	962		Do
34	Description of Ceylon	883-886		Do
35	Account of Cherra Punji	1180	Sri Katiram Gohain May 28, 1854	Do
36	Account of China	5		Goswami, 2018
37	Volcano	14-15		Do
38	Variation of climate in different latitude	18-19		Do
39	Island of Madagascar	90-93		Do
40	Egypt	157		Do
41	An account of Puli-Penang	165-166	Sri Jatiram Gohai Das, 1856	Do
42	An account of South America (Vol XII)	44-47		Do
43	An Account of South America: Ghiana, Ecuador	61-62		Do
44	An Account of South America, Brazil			Do
45	An Account of South America: Peru	86-87		Do
46	Description of London	84-85		Do

47	Measurement of the earth	87-88		Do
48	Countries in Africa	97-101		Do
49	Dr. Livingstones travel in South Africa	126-128		Do
50	South America: Bolivia	75-76		Do
51	Newzeland	178		Do
52	South America: Paraguay, Uruguay Buans Orange	190-191		Do
53	Japan	1858 (new compilation)		Saikia, 2004

Table: 10 Writings on Earth Science in Orunodoi

4.2.4.2 Writings on Earth Science in Assam Bandhu

In the Assam Banndhu, there was only one writing on earth science. It was on 'Earthquake'. The name of the writer was mentioned as K. B. (Karunabhiram Baruah). In the article the writer tried to offer scientific explanation of the causes of earthquake. He also described the effects of earthquake and recalled the massive damages caused by earthquake in earlier centuries.

Sl. No.	Topic	Page	Writer	Source
1	Earthquake	417-419	K. B.	Saikia, 2003

Table :11 Writings on Earth Science in Assam Bandhu

4.2.4.3 Writings on Earth Science in Mau

In the Mau, three writings on Natural Geography were found. Each writing consisted of several chapters. The first writing included chapters on the shape of the earth, size and density of the earth, heat of the earth and formation of the earth. The second writing included the chapters on the movement of the earth, imaginary hemispheres, natural classifications of the earth, determination of a place, determination of directions, names of the lands and water bodies. In the third writing there were chapters on vertical relief and Mountain.

- **Writings on Earth Science in Mau**

Sl. No.	Topic	Page	Writer	Source
1	Natural Geography: Chapter 1 Shape of the Earth Chapter 2 Size and density of the Earth Chapter 3 Heat of the Earth Chapter 4 Formation of the Earth	33 37 38 39-41		Sarma, 2008
2	Natural Geography Chapter 5 Movement of Earth Chapter 6 Imaginary hemispheres	59 60		Sarma, 2008,

	Chapter 7 Natural classifications of the Earth	62		
	Chapter 8 Determination of a place			
	Chapter 9 Determination of directions	62		
	Chapter 10 Names of the lands and Water bodies	62 63-67		
3	Natural Geography Chapter 2 Vertical Relief Chapter 3 Mountain	138 139		Sarma, 2008

Table: 12 Writings on Earth Science in Mau

4.2.4.4 Writings on Earth Science in Jonaki:

There were four articles on Earth Science published in Jonaki. Three out of those four were on earthquake. The articles discussed the cause and effect of earthquake. It also pointed out the advantages of earthquake. In third writing on earthquake it was tried to calculate the time of the earthquake with the help of astrology. It also tried to provide the scientific explanation of it based on the movement of earth and other heavenly bodies. Another article discussed about the ‘frozen river’. How the ice were

deposited on the high Mountains and how the stream came out of that as the ice melted due to the sun was the subject matter of the article.

Sl. No.	Topic	Page	Writer	Source
1	Earthquake and its advantages	222-223	Sri Upendra Nath Baruah	(Saikia, 2001)
2	Earthquake and its advantages	581		Do
3	Frozen river	636-637		Do
4	Earthquake	828		Do

Table: 13 Writings on Earth Science in Jonaki

The trend of writing on earth science was originated in Orunodoi and it continued till the publication of the Jonaki. ‘The shape of earth’ was a common topic in Orunodoi and in Mau. The geographical writings in Mau were much more elaborate than the writings of Orunodoi. The reflection of the scientific knowledge of the writer Late Bolinarayan Bora, an engineer was noticed throughout those writings. In three issues of Mau, a considerable amount of space was devoted only to introduce the natural geography.

Likewise an article on earthquake was published in the Assam Bandhu. It is an essay dealing with the possible causes of earthquake and reminding of the earthquake occurred earlier. But, interestingly, Jonaki devoted three writings on the same topic and

tried to discuss pros and cons of the issue. This elaborate discussion on earthquake indeed covered almost all the aspects related to earthquake which the single article published in Assam Bandhu happened to miss. From these two examples, it is obvious that what an earlier periodical started, the successive one tried to elaborate. So, the writings on earth sciences in the 19th century periodicals were a continuous process. As the time passed by, the new information on the same topic were recorded in the successive periodicals. But, at the same time it is observed that except Orunodoi, no later periodicals of 19th Century included the writings on various places of earth with the same zeal. From that fact it can be derived that the writers of the later magazines did not have the exposure like those of the writer in Orunodoi. So, the tradition of writing about different places on earth did not last after the Orunodoi.

4.2.5 Writings on Astronomy

4.2.5.1 Writings on Astronomy in Orunodoi:

Sl No.	Topic	Page	Writer	Source
1	The solar system	12-13		(Neog, 2008)
2	New Planet viewed	103-104		Do
3	Eclipses in 1848	208		Do
4	Constellation of the Great and Little Bear and Cassiopeia	289-291		Do
5	Eclipse of the sun in Feb. 23, 1849	311-312		Do

6	The solar system (gravitational force)	907-908		Do
7	The planet Jupiter (2 nd Part)	102-103		Goswami, 2018
8	The Moon part I	4		Do
9	The Saturn	66-67		Do
10	The Sun	114-116		Do
11	The Moon part II	114-116		Do
12	Astrology and fortune telling (Conversation between V and Ru about superstition in astronomy (a voice against superstition)	159		Do
13	The sky and the heavenly bodies	1855 Nov 60	Teacher-Student conversation	(Saikia, 2004)

Table: 14 Writings on Astronomy in Orunodoi

As many as thirteen writings on Astronomy were published in Orunodoi. The first one was the introduction to the Solar System. In the writing the name of only seven planets were given as the member of the solar system. Till that time the seventh planet was not christened as Uranus. It was known after its discoverer William Harschel. It was one of the earliest writings in Assamese language carrying information that the earth is a planet in the solar system. Then, the next article was about viewing a new planet. The new planet actually was the Uranus. But till that time, Orunodoi did not mention this name. In fact Uranus was discovered by Harschel in 1781. In 1846, the

new planet Neptune was discovered by Arest Neptune. But Orunodoi did not mention about it. So, the flow of information from one country to another was quite slow during the 19th century. The description of the comet was also found in the writing. The first credible description of the solar system was found in Assamese language in the pages of Orunodoi. Likewise, the first scientific description of eclipse in Assamese language was found in the article 'Eclipses in 1848' published in Orunodoi. The description of gravitational force in solar system was also found in Orunodoi in a separate writing. Then there were description of the planets and other heavenly bodies like Jupitar, the sun, Saturn and the moon in one or two writings on each.

The most important among all these writings is the writing entitles 'Jyotish and Jyotebettar Kotha' (Astrology and fortune telling). Through the conversation of two characters, 'V' and 'Ru' respectively tried to find out the superstition associated with astrology.

4.2.5.2 Writings on Astronomy in Jonaki

After Orunodoi, other periodicals abandoned the trend of writing on astronomy. It was the Jonaki which again published such writings. But, unlike Orunodoi, Jonaki published seven such notes under the column 'Miscellaneous Notes'. Only on e article is devoted to astronomy written by Late Jogakanta Bezbaruah on 'two opinions about astronomy'. He wrote about the solar system with the sun in the centre, comet, meteor etc. in the article. The other notes were about the information of discovery of a star like the sun, relationship between Venus and the Jupiter, falling star, meteor, Mars and Jupiter, solar eclipse, full moon, no moon and length of day in the different places on earth.

- **Writings on Astronomy in Jonaki (Saikia, 2001):**

Sl. No.	Topic	Page	Writer	Remarks
1	Miscellaneous note	340-341		A star like sun
2	Miscellaneous note	430-431		Relation between Venus and Jupiter
3	Miscellaneous note	477		Falling star, meteor
4	Miscellaneous note	505-508		Mars, Jupiter
5	Miscellaneous note	677		Mars
6	Miscellaneous note	740		Solar eclipse
7	Two opinions about astronomy	806	Sri Jogakanta Bezbaruah	Sun is the centre of solar system, comet, meteor etc
8	Miscellaneous note	810-811		Full moon, no moon , length of day is not the same in all places

Table: 15 Writings on Astronomy in Jonaki

The selection of the subject matter by Jonaki shows that it borrowed the tradition of writing on astronomy from Orunodoi.

4.2.6 Writings on Biology

4.2.6.1 Zoology

4.2.6.1 (A) Description of birds in 19th century Assamese periodical

Birds have always been drawing interest due to their colourful feathers, their interesting behavior, their size and their role in the ecosystem. In 19th century Orunodoi took the responsibility of introducing various kinds of birds found across the globe to the people of Assam. In other words, the Orunodoi first introduced the ornithology in Assamese language. Ornithology is a branch of zoology, concerning the study of birds. The essay on the 'Ostrich' published in the issue of Orunodoi, September 1849 may be considered the first writing of this kind in Assamese language. So, it may be said safely that the writings of ornithology was first initiated in Assamese by the periodical.

In Orunodoi there are as many as 37 writings about birds in 163 number of issues recovered till present time. It mostly covered the species which were seen in different countries of the world. There are descriptions of some extinct birds too. For example, the account of Dodo shows that the writers were well informed about the history of extinct birds too. There are as many as 10 birds which are endemic to Assam and its adjacent areas. These are:

1. Hornbill
2. The horned pheasant
3. The Hoopoe
4. The white or Barn owl
5. European Quails
6. Pigeons
7. Vulture
8. House Maina
9. Dove
10. Lesser Adjutant Stork
11. Weaver Bird

The description of the looks of the bird, the size, food habit, habitat and other behaviors were included in the writings. The periodical has the characteristics that it publishes several articles on the same bird, if the previous article had skipped some important facts to include. For example, an article on the pigeons was published in the April issue of Orunodoi in 1858. But the need of some additional information was felt by the periodical and another article on the same topic was published in June 1858 issue of Orunodoi. The seriousness of observation and devotion to deliver possible knowledge to the reader is felt in this sincere effort of writing on birds.

Orunodoi attempted to eradicate superstitious beliefs from the Assamese society. The writing on the Barn Owl published in the September, 1855 issue of Orunodoi mentioned that the people lacking scientific mentality only believed that the ‘niu-niu’ sound made by the barn owl is a bad omen and it indicated the forthcoming death of a family member.

But the description of birds found in different countries across the world indicates the encyclopedic knowledge of the writers. It was indeed an uphill task to encompass the numerous species of birds with detailed description and substantiate with the realistic illustrations in an age when communication system in Assam was not very sound. The variety of birds from different countries mentioned in Orunodoi are:

1. Ostrich
2. Dodo
3. Cassowary
4. Emu
5. Krakatau
6. Goliath Aratoo
7. Owl in England
8. Bird of Paradise
9. Curl Crested Aracari

10. Riya
11. American Wild Turkey
12. Ruff Bird
13. Crested Screamer
14. Megapode
15. Gannet or Solan Goose
16. Grouse
17. Laipoa
18. Red Partridge
19. Umbrella Bird
20. Lyre Bird
21. Toads Regius
22. Crouned Goura Pigeon
23. The Silver Pheasant
24. Poi

Orunodoi also found out appropriate names to the bird of foreign countries, which did not have a name in Assamese. For example, the Ostrich was coined in Assamese as 'Ut-charai'. 'Ut' is the Assamese word for camel. As the bird has some similarity with the animal, it has given the name as 'Ut – charai'. This name is still prevalent in Assamese language. It also named Lyre bird in Assamese as 'Charengadar Pakhi' as it has some affinity with the local Assamese stringed musical instrument called 'Chareng'.

But, not a single writing of this kind have been found in Assam Bandhu, Mau and Jonaki, the three major periodicals published after Orunodoi. The lack of this kind of writing has been felt even in the newspapers published in later period too. Therefore,

it can be safely said that the very foundation of ornithology in Assamese language was established by the first Assamese periodical Orunodoi. Though there were several periodicals in the 19th century, no one could reach the status of Orunodoi regarding the ornithological writings.

Orunodoi did not go much deeper to describe the scientific facts regarding those birds in scientific terms. Instead it simplified the whole description which could be readily intelligible by the laymen of that time. The language is very much colloquial. It tried to stick to the Assam proper names for the birds. But for those birds of which no Assamese name was available, it used the English or the local name of the bird.

4.2.6.1 (B) Description of animals in 19th century Assamese periodicals

Like the writings on birds, Orunodoi had remarkable number of writings about the animals too. As many as 44 writings were found in the recovered copies of Orunodoi, which dealt with the subjects related to animals. It covered the whole range of known and unknown animals for the people of Assam. The list of animals mentioned in Orunodoi is given below:

1. The Lion
2. Pangolin
3. The Tiger
4. The Elephant
5. The Rhinoceros
6. The whale
7. The Buffallo
8. The Ox
9. The Cow

10. The horse
11. The Alpaca or Peruvian Sheep
12. Giraffe
13. The Beaver
14. The Hippopotamus
15. Kangaroo
16. Platypus
17. Wolves
18. Pangolin
19. The Zebra
20. Marmoset
21. Apes, Gibbon and Monkey
22. The Porcupine
23. The Ibex or Mountain goat
24. Armadillo
25. The Chlamyphorus or Pehiciaage
26. The Seal
27. The Black Tiger
28. The polar or white bear
29. The Walrus
30. The gnou or horned horse
31. Wild sheep of Punjab
32. The Elk
33. The four horned sheep

34. The Tapir
35. The Alpaca or Peruvian sheep
36. The Opossum
37. The Wild cat
38. The Capybara
39. The Oryx
40. The River Porpoise
41. The Bear

It is worthy to be noticed that sometimes there were writings on the same topic in several issues of Orunodoi. But the writings were not the mere repetitions. Instead, every time the writing with the same title included some newer information which did not let the readers to get annoyed. For example, in the May, 1846 issue of Orunodoi there was an essay entitled 'Description of Lion' (Singhar Bibaran) which included the information like habitat, nature, size and physical power of the lion. It also described how lion is tamed by man and how they earn money by showing it to the people. There was another essay with the same title published in the issue of June, 1858. Interestingly, this writing included the expert comment on lion about the variety within the species. It was more specialised writing with details about the nature of the lion and how the cubs were raised by the lioness than the earlier one. It also mentioned the cause of infighting among the lions. The statistics of the age of lion is also interesting which is found in this writing. In this writing, it was hinted that in the May, 1858 issue of Orunodoi, there was a description of lion too. But it can be observed that the Orunodoi did not have any rigid pattern of continuing the same subject in several issues of it. Whenever it receives information on that topic it simply published. But the gradual sophistication of writing, inclusion of more and more information than the earlier ones indicates the maturity of writings in the course of time.

Undoubtedly, it can be said that Orunodoi for the first time introduced some animals to Assamese people in Assamese language. For example, platypus, marmoset,

capybara, elk, tapir, alpaca, beaver etc. are some such animals introduced by Orunodoi with realistic graphics.

This tradition came to an end just with the Orunodoi. No other writing of this kind was noticed in any other periodicals of 19th century.

4.2.6.1 (C) Writings about reptiles in 19th century periodicals:

The description of some reptiles found in Orunodoi was very interesting. In a writing published in Orunodoi November, 1850 issue on the ‘Sea Serpent’ can draw the attention of the readers for several aspects. First of all, it is yet to be ascertained whether such a creature really exists or not. The writing provides detailed account of witnessing this kind of sea serpent by several seafarers in different points of time in different locations. It also described the looks and the velocity of the creature in water. So, there is scope to discover the creature and learn more in course of time if the species is still exists. The curiosity of the reader was increased by this type of writing rather than satisfying them with information. Although there are some references of sea serpent or sea dragon in Greek and Hebrew mythology, this description in Orunodoi of sighting the creature is indeed different from those mythical ones.

On the other hand other writings on the reptiles are descriptions mostly found in different countries other than Assam. These writings introduced those strange creatures found in other countries and broadened the horizon of knowledge of Assamese readers. The reptiles described in Orunodoi are listed below:

1. The Rattle Snake
2. The Iguana
3. The Tortoise
4. Sea Serpent
5. The Cobra

Like the writings on birds and animals, the periodicals published in 19th century after Orunodoi abandoned the tradition of writing on single species.

4.2.6.1 (D) Writings about insects and other creatures in 19th century periodicals

Insects are a category of creatures with a considerable numbers in the world. Orunodoi cast a light on the insects in numerous writings. The accounts on the insects reflected the sincerity of the writer who observed them of his own.

The scientific mentality of the writer of those writings is very much prevalent in these writings. For example, the writing entitled ‘Locusts in 1844’, published in June, 1846 issue of Orunodoi pointed out how much conscious the writer was. Earlier he noted down that on January 27, 1844 a huge swarm of locusts appeared in Sibsagar and started eating vegetation in the entire area. Those remained for three days. Assamese people had the conception that it is a bad omen and it preceded some untoward incidents in the country. The writer waited for two years to find out the truth of the belief. But, nothing occurred during that time. So, he arrived at the conclusion that it was a wrong conception that the locusts were bad omen for the people. The record keeping habit of the writer and his constant endeavour to find out the truth attributed him the scientific mentality. The incident occurred even before the publication of the first issue of Orunodoi.

The writing on bees too had the evidence of good observational power of the writer. The writer described the social life of the bees with their behaviours in different situations. The concept of apiary was also there in the writing. While writing about the scorpion in the October, 1856 issue of Orunodoi, he gave an account of firsthand experience of keeping such a creature in Guwahati. Another writing of the mole cricket shows the historical knowledge of the writer. He described how those mole crickets were used to punish the convicts in the medieval period in Assam.

The first information about microscope was also published in the Orunodoi. It published in June, 1847 issue a picture of the creatures seen through microscope inside a drop of water. The illustration of the creatures was interesting to catch the eyes of the

readers. The interesting line included in the short description is that all the human beings including Brahmin and Mahantas were eating those creatures unknowingly along with water. It is a hint that the most pious men who adopt non-violence towards all creatures are also unaware of killing the tiny creatures found in water.

The list of insects and other creatures found in the writings of Orunodoi are given below:

1. Locust in 1844
2. The bee
3. Asiatic Centipede
4. The Scorpion
5. Mole Cricket : Kumoti
6. lice in microscope
7. Purubhuj (a kind of worm)
8. The worm with shining head (Phulgoria)
9. The great pipe fish or sea horse
10. A drop of water seen through microscope
11. Sea shells

Apart from the insects Orunodoi had some short writings on other creatures like sea horse and sea shells. There were some illustrations with the short writings on those creatures. It also mentioned some interesting facts like how people in Assam make lime and chew with betel nut by burning the shells found in the land.

Orunodoi was the first periodical to inform in Assamese language about the blood circulation system (May, 1946) inside the body. It pointed out that the blood circulation system in a body functions like the water supply system in London city.

4.2.6.1 (E) Other writings related to zoology in Orunodoi:

1. Circulation of Blood
2. Children found among wolves
3. Pangolin killed at Sibsagar(Darika riverbank)
4. Difference between men and animal

- **Zoological writings in Orunodoi:**

Sl No.	Topic	Page	Writer	Source
1	The Lion	32	॥	Neog, 2008
2	Circulation of Blood	37	व.	Do
3	Pangolin	43	व.	Do
4	Locust in 1844	45	द.	Do
5	The Tiger	47-48	§	Do
6	The Elephant	63-64	§	Do
7	The Rhinoceros	83-84	§	Do
8	The whale	90-92	§	Do
9	A drop of water seen through microscope	142		Do
10	The Buffallo	204	§	Do
11	The Ox	210-212	§	Do
12	The Cow	218-219	§	Do

13	The bee	265	.	Do
14	The horse	347-350	.	Do
15	The Alpaca or Peruvian Sheep	357	.	Do
16	Giraffe	363-365	.	Do
17	The Ostrich	371-372	.	Do
18	The Beaver	402-404	.	Do
19	The Rattle Snake	411-412	.	Do
20	The Iguana	415	.	Do
21	The Dodo	423		Do
22	The Casowary	431	.	Do
23	The Hippopotamus	456		Do
24	The Tortoise	486		Do
25	Sea Serpent	494		Do
26	Description of Australia: Kangaroo, Platypus, Emu, Krakatau	503-504		Do
27	The Goliath Aratoo of New Guniea	638		Do
28	Owl in England	638	.	Do
29	Children found among wolves	752	.	Do
30	Bird of Paradise	784-785	.	Do

31	Pangolin killed at Sibsagar(Darika riverbank)	800	.	Do
32	Difference between men and animal	931-932		Do
33	The Curl Crested Aricari	954	.	Do
34	The Zebra	995-996	.	Do
35	Velocity of bird	1014	ভ.	Do
36	Description of the Cobra	1059		Do
37	Wingless Riya Bird	1081	.	Do
38	Horse attacked by bees	1110	ন.ল.ফ.	Do
39	The Hornbill	1119	প্র.চ.দ.	Do
40	Marmoset	1123	.	Do
41	Apes, Gibbon and Monkey	1136-1138		Do
42	The American wild Turkey	1167	.	Do
43	The Porcupine	1211	.	Do
44	The horned pheasant	1227		Do
45	The great pipe fish or sea horse	1236		Do
46	The Ibex or Mauntain goat	1237-1238		Do
47	Ruff Bird	1248		Do
48	Asiatic Centipede	1253	.	Do
49	Armadillo	1254	.	Do
50	The Crested Screamer	1257		Do

51	The Panguin	1258		Do
52	The Chlamyphorus or Piehiciaage	1268		Do
53	The Hoopoe (2 nd part)	27		Goswami, 2018
54	The Seal	38		Do
55	The Black Tiger	41		Do
56	Maund raising Megapode Bird	53		Do
57	The polar or white bear	58		Do
58	The Walrus	61		Do
59	The gnoo or horned horse	79-80		Do
60	Gannet or Solan Goose	90		Do
61	Wild sheep of Punjab	95		Do
62	The Grouse, the cock of the woods	102		Do
63	The Elk	106		Do
64	The Laipoa			Do
65	The four horned sheep	123		Do
66	Red Partridge	131		Do
67	The Tapir	138		Do
68	The Coral	142		Do
69	The White or Barn Owl (against superstition)	143		Do

70	The European Quails	157		Do
71	Sea shells	168		Do
72	The Alpaca or Peruvian sheep	68		Do
73	The Umbrella bird	83		Do
74	The Lyre Bird	100		Do
75	The Opsum	106		Do
76	The Wild cat	133		Do
77	The Scorpion	157		Do
78	The Capybara (animal)	176		Do
79	The Oryx (animal)	186		Do
80	The Toads Regius (bird)	187		Do
81	The Weaver Bird	4		Do
82	The Crowned Goura Pigeon	8		Do
83	The Silver Pheasant	40		Do
84	The Poi Bird	156/7		Do
85	Purubhuj (a kind of worm)	20		Do
86	Image of lice in microscope (Dramatic expression)	52		Do
87	The worm with shining head (Phulgoria)	68		Do

88	Mole Cricket : Kumoti	70		
89	House Maina	1858 January		Saikia, ed. 2004
90	Pigeons: Grihabaj, Nat Paro	1858 January		Do
91	Lesser Adjutant Stork	1858 Feb		Do
92	The River Porpoise	1858 March		Do
93	Pigeons	1858 April		Do
94	The Lion	1858 May		Do
95	The Vulture	1858 July		Do
96	Dove and Pigeon	1858 July		Do
97	The Bear	1858 September		Do

Table: 16 Zoological writings in Orunodoi

4.2.6.2 Zoological writings in Assam Bandhu:

There were only three writings related to zoology in Assam Bandhu. Unlike the writings published in the Orunodoi, which dealt with specific animals or birds, these were some generalization on different aspects of living beings. For example, the article entitled ‘Life of the living beings’ (pp. 447-449) discusses the two types of living beings, namely plant and animals. It discussed how the living beings remain alive. The second article published in Assam Bandhu of this kind was on ‘Physical labour’ (pp.

469-472). The role of physical in among the living beings was discussed in the article. How blood circulation become possible in a body through the movement of the organs was discussed in the article. The third one was the extension the first article ‘Life of the living being’ (p. 498). The detailed description of the functions of lungs was given in this article.

1. Life of the living beings
2. Physical labour
3. Life of the living beings

- **Zoological writings in the Assam Bandhu** (Saikia, 2003):

Sl. No.	Topic	Page	Writer	Remarks
1	Life of the living beings	447-449		
2	Physical labour	469-472	Sr. M.	
3	Life of the living beings	498		

Table: 17 Zoological writings in the Assam Bandhu

No writings on zoological subjects are found in Mau.

4.2.6.3 Writings on zoology in Jonaki:

The writings related to zoology published in the Jonaki were more analytical and sophisticated in nature. For example, the articles in three episodes on ‘Body Science’ depict how the living beings move their organs. But in the second episode of the article

is much more complicated and offered a completely new set of knowledge regarding the cells of a body. It also discussed the different types of changes inside the cells. This was the first time in Assamese writings where a latest scientific concept was mentioned regarding the formation of the body of a living being. In the third episode of the writing it described how digestive system in a body functions. Likewise, the essay on 'Alimentation' also discussed about the various functions of Mouth and the glands in the pharynx and esophagus.

Jonaki followed the style of Assam Bandhu rather than the style of Orunodoi in subject selection for its writings. Instead of discussing the characteristics of a single species, it concentrated on more specific issues, like how a body of a living being functions, how different organs perform different tasks etc. For example, in the essay "Different parts of an eye" (466-467) the in depth knowledge of the different parts of an eye is given to the readers. Likewise, Jonaki also wrote on the same topic as the Assam Bandhu did. It had the article written by a female student on 'Physical Labour' (312-313) with the same subject matter which was published in the Assam Bandhu a few years back. Another writing on Zoology by Kanaklal Baruah discussed the process of evolution along with the categorization of the animals and birds.

1. Body Science 57-59
2. Body Science 70-71
3. Alimentation 72-74
4. Body Science 83-85
5. Physical Labour 312-313
6. Miscellaneous note (Small worm) 354

7. Miscellaneous note (the age of animal determination process, memories of people of different countries) 430-431
8. Different parts of an eye 466-467
9. Miscellaneous note 468
10. Zoology (Evolution) by Kanaklal Baruah 597-602
11. Body and mind 766

- **Zoological writings in Jonaki** (Saikia, 2001):

Sl. No.	Topic	Page	Writer	Remarks
1	Body science	57-59		
2	Body science	70-71		cell
3	Alimentation	72-74		Description of Mauth
4	Body science	83-85		Digestive system
5	Physical labour	312-313		
6	Miscellaneous note	354		Small worm
7	Miscellaneous note	430-431		The age of animal determination process, memories of

				people of different countries
8	Different parts of an eye	466-467		
9	Miscellaneous note	468		Cobra eating insects
10	Zoology	597-602	Kanaklal Baruah	Evolution
11	Body and mind	766		

Table: 18 Zoological writings in Jonaki

4.2.7 Writings on Botany:

4.2.7.1 Writings on Botany in Orunodoi:

Sl No.	Title	Page	Writer	Source
1	The clove tree	192		Neog, ed. 2008
2	The Nutmeg tree	216-217	§	Do
3	The Milk or Butter Tree (2 nd part)	26		Goswami, ed. 2018
4	A wonderful tree : Fracksnila			do
5	The grapes	1858 June		Saikia, ed. 2004

Table: 19 Writings on Botany in Orunodoi

Compared to the writings on Zoology, there are very few writings on botany in all the periodicals of 19th century. In Orunodoi, there are only five writings describing different trees. The process of collecting buds and drying those for future use were described in the writing entitled 'The Clove Tree'. In the writing entitled 'The Nutmeg Tree', the detailed description the tree was given. The use of the fruits and how those could be preserved for future use were discussed in details. The writing was concluded with a poem on the fruit of the nutmeg tree and its various use. Both the writings were substantiated by two illustrations of the trees. 'The Milk or Butter Tree' was a comparatively short writing which describes the process of collecting milk-like substances from the tree. On the other hand the 'A Wonderful Tree: Fracksnila' was a long article on a strange tree which got burnt when a lamp or any kind of fire was brought to the proximity. The writing also discussed various experiments carried out by different scientists on the properties of the strange tree. Both the two writings were not accompanied with illustrations. In the writing on 'the grapes', the process of making wine from the juice of grapes was described in details supported by some illustrations.

1. The clove tree (192)
2. The Nutmeg tree(216-217)
3. The Milk or Butter Tree (1855, No 2, p 26)
4. A wonderful tree : Fracksnila (1857 no 6, p 91)
5. The grapes (Arunodoi compilation by Arup Saikia, p 50)

In Jonaki too, there were some writings on plants. In one article, it the rules of pollination and germination were discussed in details. In another article about carnivorous plants the behavior of the plant and how it sucks the juice from other living beings was discussed. In the writing about utility of plants, the writer Sri Saif Uddin Ahmed wrote about the various uses of trees and plants in our day to day life.

4.2.7.2 Writings on botany in Jonaki:

1. Rules of occurrences of the plants (180-181)
2. Carnivorous plants (240)
3. Utility of the plants (765)

Sl. No.	Topic	Page	Writer	Source
1	Rules of occurrence of the plants	180-181		Saikia, 2001
2	Carnivorous plants	240		Do
4	Utility of the plants	765	Sri Saifuddin Ahmed	do

Table: 20 Writings on botany in Jonaki

4.2.8 Writings on Social Science

4.2.8.1 Writings on Social Science in Orunodoi

Orunodoi introduced various societies and people to the people of Assam. The descriptions of the tribes living in Assam at that time received much importance. Among those Garos, Nagas, Khamtis, Mishmis, Singphos, Miris and Dophlas were remarkable. In those writings the nature of the tribal people, relationship with British, their method of cultivation, social institutions like marriage, funeral customs were discussed with minute details. Most of the time, Orunodoi did not forget to mention that they were not civilized as they worship several gods and goddess. For example, in the second part of the 'Account of the Nagas' it is revealed that head hunting and other social evils prevailed among them as they were not Christian and offered worship to different gods and goddesses. For Orunodoi, civilization was the synonym of

Christianity. While it talked about the superstitious fear related to cholera, it again had the opinion that it was a result of sin committed by the sufferer.

- **Writings on Social Science in Orunodoi**

Sl. No.	Title	Page	Writer	Source
1	An account of Bhutan	53-54		Neog, ed. 2008
2	Great Britain	71-72		Do
3	Egypt (astrology, Pyramid, After Alexender)	79		
4	Customs of different countries in disposing their dead	107-108		Do
5	Description of Laplanders	123-124		Do
6	Superstitious fear of Assamese in times of Cholera (Against superstition, yet it is considered to be the result of sin)	136-137	D.	Do
7	Account of the Garos	138-40		Do
8	Account of Nagas	242-244		Do
9	Accounts of the Khamti			Do
10	Account of Mishmis	251-252		Do

11	Account of Singphos	255-257		Do
12	Abors, Miris and Dophlas (Opium cultivation)	280-281		Do
13	Akas	316		Do
14	The aboriginals of America	1036-1048		Do
15	The character of Nagas (2 nd Part) (Derogatory, head hunting, worshipping different gods and goddesses. Death sentence)	31		Goswami. 2018
16	The Bushman	86-87		Do
17	Remarriage of Hindu Widows (Government's order)	114-115		Do
18	Writing for Hindu Widows about Iswarchandra Bidyasagar	131-132	G. B.	Do
19	Marriage in China	1858 january		Saikia, 2004

Table: 21 Writings on Social Science in Orunodoi

4.2.8.2 Writings on social science in Assam Bandhu

The Assam Bandhu too followed the tradition of Orunodoi in writing on social science subjects. There were six articles on Garo people. In those account of Garos the writer, Sri R. Mahanta wrote about the community and their customs but from his own

point of view which sometimes crossed the limit of decency. For example, in the first article about Garo people, he said that Garos were almost like a kind of animal. Citing Darwin, he said that they were the link between apes and the modern men. In the writing on the Bengali people, the writer compared people of Bengal with the tribes of hills in Assam. As those were different in many ways from the people of Assam, they were considered to be inferior. Still there is a weak comment that people of Assam should live with the people of Bangle like brothers.

- **Writings on social science in Assam Bandhu** (Saikia, 2003):

Sl. No.	Topic	Page	Writer	Remarks
1	Account of Garo	101-104	R. Mahanta	
2	Account of Garo	135	Sri R. M.	
3	Bengali	163-168	A. R.	
4	Our People	198-203		
5	Account of Garo		Sri R. M.	
6	Account of Garo	464	Sri R. M.	
7	Women Education	546		
8	Account of Garo	550	Sri R. M.	
9	Account of Garo	595	Sri R. M.	

Table: 22 Writings on social science in Assam Bandhu

In the Mau, there is no such writing on social science. Yet, the writing on ‘Responsibilities of a Woman’ can be kept in this category, where the writer wanted to

confine her amidst the household works. This was completely driven by the personal whims of the writer.

In the Jonaki, there was only one writing on social science. It was written by Saifuddin Ahmed. Again the topic was ‘The Garo People’. The treatment of the subject is almost like the same with the writings on the Garo people in Asam Bandhu.

The writings on social science started with the Orunodoi. But the writers of all the writings were somewhat preoccupied with some prejudices for which the descriptions were not always objective ones.

4.2.9 Writings on Applied Science

4.2.9.1 (A) Writings on Medicinal and health science in Orunodoi:

Sl. No.	Title	Page	Source
1	Injurious influence of tobacco	144-146	Neog, ed. 2008
2	Cholera : Letter from a student in Calcutta	1055-1056	Do
3	The Chronic Dysentery	1265 purnanond sorma	Do
4	A remedy for cholera	78	Goswami, ed. 2018
5	Medicine for cholera invented	30	Do
6	Medicine for snakebite	1867	Saikia, ed. 2004
7	Medicine for dysentery	1867	Do

Table: 23 Medicinal and health science writings in Orunodoi

There were as many as seven writings on medicine and health science. Three writings on cholera indicated that in those days cholera was a dreaded disease occurred frequently. So, the news of invention of the medicine of cholera was published with due importance. The periodical also tried to aware the readers about the cause and effects of cholera and how to avoid taking contaminated water. The responsibility towards the society was carried out efficiently by Orunodoi bringing with the writings on cholera.

It also discussed the injurious influence of tobacco in human body. The news of the medicine for snakebite was also published in Orunodoi.

4.2.9.1 (B) Writings on technology in Orunodoi:

Sl. No.	Title	Page	Writer	Source
1	The Train	2	News	Neog, ed. 2008
2	General Intelligence Death in coal mines in England	10	News	Do
3	Discovery of Printing Press	23		Do
4	Ice houses in Calcutta	31		Do
5	The Thames Tunnel: process of digging	75-78		Do
6	The Eddy stone Lighthouse	131-132		Do
7	The Balloon (1766 experiment)	175-177		Do
9	Russian Sledge drawn by	235		Do

	Dogs			
10	The Great Wall of China	257-60		Do
11	Mr Maigre and his Balloons in Calcutta	321-322		Do
12	Printing Press	353-354		Do
13	Dangers of the whale fishing	592-594		Do
14	First Printed Page	931-932		Do
15	The Times Office	947		Do
16	The Pearl Fisherman of Ceylon	963-964		Do
17	Chinese Junk	999-1000		Do
18	Manufacturing of Decca Muslin	1013-1014		Do
19	Microscope and a cruel boy	1025	Story	Do
20	Account of Telescope	1047-1048		Do
21	The Telegraph	1125		Do
22	The thermometer	1214		Do
23	Steam Engine (2 nd Part)	19-20		Goswami, ed. 2018
24	Sewing Machine	158		Do
25	The Great Chinese Wall	43		Do
26	The inventor of steam	51		Do

	engine			
27	Sulfur production	83-84		Do
28	Gunpowder	162		Do
29	Railroad Engine	179-180		Do
30	Railroad Car	4		Do
31	Electric Telegraph across sea			Do
32	Tea Production in Assam statistics of last year			Do
33	Account of London Bridge	108-109		Do
34	The Thames Tunnel	149-153		Do
35	Handmade paper	68-70		Do
36	Death of cows	53	1860 Nov.	Saikia, ed. 2004
37	Watt inventing steam Engine	68	1856	Do
38	Quality of Tea		1856 March	Do
39	Opium Plantation		1867 Feb	Do
40	Rice Mill		1858 July	Do

Table: 24 Writings on technology in Orunodoi

Information of modern technology was published in Assamese for the first time in Orunodoi. Before that people of Assam did not have the knowledge of the modern day technologies like Railway, printing press, light house, telegraph, thermometer,

sewing machine, steam engine, rice mill etc. Orunodoi described the techniques of construction of the tunnel under river Thames, the Great Wall of China etc. world famous monuments. Moreover, it described several technologies and dangers faced by men to use those. The accounts on technologies in Orunodoi were the first of that kind in Assamese language.

4.2.9.2 Writings on technology in Assam Bandhu:

The most remarkable science writing in Assam Bandhu was the writing on agriculture entitled 'Kheyti'. It is the first article in Assamese language on agriculture. The article discussed on the social causes for which agriculture became neglected profession in Assam.

Apart from it, other writings on Applied science and technology were of primary level. Unlike Orunodoi, it failed to introduce the new world of technology to the people of Assam.

- **Writings on technology in Assam Bandhu** (Saikia, 2003):

Sl. No.	Topic	Page	Writer	Remarks
1	Agriculture	126-129	H.	
2	Illness	153-154	D.C.B.	
3	Cattle (Veterinary Science)			
4	Four doors of Development	235		
5	Household matters	245-247		
6	The thing that quench thirst	262-267		

Table: 25 Writings on technology in Assam Bandhu

4.2.9.3 Writings on technology in Mau:

1. Health and Hygiene in Assam

In Mau, there was only one writing on health and hygiene in Assam. In this article too, it was discussed that contaminated water was the cause of Cholera. As the people of Assam drank water from the water bodies like pond and river, they were very much prone to be attacked by the microbes causing cholera. It requested the government for good drinking water facility in Assam. This problem could be solved by digging wells as suggested by the writer.

4.3 Qualitative content analysis

4.3.1 Formats of Science Writing:

Science writings in 19th century Assamese periodicals were written in different formats. Articles, news, poems, letters and conversation method are formats observed in the periodicals. The writers aimed the general readers to deliver the message through those writings. The choice of the different formats or different genres has the intention that the contents are delivered to the readers in a familiar way. For example, if it is in letter format, the readers would know that the writer had been sending it from a distant land. If it is a conversational format between two persons, then readers will get the answers of their own question from the conversation. The colloquial nature of conversation format attracts the readers.

While categorizing the science writings in 19th Century Assamese periodicals as many as five types of formats are found. These are News, Articles, Conversations, Letter and Poem. It is obvious that the purpose of choosing the genre for science writing depends on the subject matters too. For example, if the subject is a recent development in the field of science and technology, a discovery or invention, then news is the better format to inform the readers about that for the first time. Article format is used to

discuss different aspects of a particular subject of science. It is comparative a lengthy piece of writing and provides overall idea of the subject matter in a sober way. Conversational format is used to make the writings nearer to the readers. If the colloquial elements are fused in that format, common readers find it interesting to go through. They can learn from the conversation in writings. On the other hand Epistolary format or letter format is used to provide a sense of distancing. The writer tries to introduce a topic from another part of the world to the reader. So, each and every reader may find it quite personal, as if the writer is writing to him or her only. This personal feeling makes the reading more enjoyable to the reader. It makes a very complicated subject interesting. Poetry, of course in Assam is the oldest form of literature. Everyone have the idea of poetry in literature. The science writer tries to convey his message through poetry because; people love to read out the rhyming words. They pay more interest on a poem than a general kind of writing.

The first Assamese periodical Orunodoi was the experimental ground for the science writers of that time. They started their experimentation in the periodical with their writings. The first science writing appeared in the first issue of Orunodoi in January 1846 in news format. The news was about the train with an illustration.

Science Writings in Orunodoi	
Formats	No of science writings
News	6
Article/descriptive account	236
Conversational	3
Letter	1
Poem	1
Riddle	0

Table: 26 Formats of Science Writings in Orunodoi

In Orunodoi, among the total 247 science writings found till date, 6 are in the news format. As many as 236 science writings are articles. Three are written in conversational style. While one is written in letter format. There is one more in the form of a poem. So, in Orunodoi, the number of articles on science is the highest. From the statistics it can be said that article was the best chosen format by the science writers at that time.

Assam Bandhu had not experimented much on the formats of science writing. Almost all the writings are found in the form of articles, whether those are on physics, chemistry, social science or earth science. So, the writings are descriptive in manner. The periodical failed to follow the experiment done by the Orunodoi on variegated formats of science writing.

It is important to note that the periodical entitled Mau published articles only on the topics of science. All the three articles on 'Natural Geography' are the sign of the writer's great understanding of the subject. So, the 'article' format was suitable for all those writings.

In Jonaki too the science writings mostly appeared in the form of articles. But a new format was used by the writers known as 'miscellaneous notes'. Several topics of science were included in one miscellaneous note. Most of the time, the news of scientific inventions were published in those miscellaneous notes along with other subject matters. Therefore, the information in the miscellaneous notes can be included to the category of news. There are 16 miscellaneous notes out of 44 science writings.

Another important genre introduced in Jonaki is the riddle. Riddle is used to formulate mathematical question. There are three mathematical riddles in Jonaki published till 1900. So, Jonaki experimented with another genre, not found in the earlier newspapers.

Science Writings in Jonaki	
Formats	No of science writings
News (Miscellaneous Notes)	14
Article	23
Conversational	4
Letter	0
Poem	0
Riddle	3

Table: 27 Formats of Science Writings in Jonaki

From the above analysis, it can be summed up as:

- Till 20th century the science writings were written in the following formats:
 - a) Article
 - b) News
 - c) Conversational form
 - d) Letter and
 - e) Riddle
- Article was the widely used format in the 19th century Science Writings in the periodicals.
- Experimentation of using different formats to write Science Writing was started in Orunodoi and it continued till Jonaki.

- Writers in Jonaki used the format ‘riddle’ to teach mathematics. They found it more convenient to take mathematics closer to the common people which were not done in earlier periodicals. Riddles were an integral part of Assamese folk culture.

4.3.2 Vocabulary pattern used in 19th Century Assamese periodicals

Orunodoi brought a new era to Assam. It brought new knowledge, new information which came into the social life. The new additions to the culture needed new vocabulary. The writers of science writings in Orunodoi too faced the problems while describing things. So, first of all they felt the limitation of vocabulary in Assamese language to write about science. In the issue of Orunodoi February, 1855 in the article ‘The Railway’ it is frankly mentioned that in Assamese it is impossible to explain everything about the Railway due to shortage of appropriate words. (Goswami, 2018. p19)

It is also said in the same article that the writers have the shortage of knowledge about the scientific inventions of that time. So, Orunodoi pointed out two challenges in front of the science writers of that time. To overcome the challenge of the shortage of appropriate words, the missionaries tried to translate the borrowed foreign words into simple Assamese words, which were nearer to the language of the people of Assam. They coined Assamese names for the words and used ancient Assamese words to find out appropriate meaning of the foreign words. Where there was no Assamese word available to mean the foreign word, they used the foreign word with an explanation in Assamese.

Dr. Maheswar Neog (2008) listed such words used in the Science writings in Orunodoi:

The new knowledge of geography gave the names of places and things	
Foreign word	Assamese Word
Aurora	উতৰ অৰুন
China	থেহ দেস
Chinese	থেহ লোক
Coal	নাগ মাটি
Compass	কম্পাচ
Crater	ভুমুক
Englishman	ইংৰাজ
Frenchman	ফ্ৰান্সি
Giraffe	নাহৰ ফুটুকীয়া পহ
Grape	লতা পনিয়ল
Gulf	মহাখাল
hour	ঘড়ী
Ice	পানী সিল
Island	মাজুলি
Lava	তপত জোল
Mediterranean sea	ভূমাজৰ সাগৰ
Mile	মাইল

Navigator	নাওবৈচা
Oyster	এবিধ ডাঙৰ শামুক
Pacific ocean	পাচিফিক
Rail road	ধুআৰ ৰথ জোআ ৰেলৰদ
Railway car	ধুআৰ ৰথ
Ship	ভাপৰ নাও
Tide, and ebb	জোৱাৰ ভাটা
United states of America	আমেৰিকাৰ মিল দেশ
New professions offered some new words, sometimes replacing the old ones	
Ambassador	বৰ কাকতি
Assistant	সহাই
Bank	বেলক
Captain	কাপ্তান
Collector	কালেক্টৰ
Collectorate	কালেক্টৰি
Commission	কমিস্যন
Commissionary	কমিস্যনৰি
Company	কম্পানি
Council	কৌঞ্চল

Court	কাচাৰী ঘৰ
Doctor	ইংৰাজী বেজ বৰুৱা
Exhibition	মহা দৰ্শন
Government	গৱৰ্নমেণ্ট
Hospital	বেজ সাল
Insurance	বীমা
Judge	জজ
Law	কানন
Library	পুথিসালি
Magistrate	মাজেস্টৰ
Medical College	প্ৰধান বেজৰ স্কুল
Mint	মাইকী পোৱালী সাল
Museum	দৰ্শন ঘৰ
Office	অফিচ
Parliament	ৰাজ মেল
Police	পোলিচ
School	স্কুল
Zoo	পহু গড়
Case	কেইচ

Compose	কম্পোচ
Correct	কৰেক্ট
Forme	ফৰ্ম

Table: 28 Use of Assamese synonyms in Orunodoi for foreign words

Apart from these English words some from Persia, Hindi and Urdu came into the writings of Orunodoi. However, the use of such words in science writing is not seen. It is because; most of the scientific inventions are done in the western world. So, the vocabulary for those things is borrowed from the European languages, mainly from English.

Interestingly some words coined or used in the science writings of Orunodoi are used in Assamese language in the 21st century. For example, Englishman, mile, bank, captain, collector, court, insurance etc. words are used in Assamese language as used by Orunodoi.

Foreign word	Word used in Orunodoi
Englishman	ইংৰাজ
mile	মাইল
bank	বেনক
captain	কেপ্তেইন
collector	কালেক্টৰ
court	কাচাৰী
insurance	বীমা

Table: 29 Assamese words coined by Orunodoi are still in use

On the other hand some words used by Orunodoi were replaced by some other words in the later years. For example,

Foreign word	Used by Orunodoi	Present word
China	থেহ দেশ	চীন দেশ
Chinese	থেহ লোক	চীনা লোক
Coal	নাগ মাটি	কয়লা
Crater	ভুমুক	গাত
Giraffe	নাহৰ ফুটুকীয়া পহ	জিৰাফ
Grape	লতা পনিয়ল	আঙুৰ
Gulf	মহাখাল	উপসাগৰ
Hour	ঘড়ী	ঘন্টা
Ice	পানী সিল	বৰফ
Island	মাজুলি	দ্বীপ
Mediterranean Sea	ভূমাজ সাগৰ	ভূমধ্য সাগৰ
Navigator	নাওবৈচা	গুৰিয়াল
Oyster	ডাঙৰ শামুক	অয়েষ্টাৰ
Rail Road	ধুআৰ বথ জোৱা ৰেলৰদ	ৰেল পথ
Railway car	ধুআৰ বথ	দবা
Ship	ভাপৰ নাও	জাহাজ
United states of America	আমেৰিকাৰ মিল দেশ	আমেৰিকা

Pacific Ocean	পাচিফিক	প্ৰশান্ত মহাসাগৰ
Ambassador	বৰকটকী	ৰাষ্ট্ৰদূত
Assistant	সহাই	সহকাৰী
Doctor	ইংৰাজী বেজ বৰুৱা	চিকিৎসক
Exhibition	মহাদৰ্শন	প্ৰদৰ্শনী
Government	গৱৰ্ণমেণ্ট	চৰকাৰ
Hospital	বেজ সাল	চিকিৎসালয়
Judge	জজ	বিচাৰপতি
Law	কানুন	আইন
Library	পুথিসালি	পুথিভঁৰাল
Magistrate	মাজেস্টৰ	দণ্ডাধীশ
Medical College	প্ৰধান বেজৰ স্কুল	চিকিৎসা মহাবিদ্যালয়
Mint	মাইকী পোৱালী সাল	টাকশাল
Museum	দৰ্শন ঘৰ	যাদুঘৰ
Office	অফিচ	কাৰ্যালয়
Parliament	ৰাজ মেল	সংসদ
Police	পোলিচ	আৰক্ষী
School	ইস্কুল, পঢ়া সালি	বিদ্যালয়
zoo	পহুগড়	চিৰিয়াখানা

Table: 30 Words used by Orunodoi and replaced in later period

From the above analysis it is seen that most of the words used in the science writing in Orunodoi did not remain permanent in Assamese. It was due to the availability of other appropriate words found by the later Assamese scholars. The words coming from Persian, Urdu and Hindi too contributed to the tradition of replacing the words used by Orunodoi. Behind this, the attempt to establish the Sanskrit language as the origin of Assamese language by the later Assamese scholars was one of the strong reasons which happened with the language used by Orunodoi too.

In this connection the observation of Dr. Miles Bronson is also remarkable. He said that the books written by the missionaries were unpopular among the educated Assamese people. They were against the mode of spelling adopted by the missionaries. They were trying to prove that Assamese language was related to the Sanskrit.

From this statement it is obvious that the educated Assamese people tried to establish the similarity of Assamese with Sanskrit. So, the words coined by Orunodoi were later replaced with some appropriate words borrowed from Sanskrit origin.

For almost 40 years, Assamese language was abandoned in the offices and schools. But 12 years before the publication of the Assam Bandhu, Assamese language regained its former status. But till the publication of Assam Bandhu Assamese language was in mixed form. It was yet to be polished (Saikia, 1998). Unlike Orunodoi and Assam News, Assam Bandhu was not a newspaper. It is a monthly magazine. So, most of the science writings in this magazine were in the form of articles. Following the tradition of Orunodoi, this periodical too coined Assamese words for the English words. For example in the essay 'Dah' there are words like:

English	Assamese
Oxygen	অক্সিজান
Nitrogen	ফাৰজান
Carbon	এণ্ডাৰজান
Hydrogen	জলজান

Table: 31 Coining of words in Assam Bandhu

These words found in the Assam Bandhu were used by the later Assamese writers. But, due to lack of constant development of Assamese vocabulary in the field of science, these words have become almost obsolete in present time. People use the English words again in Assamese instead of those coined words.

In the essay 'Piyah Mora Bostu' it is seen that the words like Soda-water, Lemonade were used by the writer. At the same time, the writer used the Assamese unit of weight as 'Ser' not the British measurement unit 'Kilogram'. In the article 'Unnatir Charikhan Duwar' the words like Compass, telegraph are also found. Those are still in use in Assamese language.

In the article 'Amaluk' it is said that along with the people from different places of the world, some new vocabulary and culture have entered Assam. According to the writer it is a sign of development.

Another periodical Mau also played an important role in the use of new vocabulary. The writings on natural geography found in Mau were indeed some extended version found in Orunodoi. In Orunodoi, the Assamese word for island was 'Majuli'. But Mau used the word 'Dwip' instead of it. This word is still in use in Assamese language. From this observation it may be said that the vocabulary during the days of Mau has got a permanent shape which were accepted by the contemporary readers.

Mau was the first periodical to provide appropriate definitions of the words like 'Dwip' (দ্বীপ), 'Jujak' (যোজক), 'Antarip' (অন্তরীপ), 'Parbat' (পৰ্বত), 'Parbat Punja' (পৰ্বত পুঞ্জ), 'Parbat Shreni' (পৰ্বত শ্ৰেণী), 'Tila' (টিলা), 'Samabhumi' (সমভূমি), 'Mohasagar' (মহাসাগৰ), 'Sagar' (সাগৰ), 'Upsagar' (উপসাগৰ), 'Pranali' (প্ৰণালী), 'Hrad' (হ্ৰদ), 'Nadi' (নদী), 'Upanadi' (উপনদী) and 'Sakhanadi' (শাখানদী). The periodical used the British measurement units like Mile, foot etc. in Assamese language.

Jonaki used the words in the science writings which are now used in Assamese language. The use of language was sophisticated in Jonaki than the earlier periodicals. In Jonaki, the words like electron, electricity were used for the first time in the article 'Guru aru Chatar'. The discussion about the gravity (মধ্যাকৰ্ষণ) was also found in

Jonaki. The word madhyakarshan is still in use in Assamese language. The Assamese synonyms for the words comet, meteor, solar system were used as Dhumketu (ধুমকেতু), Ulka (উল্কা), Soura Jagat (সৌৰ জগত), which are still in use. From the above analysis it is seen that during the course of time from Orunodoi to Jonaki the Assamese language had experimented with scientific vocabularies and attained a stable position at the end of the 19th Century.

4.4 Use of Illustrations:

An illustration works as interpretation or visual explanation of a text. An illustration attracts the readers of a magazine or a newspaper immediately. Then, the illustration provides a support to the texts written with it. The missionaries understood it very well and used illustrations from the very first issue of Orunodoi. The illustrations given in support of texts indeed increased the attraction of the written texts of those science writings published in Orunodoi.

During that period the Assamese language was yet to get its modern sophisticated form. The missionaries very often felt the scarcity of appropriate Assamese words to describe each and every scientific thing. So, the adding of illustration in support of the texts can be observed as a technique to convey an accurate message to the reader. Where the words fail, the illustration may carry the meaning. There are some illustrations in Orunodoi which are published without any texts. Those independent illustrations may also carry some meaning of their own. But it is important to note that there is always a caption under every illustration.

Most of the illustrations are sketches of the things. At that time, use of photographs was not a vogue. So, illustrations were done by hand and then moulds were made to print it in the magazine. However, though photographic reality is absent in those illustrations, they have served the purpose at that time.

But, the other Assamese periodicals in the 19th century could not maintain that tradition. No such illustrations are found in the pages of Assam Bandhu, Mau and Jonaki. There may be two factors. There were lack of experts in drawing the illustrations or they simply ignored the tradition of putting illustration with texts. During the last decades of the 19th century, the Assamese language has received a final structure with a considerable number of vocabularies. So, the writers of the later periodicals may be confident about the power of words they used. Whatever the reason, it is clear that the trend of using illustration with the science writings have come to an end in the 19th century Assamese periodicals. This trend is again observed in the Assamese magazines of the 20th century like Awahan.

4.5 Findings:

From the above analysis the researcher has observed the following points:

4.5.1 About the subject matters:

- The trend of science writing in the Assamese periodicals started with the publication of Orunodoi. In the Assam Bandhu, the frequency of publication of science writing reached the pinnacle. But after that the Assamese periodicals in 19th Century neglected the trend to some extent. So, the frequency of science writing in Mau and Jonaki were decreased. The trend though at first gained momentum became weaker at the end of the 19th century.
- Orunodoi the first periodical included the subject matters of 10 branches of science. These are Physics, Astronomy, Earth Science, Zoology, Botany, Social Science, Anthropology, Applied Science, Mathematics and Statistics. But Assam Bandhu includes writings on Physics, Earth Science, Social Science, Anthropology, Applied Science and Chemistry. On the other hand Mau included

subject matters from Earth Science and technology. Jonaki, the last periodical in the 19th century published science writings on Physics, Astronomy, Earth Science, Zoology, Botany, Social Science and Mathematics. So, it can be said that Orunodoi was on the top in selection of science subjects. It wrote on variety of science subjects which later Assamese periodicals in the 19th century failed to do. However, the Assam Bandhu introduced writing on two subjects in Assamese language. These are Chemistry and Agriculture. It is noticed that no other Assamese periodical in the 19th century could surpass the first Assamese periodical Orunodoi in the context of subject matters of the science writings.

- Orunodoi first wrote about mathematics. But this trend was abandoned by other 19th Century Assamese periodicals. It was again Jonaki which tried to revive the trend of writing about mathematics during the last decade of the 19th century. However, the numbers of such writings are very few.
- Orunodoi also the forerunner in publishing writings on statistics. In Orunodoi for the first time in Assamese language the population data was published. Later, the other 19th century Assamese periodicals abandoned this practice.
- Writing on subjects of physics and physical matters started with Orunodoi. But the writings found in Assam Bandhu are more detailed in nature than those published in Orunodoi. The in depth knowledge is seen in those writings in Assam Bandhu. Surprisingly, Jonaki imitated those writings of Assam Bandhu. The science writers of Jonaki even copied the topic from the writings of Assam Bandhu. For example, the writings on ‘water’ can be pointed out.
- Assam Bandhu was the originator of science writing in the subject matter related to Chemistry. But no writings on that subject are seen in the later Assamese periodicals of the 19th Century.

- Orunodoi remained on top of the list with 53 writings on earth science. The later periodicals followed the path shown by it. Interestingly, Jonaki again imitated the subject matter from Assam Bandhu in the writing about 'Earthquake'. So, it can be said that gradually the interest for scientific knowledge was given less importance by the later Assamese periodicals of the 19th century.
- Orunodoi devoted a lot of space in writing about Astronomy. But, later periodicals almost gave up writing on astronomy. It was Jonaki which included some information about astronomy. But Jonaki included all those information in the 'Miscellaneous Notes'. There is only one article published in Jonaki about astronomy. Therefore, it can be observed that the later Assamese periodicals in the 19th century did not have the sincerity of Orunodoi to publish the writings about astronomy.
- Orunodoi is unchallenged in writing on zoological subjects too. It tried to introduce various native and foreign birds and animals to the people of Assam. Unfortunately that tradition ended with the Orunodoi itself. No other 19th century Assamese periodical wrote article on birds and animals. Jonaki followed the style of Assam Bandhu rather than the style of Orunodoi in subject selection for its writings. Instead of discussing the characteristics of a single species, it concentrated on more specific issues, like how a body of a living being functions, how different organs perform different tasks etc. Jonaki again followed the process of subject selection for the writings on biology. But the writings in Jonaki are more sophisticated and detailed than those published in Orunodoi.
- Orunodoi started the trend of writing on social science and anthropology. Assam Bandhu too followed the path shown by Orunodoi. It published six articles on the 'Garo' people. Though the writer made derogatory comments on Garo people, these were the detailed analysis of various aspects related to them. Jonaki too published one article on social science on Garo people. Jonaki in fact

imitated the writing of the Assam Bandhu. But the number of writings on social sciences decreased after the Orunodoi.

- Orunodoi is the pioneer of writings on medical science. The writings on cholera and dysentery showed that those were the common diseases in Assamese society. So the news of invention of medicine for cholera was published with due importance.
- Likewise writing on applied science and technology were also published in Orunodoi for the first time in Assamese language. Assam Bandhu also published six writings on technology. But after that the other Assamese periodicals of the 19th century abandoned writing about applied science and technology.

4.5.2 About the format and technique used in the science writings in the 19th century Assamese periodicals:

- Till 20th century the science writings were written in the following formats:
 - i. Article / Descriptive account
 - ii. News
 - iii. Conversational form
 - iv. Letter and
 - v. Riddle
- The widely used format of Science Writing in the Assamese periodicals in the 19th century was the article format.
- Experiment of using different formats to write Science Writing was going on throughout the century.

- Writers in Jonaki used the ‘riddle’ format to talk about mathematics. They found it more convenient to take mathematics closer to the common people which were not done in earlier periodicals.
- Likewise the conversational method of explaining scientific matters in the science writing was also a vogue of that time.
- Using illustrations with the science writing was started with Orunodoi. But other periodicals in the 19th century did not follow the trend.

4.5.3 About the language and vocabulary used in the science writings in the 19th century Assamese periodicals:

- In the 19th century there were not enough vocabulary to describe the scientific discoveries in the western world. It was a limitation of those science writings published in the periodicals.
- To overcome the scarcity of appropriate words, Orunodoi coined a lot of words which were closer to the oral language of Assam at that time. But where no such words were available, Orunodoi used the English word in written in Assamese letters.
- Some words coined by Orunodoi for the science writings are still in use in Assamese language. But some other words are changed in later period. It was due to the influence of Sanskrit language as used by the Assamese learned scholars.

- In the periodical *Mau*, most of the definitions related to the earth science were given in lucid language. Those Assamese words used in *Mau* are still in use in Assamese language.
- The trend of coining words was a continuous practice throughout the 19th century Assamese science writings found in the periodicals at that time.

References:

Berelson, B. (1952). *Content Analysis in Communication Research*. Glencoe, Illinois:

The Free Press

Goswami, B.K. (Ed.). (2018). *The Arunodoi* [Sunrise]. Jorhat: Asom Sahitya Sabha

Neog, M. (Ed.). (2008). *Orunodoi* [Sunrise]. Guwahati: Publication Board Assam

Saikia, A. (2002). *Orunodoi* [Sunrise]. Nagaon. Krantikal Prakashan

Saikia, N. (Ed.). (2003). *Assam Bandhu* [Friend of Assam]. Guwahati: Publication

Board Assam

Saikia, N. (Ed.). (2001). *Jonaki* [Firefly]. Jorhat: Asom Sahitya Sabha

Sarma, S. N. (Ed.). (2008) . *Mau* [The bee]. Guwahati: Publication Board Assam

CHAPTER - 5

Conclusions

5.1 In the previous chapter it is discussed that the science writing in Assamese language started with the publication of the monthly periodical Orunodoi. The tradition of science writing was carried forward by the other periodicals of the 19th century. In other words, it can be said that the origin and growth of science writing in Assamese language was possible only because of the Assamese periodicals published in the 19th century.

Since the days of Orunodoi till the end of the 19th century several trends have been observed in the Assamese science writings. These trends are mentioned in the findings of the earlier chapter. These can be observed in terms of subject matters, formats of writing and language and vocabulary used in them.

5.2 Discussion on research questions:

5.2.1 What was the backdrop of science writing in Assam?

The oldest evidence of science writing in the world is related to the ancient Sumerian Civilization. Sumerians used cuneiform to write those science writings. After that the Egyptian civilization recorded the science writings on several papyruses. This trend was also observed in Greek and Roman civilizations too. Then the tradition was adopted by the other writers in different languages. In England, the writings of Francis Bacon show his love for empirical studies of scientific things and happenings (<https://www.famousscientists.org/francis-bacon/>).

In Assam, it is undoubtedly the Orunodoi which laid the foundation of science writing in Assamese language. But, before Orunodoi was published in Assam there were around twenty periodicals were published in the neighbouring Bengal. Dr. Satish Chandra Bhattacharyya in his essay entitled *Orunodoir Arhi Rupe Bangiya Kakat* opined that the newspapers and magazines published in Bengali at that time became the model for the first Assamese periodical Orunodoi (Saikia, 1998). So, before science writings were published in Orunodoi, the Bengali magazines and newspapers paved the way for it. The magazines and newspapers of Bengal like Digdarshan(1818), Samachar Darpan (1818), Bangal Gazattee, Sambad Koumudi (1821), Chamachar Chandrika (1822), Bangadut (1829), Sangbad Prabhakar (1831), Bigyan Sewadhi (1832) etc. were some examples from which the Assamese paper owed a lot. So, before publication of science writings in Assamese in the 19th Century periodicals, the tradition was started in Bengali in that same century.

But when we focus on the Assamese language, it is indubitably the Orunodoi which initiated the trend of science writing. So, along with the literary and linguistic value of the Orunodoi, the attempt to popularize science among Assamese people is also very important aspect of the periodical.

5.2.2 What were the subject matters of the Science writings in 19th Century Assamese periodicals?

According to the subject matters, the science writings in the 19th century Assamese periodicals can be divided into four major categories. These are

1. Writings on pure science
2. Writings on natural science
3. Writings on Social science and
4. Writings on applied science or technology

These categories have several branches. All these are mentioned in the Chapter 4 of this report.

In the earlier chapter it was discussed how the trends of science writing in 19th century Assamese periodicals was started with the publication of Orunodoi in 1846. In the findings of the earlier chapter it is noticed that in the Assam Bandhu, the frequency of publication of science writings reached the top. But after that the Assamese periodicals in 19th Century neglected the trend to some extent. So, the frequency of science writing in Mau and Jonaki were very few. The trend though at first gained impetus, became weaker at the end of the 19th century.

Orunodoi the first periodical included the subject matters of 10 branches of science. Assam Bandhu includes writings on six branches only. On the other hand Mau included subject matters on Earth Science and technology. However, Jonaki, (Saikia, 2001) the last periodical in the 19th century published science writings on seven branches of science. So, it can be said that Orunodoi was on the top in selection of science subjects for the science writing. It included variety of science subjects, which later Assamese periodicals in the 19th century failed to do. Though writings on mathematics started with Orunodoi, no such writing was seen in Assam Bandhu and Mau. It was the Jonaki which again revived the trend of writing on Mathematical subjects. Compared to other subjects of science writing, the number of writing on pure science were very few.

Though writings on physics and physical matters started with Orunodoi, the writings in Assam Bandhu carried better insight and depth of knowledge than the earlier ones. It was also a trend of that time that writings on a particular topic in earlier magazine was again repeated in the next but with more information and analysis. In the 19th century, only Assam Bandhu included two writings on Chemistry.

Orunodoi remained on top of the list with 53 writings on earth science. The later periodicals followed the path shown by it. Interestingly, Jonaki again imitated the subject matter from Assam Bandhu in the writing about 'Earthquake'. So, it can be said that gradually the interest for scientific knowledge was given less importance by the later Assamese periodicals of the 19th century.

Orunodoi devoted a lot of space in writing about Astronomy. But, later periodicals almost gave up writing on astronomy. It was Jonaki which included some

information about astronomy. But Jonaki included all those information in the 'Miscellaneous Notes'. There is only one article published in Jonaki about astronomy.

Orunodoi is matchless in writings on zoological subjects too. It attempted to describe various native and foreign birds and animals. Unfortunately that tradition ended with the Orunodoi itself.

Orunodoi started the trend of writing on social science and anthropology. Assam Bandhu too followed the path shown by Orunodoi. It published six articles on the 'Garo' people. Though the writer made derogatory comments on Garo people, these were the detailed analysis of various aspects related to them. Jonaki too published one article on social science on Garo people. Jonaki in fact imitated the writing of the Assam Bandhu. But the number of writings on social sciences decreased after the Orunodoi.

Orunodoi is the pioneer of writings on medical science. The writings on cholera and dysentery showed that those were the common diseases in Assamese society. So the news of invention of medicine for cholera was published with due importance.

Likewise writing on applied science and technology were also published in Orunodoi for the first time in Assamese language. Assam Bandhu also published six writings on technology. But after that the other Assamese periodicals of the 19th century abandoned writing about applied science and technology.

5.2.3 What were the formats and techniques applied in the Science Writings in 19th century Assamese Periodicals?

Till 20th century the science writings in Assamese periodicals were written in article, news, conversational form, letter and riddle formats. Article was the most widely used format of science writing at that time. However, the experiment of using different formats of writing about scientific subjects in the 19th century Assamese periodicals was going on throughout the century.

The reason behind using different formats in the science writing was to attract the readers' attention. For example the writers in Jonaki used the 'riddle' format to talk about mathematics. They found it more convenient to take mathematics closer to the common people which were not done in earlier writings. Likewise the conversational method of explaining scientific matters in the science writing was also a vogue of that time. Using illustrations with the science writing was started with Orunodoi. But other periodicals in the 19th century did not follow the trend.

5.2.4 What was the language and vocabulary pattern in the science Writings of 19th century Assamese periodicals?

In the 19th century there were not enough terminologies to describe the scientific discoveries in the western world. It was a limitation of those science writings published in the periodicals. To overcome the scarcity of appropriate words, Orunodoi coined a lot of words which were closer to the oral language of Assam at that time. But where no such words were available, Orunodoi used the English word written in Assamese letters.

Some words coined by Orunodoi for the science writings are still in use in Assamese language. But some other words are changed in later period. It was due to the influence of Sanskrit language as used by the Assamese learned scholars. In the periodical Mau, most of the definitions related to the earth science were given in lucid language. Those Assamese words used in Mau are still in use in Assamese language. The trend of coining words was a continuous practice throughout the 19th century Assamese science writings found in the periodicals at that time.

5.3 Scope for further study

This research work primarily examines the various trends in science writing in the 19th century Assamese periodicals. Due to the limitation of time and vastness of the subject the trends in science writing in the 20th century Assamese periodicals are not thoroughly examined in this research. So, it is a primary research of this kind to highlight the issues related to the subject based on the 19th century science writings.

There is scope to extend the research for the 20th century too. Any researcher willing to do further research in this field can go for this research. However, if any researcher in this field in future receives any help from this research work, it will be a matter of satisfaction for the researcher.

References:

Saikia, C. (Ed.). (1998). *Asomor Batri Kakot-Alochanir dersha Bosoriya Itihash* [150 years history of Assamese Newspapers and Magazines]. Guwahati: Celebration Committee of 150 years of newspapers in Assam

Saikia, N. (Ed.). (2001). *Jonaki* [Firefly]. Jorhat: Asom Sahitya Sabha

Bibliography

- Bakatial, B. (2000). *Ahom rajsabhar sahityar buranji* [History of the literature in the court of Ahom King]. Dibrugarh: Bhadreswar Bakatial
- Barpujari, H. K. (1986). *American Missionaries and North East India*. Guwahati: Spectrum Publications
- Barpujari, H. K. (2007). *The comprehensive History of Assam*. Guwahati: Publication Board Assam
- Baruah, H. K. (2003). *Panindranath Gogoi Rachanawali* [Collection of the writings of Panindranath Gogoi]. Dibrugarh: Bani Mandir
- Baruah, P.C. & Goswami, B. (Ed.) (1998) . *Asomor Sangbadik: jivan parichiti* [Journalists of Assam: Introduction]. Guwahati: Celebration Committee of 150 years of newspapers in Assam.
- Bernal, J. D. (1939) *The Social Function of Science*. London: George Routledge & Sons Limited.
- Berelson, B. (1952). *Content Analysis in Communication Research*. Glencoe, Illinois: The Free Press
- Berger, A. A. (2012). *Media Analysis Techniques*. New Delhi: Sage Publications India Private Ltd.
- Bezbaruah, L. (2014). *Mur Jivan Suworan* [Memories of my life]. Guwahati: Lawyer's Book Stall
- Bhuyan, A. (Ed.). (2000). *Nationalist Upsurge in Assam*. Guwahati: Editorial Board on Behalf of Govt. of Assam
- Bhuyan, S.K. (2012). *An Assamese Miscellany*. Guwahati: Publication Board Assam
- Bhuyan, S.K. (2012). *Assam in the 18th Century*. Guwahati: Publication Board Assam
- Blum, D. & Knudson, M. (1997). *A Field Guide for Science Writers, USA*: OUP

- American Baptist Foreign Mission Society: One Hundred and Eighteenth Annual Report. (1932). 152 Madison Avenue, New York, Foreign Mission Headquarters: Board of Management.
- Bordoloi, P. (2012). *Itihasor Patot Asomor Sambad and Sangbadikata*. [Newspapers and journalists of Assam in the pages of history] Guwahati: Publication Board Assam
- Borua, P.C. (2012). *A Short History of Assamese Newspapers*. Guwahati: Sahitya Ratna Prakashan
- Bronson, M. (1839). *Spelling Book and Vocabulary in English, Assamese, Singpho and Naga*. Jaipur: American Baptist Mission Press
- Brown. N. (1848). *Grammatical Notices of the Assamese Language*. Sibsagar: American Baptist Mission Press
- Chakravarty, B. (2011). *Colonialism and social history of a vernacular Assamese language and folklore in the nineteenth century* (Doctoral thesis). Gauhati University. Guwahati
- Chatterjee, Dr. Suniti Kumar. (1970). *The Place of Assam in the History of Civilisation of India*. Guwahati: Department of Publication, University
- Choudhury, R.D. (2012). *Some Aspects of History and Culture of Assam*. Guwahati: Publication Board Assam
- Das, B. (2019). *Assam Mission in Missionary Magazine*. Boston, India: Notion Press
- Devi, P. (2005). *Itihasat Bigyan* [Since in the History]. Guwahati: Publication Board Assam
- Gannon, R. (Ed.). (2007). *Best Science Writing: Readings and Insights*. Hyderabad: Universities Press India Pvt. Ltd.
- Gait, E.A. (2017). *A History of Assam*. India: EBH Publishers

- Goswami, D.C. (2007, July). Science Popularisation Activities in Assamese. *Indian Journal of Science Communication*. 6(2). 3-8
- Goswami, B.K. (Ed). (2008). *Asom Pradipika* [Lamp of Assam]. Guwahati: Publication Board Assam
- Goswami, B.K. (Ed.). (2018). *The Arunodoi* [Sunrise]. Jorhat: Asom Sahitya Sabha
- Goswami, D. (2004). *Socio-Literary Conditions as Reflected in the Nineteenth Century Assamese Journals* (Doctoral thesis). Gauhati University. Guwahati
- Goswami, D. (2005). *Unnabingsa Satikar Patabhumit Asomiya Sambad Patrar Udhbahab aru Bikash* [Origin and development of newspapers in Assam in the 19th century]. Golaghat: Kamargaon Regional Journalist Association
- Goswami, H. (2009). *Descriptive Catalogue of Assamese Manuscripts*. Guwahati: Department of Historical & Antiquarian Studies in Assam
- Guha, A. (1977). *Planter Raj to Swaraj*. Delhi: Indian Council of Historical Research
- Haque, Aziz-ul. (2019). *Avadan: Contribution of Baptist Missionaries Towards Assam*. Guwahati: Author
- Hazarika, P. (2014). *Charyyapada* [Song of Buddhist Monks]. Guwahati: Dalimi Prakashan
- Kakati, B. (1995). *Assamese: Its Formation and Development*. New Delhi: LBS Publication
- Kalita, R.C. (2008). *Assam Association: A Study in Regionalism*, Guwahati: Publication Board Assam
- McQuail, D. (2012). *McQuail's Mass Communication Theory*. New Delhi: Sage
- Mahanta, A. (Ed.). (2008). *Ghar Jeuti* [Light of the house]. Guwahati: Publication Board Assam
- Mahanta, P. (2007). *Bharat Adhunik Bigyan* [Modern science in India]. Guwahati: Publication Board Assam

- Majumdar, P.(Ed.). (2007). *Asomot Bigyan Charchar Dhara* [Trends in study of science in Assam], Guwahati: Publication Board Assam
- Mark.J.J. (2019) Mesopotemian Science and Technology, *Ancient History Encyclopeia*. Retrived from https://www.ancient.eu/Mesopotamian_Science/ Medhi, S.B. (1978). *Transport System and Economic Development in Assam*. Guwahati: Publication Board Assam
- Mills, A. J. M. (1984). *Report on the Province of Assam*, Guwahati: Publication Board Assam
- Mondal, N, C. (2012, March). Popular Science Writing in Bengali: Past and Present. *Science Reporter*. 49(03), 43-45. Retrieved from <http://nopr.niscair.res.in/bitstream/123456789/13678/1/SR%2049%283%29%2043-45.pdf>
- Neog, M.(Ed.) (2008). *Orunodoi* [Sunrise]. Guwahati: Publication Board Assam
- Robinson, W. (2011). *A descriptive Account of Assam*. Guwahati: Bhabani Print and Publications.
- Roy, A & Dutta, A. (2011). *Science Communication in Assam*, Guwahati: DVS Publishers
- Saikia, A. (2002). *Orunodoi* [Sunrise]. Nagaon. Krantikak Prakashan
- Saikia, C. Ed. (1998). *Asomor Batri Kakot-Alochanir dersha Bosoriya Itihash* [150 years history of newspapers and magazines in Assam]. Guwahati: Celebration Committee of 150 years of newspapers in Assam
- Saikia, N. (Ed.). (2001). *Jonaki* [Firefly]. Jorhat: Asom Sahitya Sabha
- Sarma, D.(2007). *Asomiya Jati Gathan Prakriya aru Jatiya Janagosthigata Anusthan Samuh* [The process of Assamese nationbuilding and the institutions of different communities] Jorhat: Ekalavya Prakashan
- Sarma, S.N..(Ed.). (2008). *Mau* [The bee]. Guwahati: Publication Board Assam

- Sarma, G.P & Bormudoi, A. Ed. (2007). *150 Years of Journalism in Assam*. Guwahati: Media Trust, Assam
- Science Writing vs. Scientific Writing*. (2020). Retrived from <https://sites.duke.edu/scientificwriting/science-writing-vs-scientific-writing/>
- Sharmah, B. (2007). *Rebellion of 1857*. Guwahati: Publication Board Assam
- Singh, V.K. (2011). *Handbook of Science Communication*. New Delhi: ABD Publishers
- Subbarayappa, B. V. (2013). *Science in India: A Historical Perspective*. New Delhi: Rupa Publications India Pvt. Ltd.
- Subbarayappa, B. V. (2007) *Science in India: Past and Present*. Mumbai: Nehru Centre
- Tamuli, L. (Ed.). (2008). *Usha*. Guwahati: Publication Board Assam
- Tamuli, L.(Ed.). (2005). *Banhi*. Guwahati. Publication Board Assam
- Volk, K.(2017). *Science Writing in Greco-Roman Antiquity: Key themes in ancient history*. Retrived from <https://bmcr.brynmawr.edu/2017/2017.08.07/>
- White, A. (2015). *A Memoir of the Late David Scott*. Guwahati: Department of Historical & Antiquarian Studies in Assam
- Wimmer, R. D. & Dominick, J.R. (2015). *Mass Media Research: An Indtroduction*. Delhi: Cengage Learning India Pvt. Ltd.
- Ward, S. R. (Ed.). (2016). *A Glimpse of Assam*. India: EBH Publishers
- Zimmer, C. (2013). *A Note to Beginning Science Writer*. Retrived from <https://www.nationalgeographic.com/science/phenomena/2013/06/24/a-note-to-beginning-science-writers/>

APPENDIX

(1)



Dr. Nathan Brown (1807 – 1886)

(2)



Eliza Brown (1807 – 1871)

(3)



Dr. Miles Bronson (1812 – 1883)

(4)



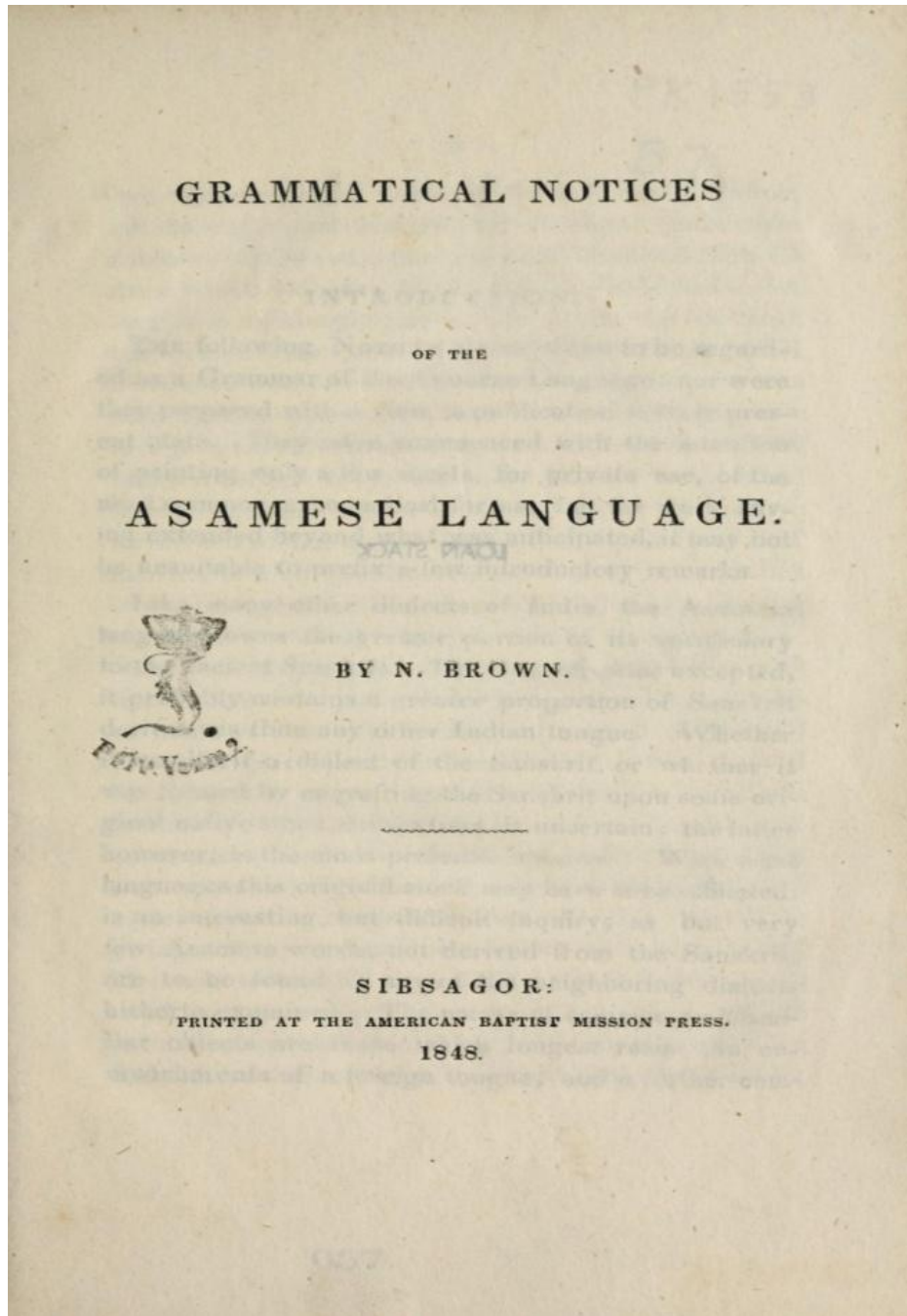
The gun gifted by Robert Bruce to the Singpho King Bisa Gam in 1823
Photo : Suryya Kumar Chetia

(5)



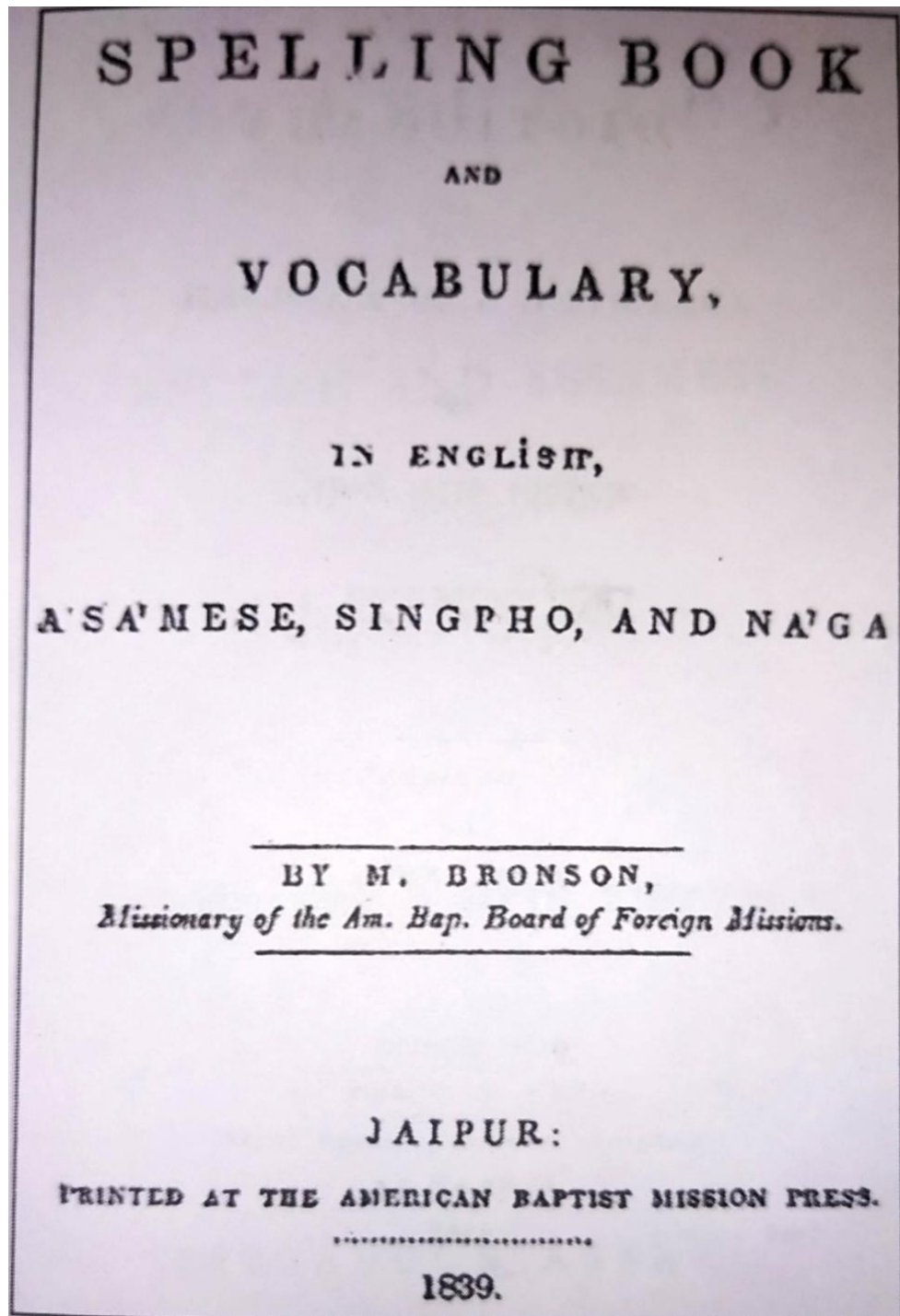
Robert Bruce (? – 1824)

(6)



Dr. Nathan Brown's book on Assamese Grammer

(7)



Book on vocabulary by M. Bronson