

**SCIENCE WRITING IN ORIYA**  
**1850 - 1950**

*An Electronic Compilation of  
Science Articles and Books in  
Oriya Language*

**Srujanika**

Bhubaneswar

**Vigyan Prasar**

New Delhi

**2010**

# Contents

Foreword

Preface

Credits and Acknowledgement

## INTRODUCTION

6

Emergence of Modern Oriya Literature

The Year 1866 - A Turning Point

Modern Oriya Literature: Facets and Characters

Oriya Periodicals

Science Books in Oriya

Works of Reference

Science Articles in Oriya Periodicals

The Writers of Oriya Science Articles

Supporting Activities

Technical Terms in Oriya

Summing Up

Important End Note

References

## TABLES

18

[Table 1](#): Some Important Oriya Periodicals in Publication Before 1950

[Table 2](#): Pre-1950 Science Books and Reference Works

[Table 3](#): Selected Science Articles in Oriya Published Between 1850 and 1950

[Table 4](#): Science Writers in Oriya Language (1850-1950)

[Table 5](#): Oriya Science Writings: Some Statistics

[Table 5a](#): Number of Articles Found in the Major Periodicals

[Table 5b](#): Distribution of Articles According to Length

[Table 5c](#): Number of Articles Published Over Different Periods

[Table 5d](#): Number of Articles Published by Different Authors

## COVER PAGES AND MASTHEADS OF SOME ORIYA PERIODICALS

36

## INDEX FILES

[Index to the Writing Compilation \(Hyperlinked to the books and articles\)](#)

[Notes for using the index](#)

[Index to Periodical Content of the Files](#)

[Index to Pre-1950 Oriya Science Books and Reference Works](#)

[Chronological Index to Science Articles in Oriya](#)

[Authorwise Index to Science Articles in Oriya](#)

## Foreword

“Science Writing in Oriya 1850-1950” is part of Vigyan Prasar’s attempt at documenting science communication efforts in different Indian languages. This project traces the beginning of popular science writing in Oriya, a rich language. The use of technical terms in science, topics covered by popular science writers, early magazines that carried popular science articles and representative popular science articles published in the past give an idea of the treatment of the subject and the style of the language. This monograph is a reference work and will serve as an inspiration for young communicators. Many of early magazines which published popular science articles are very rarely available and if no efforts are made for their preservation they would be lost forever. The arduous exercise undertaken in Oriya points out the state of scientific understanding and the strengths and weaknesses of the styles of presentation.

Vigyan Parishad, Prayag, Allahabad, developed a two-volume work titled "Hindi Mein Vigyan Lekhan Ke Sau Varsh: 1850-1950" (Hundred Years of Science Writing in Hindi: 1850-1950) that has been published by Vigyan Prasar. Science Communicators’ Forum, Kolkata has researched the time period 1818 to 1860 and the output has been published by The Asiatic Society, Kolkata. The task of documenting the popular science writing in Marathi has been taken up by Marathi Vidnyan Parishad, Mumbai. Efforts are being made to cover other Indian languages.

Srujanika has been engaged in innovative science education and science popularisation work in Orissa for the past several years. The research for this monograph covers the period 1850-1950. Besides popular science articles, Srujanika has also documented popular science books published in Oriya during the period. Some of the best known science writers and scholars were associated with the project. It is no wonder that the output of the project has come out as an important research document. It is not only a historical document but will also provide stimulus to present science writers in Oriya. The work will be important to science writers, linguists, historians, lexicographers and others.

Er Anuj Sinha  
Director  
Vigyan Prasar

# Preface

Science writing has always played a central role in Srujanika's science appreciation programmes. While generating articles on a wide range of scientific topics we have tried to keep in sight what was already in existence. This gave us an idea about the areas well covered and where coverage was sparse. It also brought to our notice the strengths and weaknesses of the styles of presentation used. And we tried to improve our own writings based on such findings.

In the beginning, however, our familiarity was limited to the contemporary publications. We were exposed to a wider range of science writings when we undertook the task of preparing an "Annotated Bibliography of Popular Science Books in Oriya" around 1995 as a part of an NCSTC (Dept. of Science & Technology, Govt. of India, New Delhi) initiative. Although the work was limited to books only, it gave us an idea about the difficulty in locating old Oriya publications, especially those on science. Getting older periodicals was still harder and that held us back from going after the magazine articles.

The idea of preparing a comprehensive compilation of science writings in Oriya was revived during the Vigyan Prasar seminar on "Science Popularisation through Indian Languages" in September 2003. By this time we had also initiated a programme of preserving early Oriya publications through digitization using a low-cost improvised setup. This had brought us into closer contact with the literary circles and with people/institutions holding such material. While preparing an inventory of such holdings, we started exploring their science content also. Our first digital archive, an electronic version of one of the most important Oriya publications - a legendary 7-volume 9500-page lexicon titled Purnachandra Odia Bhashakosha, was released in August 2008. Among those present on the occasion was Dr. Subodh Mahanti who represented Vigyan Prasar and we agreed that the time had now come for taking up the compilation of science writings in Oriya.

After further discussions and planning an initial meeting for the purpose was held at the residence of Prof. Gokulananda Mohapatra, the person who has contributed the most to popular science writing in Oriya, on November 18, 2007. A tentative plan of action was drawn up at the meeting and a committee to guide the work was formed. The actual work commenced in April 2008 with the full support of Vigyan Prasar.

The task of collecting the articles still proved formidable. The publications were scattered among many individual and institutional holdings, where neither borrowing or photo-copying was possible. Convincing the holders to let us take digital images of the publications was not always easy and even where we got the permission, the process was slow with our improvised setup as it involved a lot of manual post-processing of the images. But it also had its rewards. Instead of copying only the science articles, we digitised the entire publications that became available to us. The collection, which is still being processed, will certainly have a lasting value.

The original objective of preparing a compilation of the science writings has, however, reached a presentable stage and no major findings are likely to come up soon. Hence we are presenting the compilation in this electronic form, which can be updated with ease, for initial viewing and critical appraisal. Based on the feedback received, we will publish a printed version with only selected articles to be distributed along with the complete compilation on a CD-ROM in the near future.

Needless-to-say the entire work has been a group effort. Not only the core group of Srujanika was totally immersed in this work, members of the advisory committee and numerous science writers, bibliophiles, literateurs, academicians and persons just interested had joined hands to get it moving. However, the support of Vigyan Prasar played a key role in making this whole thing happen.

We have tried to list some of the more identifiable contributors to the work on the credit page, but certainly many more have been left out. We appreciate their contribution the most and it is to those unknown workers that we dedicate this compilation.

Srujanika Team

# Credits and Acknowledgement

Overall Co-ordination and Writeup

Nikhil Mohan Pattnaik

Logistics and Data Management

Puspashree Pattnaik

Material Collection and Digitization

Jeeban Kumar Panda, Siva Prasad Patra

Text Composition, Proof Correction and Preparation of the Final Compilation

Padmaja Nandini Sahoo, Mili Mohanty, Bharati Mahanty, Sampad Mohapatra

Material, Suggestions and Discussions

Sri Aurobindo Pattanaik, Prof. Basanta Kumar Panda, Smt. Basanti Das,  
Sri Bauribandhu Pattnaik, Dr. Chitta Ranjan Mishra, Dr. Fanindra Bhushan Nanda,  
Prof. Gouranga Charan Dash, Prof. Maheswar Mohanty, Prof. Prafulla Kumar Mohanty,  
Smt. Rama Kar, Dr. Subodh Mahanti, Prof. Sudarshan Acharya,

Advisory Committee

Prof. Gokulananda Mohapatra, Chairman

Prof. Basudev Kar, Prof. Nityananda Swain, Prof. Amulya Kumar Panda, Prof. Surya  
Narayan Behera, Prof. Gadadhar Mishra, Prof. Gouranga Charan Dash, Dr. Nikhil  
Mohan Pattnaik, Sri Jeeban Kumar Panda, Sri Nachiketa Khamari Sharma,  
Smt. Puspashree Pattnaik (Convener).

All-round Support

Prof. Debendra Kumar Dash, Prof. Debi Prasanna Pattanayak,  
Sri Gopal Prasad Nanda, Prof. Jatindra Mohan Mohanty.

Libraries Consulted

Orissa State Archives, Orissa State Museum Library, Eastern Region Language  
Centre Library, Regional Institute of Education Library, Utkal University Library  
(Bhubaneswar)

Utkal Sahitya Samaj Library, The Samaja Library, Bigyan Prachar Samiti Library  
(Cuttack)

Biswa-Tara Library (Baleswar), Dasarathi Pathagara (Nuagaon, Nayagarh)

We most sincerely acknowledge the valuable contributions  
of all these persons and institutions.

# Introduction

Thinking generally, there seems to be an automatic connection between science and all things "modern". This link seems to extend to the field of literature also. If one examines the development of literature in various languages, one can find many direct and indirect contributions of science towards its growth. While the changes in educational and thought processes can be considered as indirect contributions, development of communication and printing can be seen as the direct ones.

Literature in turn has also played its role in the growth of science, its biggest impact being in opening up of the mind to subtler aspects of life and nature. The growth of language facilitated the spreading of scientific facts and thoughts both among the scientists and the common people. This helped science in two ways - by enhancing interaction among the scientists and by bringing about a societal understanding about science.

Thus it is necessary to be generally familiar with the modern phase literature in any language in order to appreciate the science-related writings in that language.

## **Emergence of Modern Oriya Literature**

Like in any other language Oriya literature went through a long process of development to arrive at its modern period which is generally considered to have started during the second half of the nineteenth century. While it is not possible, nor necessary, to put an exact starting date for this, the year 1866 can be considered to be a turning point. However, many developments, mostly political and social, that prepared the ground for the emergence of modern Oriya literature started around the beginning of the nineteenth century.

A major factor in this process of evolution was an increased contact with western education and culture. This was brought about primarily by the British occupation of Orissa in 1803. The British rule facilitated the expansion of the activities of the Christian missionaries into Orissa from neighbouring Bengal. The missionaries had established a printing press in Serampore, Bengal, in 1797 which was acting as a hub for their preparation of religious literature in Indian languages. Fort William College of Calcutta, established in 1800, had programmes for helping the members of British administration in learning Indian languages including Oriya.

With such facilities being available the zealous missionaries lost no time in bringing out Christian literature in Oriya. The first printed Oriya book brought out in 1809 was the New Testament. Interestingly the book that followed in 1811 was a "dictionary" titled, "A Vocabulary: Ooriya And English: For the use of students". However, it was more a collection of Oriya words with their pronunciations and meanings in English rather than a dictionary with conventional alphabetic arrangement.

The Serampore Press continued producing other Oriya books, but these were primarily Christian religious literature. A need for educational texts soon arose with the establishment of English schools in Cuttack in 1822 and at other places soon after. Several such publications appeared between 1831 and 1845, prominent among these being - Oriya Grammar (1831) and Oriya Dictionary in three volumes (1841-43), both by Amos Sutton (B. Niya Alankar being the co-compiler of the Oriya-Oriya dictionary). Sutton also authored "Padartha Bidyasara" - a textbook on natural sciences (Jada Bigyan) which was published in 1832. There were several other primers, readers and text books on history and geography during this period.

The first printing press in Orissa was set up at Cuttack by the Missionaries. It helped in increasing the production activity in Oriya language. In addition to publishing the religious and school books the Mission Press undertook the printing of books by local authors. It also helped in the attempts to bring out periodicals like Gyanaruna (1849), Prabodha Chandrika (1856-58) and Arunodaya (1861-63) all these were published by the missionaries. The three magazines were rather short-lived to have any strong literary impact, but were important as experiments in the new area.

### **The year 1866 - a turning point**

The developments during the previous sixty years provided adequate facilities for education and communication for a new generation of Oriyas to try out their ideas in the literary and socio-cultural fields. A new sense of linguistic nationalism was also emerging among the Oriyas at this time. Two unrelated events of the period helped in expediting and intensifying the process to a great extent.

The first was the devastating famine that ravished Orissa during 1865-66. Not only a large number of people perished, the suffering of the survivors was severe and continued for a long time as the British Government in Calcutta seemed to be ill-informed about the situation. The lower level Government workers, mostly from outside Orissa, had for various reasons neither assessed the situation correctly nor taken any timely remedial steps. Utkal Dipika (The Light of Utkal) the first weekly newspaper in Oriya was launched by Sri Gouri Shankar Ray on the 4th August 1866 in the middle of this great calamity. Dipika not only documented the plight of the drought-stricken Orissa in the most forceful manner, it also drew the attention of the British ruler to the neglect of Orissa in many other respects. Its impact was profound and reached all the way upto the British Parliament, which recognised the problems and initiated mechanisms for their redressal. The movement to seek help for the famine-stricken rallied all public-spirited Oriyas around Utkal Dipika and it provided a ready forum for their views on Oriya nationalistic issues. It also set in motion literary changes by strengthening prose as a powerful medium of writing.

The second event during 1868-70 posed a threat to Oriya language itself. An attempt was made to portray Oriya as a dialect of Bengali without any claim to an independent existence. A proposal was floated to deny any recognition to Oriya and stop its usage as the language of text books. This movement was initiated by some Bengali employees of the British Government posted in Orissa and had no involvement of the Bengali literateurs. It was most likely not born out of linguistic pride but was motivated more by a desire to keep the jobs in Orissa and the publication trade in their control. The attack, however, was vicious and multipronged and created enough stirrings both in Orissa and Calcutta. This caused the educated Oriyas to rise in defence of the language which was done through the documentation of the richness of existing Oriya literature and through newer initiatives in the literary field. Utkal Dipika played a focal role in this defence too.

In time, the immediate impacts of both the famine and the antiOriya movement passed. But the spirit of Oriya nationalism remained strong. While Utkal Dipika continued to be the major periodical, several other publications, varied both in approach, content and place of publication, were born. The Orissa Printing Company, established in 1866 in Cuttack with its own press, overcame the teething troubles by 1868 and provided strong support to Oriya publishing activities over the years to come. All these developments established the modern phase of Oriya literature on a firm footing.

### **Modern Oriya Literature: Facets and Characters**

Like in most languages one can find radical changes in the modern Oriya literature both in form and content as compared to its older periods. Early and medieval Oriya literature consisted mostly of various forms of poetical writings: the kavyas, long and ornate narratives in verse that required high degree of mastery over the language to understand and appreciate; the epics, depiction of mythical lores in less intricate rhyme; and the lighter poems and lyrics. There were some notable pieces of writings in prose, but these were rather small in number. The older Oriya literary works used God and deities, myths, nature, kings and wars as their themes. Spiritual and religious sentiments as well as devotion to the deities and the rulers were the underlying sentiments for many of these works. The epics were written to be recited among the working people to arouse piety and righteous feelings. The lyrics were, however, the most popular and were sung to entertain and lighten a burdened life.

Modern Oriya literature, in contrast, used prose as its medium of expression. Prose provided freedom for expressing intricate ideas in logical and analytical ways. Essays and short compositions became powerful vehicles for ideas and issues. Almost anyone could now express their ideas in writing as the emphasis shifted to the content rather than style. Even poetry - it did continue to exist and thrive - took on newer directions in its modern form. Kavyas and devotional lyrics too changed in form in the hands of the modern poets but retained its power to arouse the deeper human emotions. Other forms of writings like novel, drama, satire and short story also emerged slowly.

The contents of modern writings also changed. Gods, deities and emperors yielded their place to the common man. Writers focused on the happenings around them to create both fiction and philosophy. Newer areas of human knowledge entered the literary scene and students of these newer academic divisions started writing about their work for the public - both to inform and to seek popular support for their work. This is the point where science became a subject for literature. Initially established writers wrote about science and scientists. But in time students of science joined, and even overtook, them in this endeavour. As a result not only modern Oriya literature became broader and richer, science writing efforts grew into a recognised branch of literature.

Three persons have been generally acknowledged for final transformation of Oriya literature into its modern form. They are: Fakir Mohan Senapati (1843-1918), Radhanath Rai (1848-1908) and Madhusudan Rao (1853-1912). Each one of them has made profound contribution in the form of writings, by introducing new ideas and styles, and through other activities which helped in the overall growth of Oriya literature.

Radhanath Rai, referred to as Kabibara (poet supreme), continued the tradition of writing Kavyas. But these poetical works took a very different form in style, content and emotive depth as did his path-breaking prose writings. His major contribution was to free Oriya literature from the medieval prejudices and inject newer societal consciousness into it. The overall impact of all his work was so great that this period of Oriya literature is also referred to as the Radhanath era.

Madhusudan Rao, also called the Bhaktakabi (devotional poet), was a teacher/educationist by profession, but also a poet and follower of Brahma way of life in practice. His subtle injection of liberal ideas through lucid prose and poetry aroused the readers' deeper feelings and also was very suitable for text books. In fact, the text books written by him dominated the school education scene, especially for the primary classes, and proved far more refreshing compared to the crudely translated texts being used till then. He also compiled useful manuals for teachers and was among the first ones to write science articles for the public. His literary works, both in form of prose and poetry, original as well as translations/adaptations, are important enough to place him among the creators of modern Oriya literature.

Unlike Radhanath and Madhusudan, Fakir Mohan Senapati was brought up and educated in the traditional way. Thus his exposure to western ideas and literature was minimal. This is reflected in his early writings which comprise translations of the epics in the traditional style and text books. One of his earliest works was *Jibana Charita*. It was a partial translation of Vidyasagar's adaptation of 'Biographies' in English, and introduced the biographies of many scientists into Oriya literature. Also during this period he contributed much to the Oriya literature through the setting up a printing press, involvement with newspapers/magazines and through his active role in resisting the anti-Oriya language movement. Fakir Mohan's literary brilliance erupted late and this was reflected in his short stories, novels and autobiography - all of which were published during 1898 to 1918. His writings reflected the social realities around him and was marked by evolved development of characters and plots, while the narrative was lucid, folksy and witty. For all this he has been considered as the crowning architect in the modernisation of Oriya literature and is revered with the title of Byasakabi - the learned poet.

Two other persons - Gowri Shankar Ray and Madhusudan Das - have also played important roles in the emergence and growth of modern Oriya literature. Gouri Shankar - Karmabira (the heroic worker) - was deeply involved with the establishment and management of the first non-missionary-owned printing press and publishing house, the Cuttack Printing Company, in 1864. This and the publication of Utkal Dipika, which he edited and managed, facilitated the emergence of new writers and also helped in the development of Oriya prose writings, the vehicle for any modern literature. Madhusudan Das has been considered the father of modern Orissa for his far-reaching social and political activities. The spirit of Oriya nationalism that he kindled and stoked, worked as a guiding force for the nascent modern Oriya literature and sustained it in its growing years.

It is on this background that science entered the social, educational and literary fields of Orissa and the growth of science writing and that of modern Oriya literature went hand in hand.

## Oriya Periodicals

Regular publications in form of newspapers and magazines have proved essential for the growth of language and literature. Periodicals required compositions in prose as it was the most suitable for the expression of wide ranging ideas and facts. Quick publication of the periodicals also helped in exposing the writings to quick scrutiny and this provided scope for fast refinement and overall improvement. This applied to Oriya also and it is no coincidence that the periodicals and literature progressed together.

The first Oriya magazine was a hand-written news-sheet - *Kujibara Patra*. This was being brought out by Mahanta Sadhu Sundar Das (Sundari Babaji) of Kujibara Math during the 1830's. However no copies of this are now available to be seen.

With increased printing facilities, the missionaries started the publication of a magazine - *Gyanaruna* - in 1849. This first printed Oriya magazine was, however, very short-lived and no copies of it have survived. *Gyanaruna* was followed by a second printed magazine - *Prabodha Chandrika* (1856-58) - which continued somewhat longer and attempted to address the general public by disavowing any religious objectives. Its first editorial stated that the magazine *will not have any religious objectives but would help educate the natives (Oriyas) so that they can compete for the Government jobs so far held by outsiders*. During the three years of publication it tried to live upto its claim by publishing articles of general interest including some relating to science. A few copies of *Prabodha Chandrika* have survived in a private collection, but the contents of the first volume are available in a reprinted form. After the closure of *Prabodh Chandrika* another attempt at magazine publication was made by the missionaries in 1861. The magazine *Arunodaya* continued publication for about three years, but not much is known about its contents as all copies of it have disappeared. These first Oriya magazines were rather shortlived to have any literary impact, but proved valuable as path-breaking experiments.

Launching of *Utkal Dipika* in 1866 brought about a new era in magazine publication. This was edited and managed by Gowri Shankar Ray, a socially active Oriya person and had the backing of the community. It also took up issues of regional importance and this gave it a wide reader base. *Utkal Dipika* was more of a newspaper rather than a magazine and was published on a weekly basis. It was first printed by lithography on stone plates but was machine printed after about a year and half. In addition to publishing the news - local, as collected from its own sources and "global" as gleaned from other publications, it also spared space for longer commentary on various subjects of interest. This helped in some reports and articles on science being published in it.

*Dipika* was soon followed by the publication of *Bodhadayini* (named later as *Baleswar Sambad Bahika*) in 1868 from Baleswar. It followed *Utkal Dipika* closely in contents and style. Many other periodicals, mostly weeklies in newspaper style, started publishing from Cuttack as well as some other places in Orissa. Some of these had specific purpose in mind while others were more general. Most of these newer publications did not continue for long, but some like the *Utkal Putra* (1873) had a strong impact. *Utkal Dipika* and *Baleswar Sambad Bahika*, however, maintained steady publication which continued well into the nineteenth century. These two were joined in 1889 by another important periodical - *Sambalpur Hiteishini* - from Bamanda State in western Orissa and made significant impact in the social and literary spheres.

When the newspaper publication activities continued steadily, attempt was made to publish a magazine in the conventional sense. The monthly literary magazine *Utkal Darpan* appeared from Baleswar in 1873 as a result and continued only for two years in this form. Even during its short life span it provided the much needed space for quality prose - both fiction and philosophy. It is in the pages of *Utkal Darpan* that the first science articles of reasonable length and depth were published.

Other literary magazines that followed *Utkal Darpan* before the turn of the century were *Utkal Madhupa* (1878), *Pradeepa* (1885), *Asha* (1888), *Utkal Prabha* (1891), *Indradhanu* (1893), *Bijuli* (1893) and *Utkal Sahitya* (1897). Except for the last one all others folded up after only a few issues, but each of these had played important roles in different ways during their publication.

Publication of *Utkal Sahitya* marked a new era in magazine publishing much like what *Utkal Dipika* had done for newspapers. *Utkal Sahitya* was edited by Viswanath Kar, a person deeply committed to literature and society, and was supported by a circle of like-minded persons who worked hard to sustain the magazine. In the opening editorial *Utkal Sahitya* lamented the short life of its predecessors and stressed the pressing need for a literary magazine. It stated that it will try its best to *present the best from the older literature and also the advanced concepts and thoughts of the modern era with the help of its learned contributors*. It included science specifically as an area where articles will be the most welcome. In keeping with its objectives a biography of Benjamin Franklin was featured in its first issue. In time it carried science articles on a regular basis and often explored the philosophical and social aspects of science through special articles.

*Utkal Sahitya* brought in a large degree of maturity in magazine publishing both in the way of content and production. This encouraged others to start new magazines with specific clientele and philosophy in mind. Some of the more important new general publications were *Utkal Madhupa* (Bamanda, 1900), *Mukura* (1906), *Satyabadi* (1915), *Sahakara* (1919), *Naba Bharat* (1934), *Dagaro* (1936), *Sankha* (1945), *Chaturanga* (1946). While *Utkal Sahitya* continued regular publication till about 1940, *Satyabadi*, which played a valuable role in education and national movement, closed by 1919, *Mukura* and *Sahakara* published for about 25 and 30 years respectively. *Naba Bharat*, *Sankha* and *Chaturanga* all ceased publication by 1950. *Dagaro* continued in publication beyond the 1950's along with several newer magazines which came into existence around 1950 as well as with newer forms of some older discontinued ones. Two periodicals - *Samaja* (1919) and *Prajatantra* (1930) - which started as weeklies are still in publication as daily newspapers. There were many other magazines appearing from various parts of Orissa which did not survive for long, but had useful life nevertheless.

During this period a few magazines were published specifically for children. The major ones of these were *Prabhata* (1909), *Panchamruta* (1920), *Jahnamamu* (1932). There were also specialised magazines for women, co-operative movement, health and science. In addition, many magazines had dedicated pages for specific target subjects. A magazine *Bigyan Darpan*, devoted solely to science writings in Oriya, was published between 1880 and 1883 from Calcutta. Although no copy of this magazine has been seen, reviews of the magazine and an article reprinted from it have appeared in other contemporary periodicals. A magazine on health and medical subjects - *Utkal Chikitsaka* - was published in 1894 by Ramakrushna Sahu, a medical practitioner trained at the Cuttack Medical School, and a regular writer on health matters. Another magazine *Alochana* was published for a short time during 1900 from Bamanda and was devoted exclusively to discussions on science and agriculture. It was started to publish primarily the discussions at a forum - *Alochana Sabha* - in Bamanda. No copies of *Utkal Chikitsaka* or *Alochana* are available now.

It can be seen from the foregoing that a succession of magazines helped sustain the growth of Oriya literature in its modern form. These encouraged the publication of articles on newer subjects and science writing benefited immensely from this.

[Table 1](#) lists some important Oriya periodicals before 1950 along with the available details. Cover pages and mastheads of some of these periodicals are reproduced in the pages following the tables.

### **Science Books in Oriya**

One of the first Oriya books to be printed was a dictionary or more accurately, a book of Oriya words with their English equivalents. Published in 1811, this book - "A Vocabulary Oriya And English For the use of students" by Mohunpersaud Takoor - presented the words under different subject headings. Interestingly, several of the subjects covered were science-related. It also contained sections on plants and materia medica which gave the scientific names of a number of plants. This trend of listing the botanical names in Oriya dictionaries continued through the 1930's.

The Oriya books published during 1811 to 1830 were mostly religious books and a few text books of general reader type. The first science text book *Padarthabidya Sara* (Essence of Physical Sciences) by Amos Sutton appeared in 1830 and was in the form of questions and answers. A few other similar books, written or translated from English/Bengali mostly by the missionaries and their Oriya speaking

associates, were published through the 1870's for use in the schools. Fakir Mohan Senapati's *Jeeban Charita* (Life Stories) was published in 1866 also to be used as a general reader in schools. This book was a part translation of Eshwara Chandra Vidyasagar's Bengali adaptation (1849) of Chambers' "Biography". Interestingly, almost all the biographies that appeared in the Oriya version were of scientists, including Copernicus, Galileo, Herschel, Newton and Linnaeus.

Science-related books published during the next 80 years or so, till the late 1940's, were either text books or books on health/medical matters and agriculture/animal husbandry. These were designed to be used as supplementary reading by the students or as reference by the general public and field workers. The text books included titles on physical science, animal and plant science, health and hygiene and agriculture. Some of the notable general books were *Tika Deba Bisayaka Bidhana* (John Short, 1867, Vaccination Procedures), *Sishupalana O Sishusiksha* (Ramakrushna Sahu, 1885, Childcare and Child Education), *Swasthya Sadhana* (Shyamasundar Pattnaik, 1894, Health Resources), *Oushadha Bhandar* (Gopabandhu Nayak, 1916, Medicine Store), *Krushaka Bandhu* (Madanmohan Pradhan, 1920, Farmers' Friend), *Basanta* (Banabihari Pattnaik, 1929, Small Pox), *Udvida Bigyan* (Aram Patra, 1935, Plant Science), *Malaria* (Gopalchandra Pattnaik, 1941, Malaria). The books on health-related subjects by Banabihari Pattnaik and Gopalchandra Pattnaik, both doctors, were written in a very readable style while keeping the information content high. Nilamani Bidyaratna, the editor of *Sambalpur Hiteishini*, *Utkal Madhupa* and later of *Utkal Dipika*, wrote several books on the treatments for cholera, small pox, fever, cattle diseases, and snake bites, between 1895 and 1915.

There were a few books which were written purely as 'popular science' during this period. These were *Prakruti* (Sachidananda Deb, 1911, Nature), *Brusti Bigyan* (Sachchidananda Deb, 1915, Meteorology), *Samanta Chandrasekhar* (Chandrasekhar Mishra, 1932, Biography of Samanta Chandrasekhar), *E Jugara Asura* (Prasad, 1947, Demon of this Era), *Bigyan Bismaya* (Gokulananda Mohapatra, 1949, Wonders of Science), *Bigyan Krutittwa* (Gokulananda Mohapatra, 1949, Achievements of Science), *Pilanka Kahinki* (2 vol., Godabarisha Mishra, ~1950, Children's Questions).

*Prakruti* was a *khanda-kavya* (short verse) describing the evolution of the physical and the living Universe, while *Brusti Bigyan* was meant to provide a background for the data gathered at the author's own meteorological observatory. *Samanta Chandrasekhar* was the first original biography of a scientist, that too one from Orissa itself (Samanta Chandrasekhar or Pathani Samanta (1835-1904) was a naked-eye astronomer noted for his ephemeral observations and calculations of high accuracy and the author of *Siddhanta Darpan* (1899)). The biography was even more notable as it described the Samanta's work in much detail and also explained his Sanskrit compositions in easily understandable Oriya. *E jugara Asura* describes the nuclear bomb and the devastation caused by it in form of a story. Godabarisha Mishra, a noted educationist and socio-political activist, wrote two science fiction books - the first in Oriya - around 1950 based on some English ones. These were *Ghatantara* (A Change of Body, inspired by 'Dr. Jekyll and Mr. Hyde') and *Nirbasita* (The Banished). He also wrote two small volumes composed of questions and answers relating to science for children under the title *Pilanka Kahinki*. Gokulananda Mohapatra's two books of this period were compilations of his articles published in various magazines on various aspects of contemporary science and set the trend for science writing in the 1950's.

### Works of Reference

Compilation of an encyclopedia in Oriya was not attempted seriously till the 1930's. The first such compilation was done by Lala Madhab Lal and the result was his *Bibidha Sangraha* (Miscellaneous Collections). This was followed by similar works by Bhagirathi Mohapatra (*Ratnakosha ba Bruhat Bibidha Sangraha*, 1935), Lala Nagendra Kumar Roy (*Bibidha Ratna Sangraha*) and Akshaya Kumar Chakrabarti (*Bibidha Sara Sangraha*). These were intended to be books of general knowledge and included interesting information relating to science.

Publication of *Purnachandra Odia Bhashakosa* was started also during the 1930's. This was a comprehensive lexicon (7 volumes, ~9500 royal quarto pages, 1931-1940) compiled by Gopal Chandra Praharaj and contained many short explanations of important terms as well as several

encyclopedic articles running into many pages. Many such writeups relating to science are found in the Bhashakosha including a 16-page article on *nakshatra* (asterisms). It also contained short descriptions of about 1300 plants including their scientific names and medicinal usage.

Balakrushna Kar, already involved with the publication of magazines like *Sahakar* and children's magazine *Jahnamamu*, conceived the idea of a multi-volume encyclopedia keeping children in mind. Accordingly, he planned to make each volume self-sufficient and to be based on a single subject. Of the 8 volumes proposed, three were to be on science subjects like the living world, the Universe/creation and wonders of science. The first volume on the living world came out in 1941 and was followed by the volume on world history (1943). Unfortunately, the publication could not continue as planned and the work remained incomplete after the publication of the volume on the Universe in 1957. However, the volumes published were well received for their simple language, lucid presentation and numerous illustrations many of which were in colour.

Table 2 gives the details of the pre-1950 science books in Oriya. The full contents of the available books or excerpts from the works of reference are included in the compilation either as scanned originals or recomposed text.

### Science Articles in Oriya Periodicals

The earliest science articles found in this search of Oriya literature of the modern period dates back to 1856. The two articles in the magazine *Prabodha Chandrika* were on the subjects of respiration and blood circulation and were of moderate length (~450 words). These were followed by a book of biographies, Fakir Mohan Senapati's *Jeeban Charita*, which presented sketches of life and work of several scientists like Copernicus, Galileo, Herschel, Newton and Linnaeus. The biographies of 1000 to 2000 words were, however, translations from Bengali version of the original writings in English. Hence these were important more from a literary point of view - using the still-evolving Oriya prose as a vehicle for modern topics words for which did not even exist in the language.

Most of the other science writings found over the next 40 years were short pieces suitable for newspapers. These were reports relating to health and disease issues, celestial events like the eclipses, reviews of science books and magazines and other developments that the editors found interesting. Some examples of the last were: several reports on the proposal to establish a 'science association' (*Bigyan Sabha*) by Dr. Mahendralal Sarkar, reports on the establishment of a science institution in Bangalore by the Tatas, report on Kashmir Maharaja's initiative to have science books translated into Sanskrit, King of Siam inviting foreign astronomers to observe an eclipse as the state's guests, what Darwin says..., boy blinded from viewing eclipse with naked eye.

Some of the short reports in the newspapers gave scientific explanations of some happenings. For example, there was a report of some young brides falling into the wells while drawing water. In addition to mentioning that the wells did not have adequate safety walls etc., the report explains that the young brides usually wear a lot of ornaments on the upper body which shifts the 'centre of gravity' of the person upward and makes them prone to toppling over while bending down to draw water. Another article explains, in a story form, how oil can prevent boiling over of dal while being cooked by lowering the 'surface tension'.

The newspapers also carried some longer articles; some as purely informative, while others provided background for discussion. Some of the latter were: 'Medical sciences' (1869) presents a historical development of human maladies and their treatments; 'Science education' (1871) discusses how science has empowered the western world through new discoveries and hence the importance of our learning science; 'Seeing star and moon during the day' (1879) explains the circumstances under which planet venus might be visible before sunset or after sunrise as a 'star' and decries the unnecessary fear of seeing it; 'Science and its benefits' (1880) and 'Lack of scientific discussions' (1881) elaborates on the value of scientific discoveries and comments on our habit of not being inquisitive which hinders scientific progress; 'Is this the comet of Mahabharat?' (1882); 'Eclipse musing' (1896) explains the eclipses and questions the rituals like fasting observed by our people; 'Food habits and human life' (1998) explores how food affects our life.

The newspapers also provided a forum for the readers to seek information and raise issues. An interesting example of this was the query by a reader in 1882 whether the forthcoming transit of venus would be visible from Orissa. This was answered in the negative by an astrologer who did the computation using Samanta Chandrasekhar's ephemerides.

It should also be noted that many articles were simply sensational and had no verifiable basis. Some of these related to the curing of dreaded diseases like leprosy, small pox and cholera or conditions like snake and dog bites. A report was published even on the method of bringing the dead back to life. Reports of imaginary diseases and phenomena also found their way into the news pages.

Literary magazines provided scope for longer and more serious articles. But as mentioned earlier such magazines in Oriya were few and transient before 1897. Still the magazines *Utkal Darpan* (1873), *Utkal Madupa* (1879) and *Pradeepa* (1885) carried science articles regularly during their short existence. These articles covered areas like physical aspects of science like the celestial bodies and phenomena, raised questions like the possibility of life on other planets and explored philosophical aspects like science and religion, method of science (observation and experimentation).

Publication of *Utkal Sahitya* in 1897 provided a more stable platform for science articles. Of the many new magazines that followed the following devoted regular space for science: *Utkal Madhupa* (Bamanda, 1900), *Mukura* (1906), *Satyabadi* (1915), *Sahakar* (1921), *Baruni* (1925), *Bhanja Pradeepa* (1931), *Naba Bharat* (1934), *Sankha* (1945) and *Chaturanga* (1946). This encouraged newer and specialised writers to contribute and also widened the range of topics covered. The children's magazines in Oriya devoted a significant portion of their pages to science. Thus many interesting science articles are found in such magazines, e.g., *Prabhata* (1909), *Panchamruta* (1920) and *Jahnamamu* (1932).

The magazine articles continued the earlier trend of publishing both informative and philosophical writings. While most were entertaining and stimulating, some of the latter initiated strong debates among the readers. Mohini Mohan Senapati's article titled, 'Aspirations and Objectives of the Present Era' (1905) discussed the origins of religion to anthropomorphism and the reluctance of man to renounce it. He explored the reasons as to why the dependence on religion was not suitable for the present era and why man should follow the path of nature and science. The article stirred up a debate between the rationalists and traditionalists in the pages of the magazine. Other articles like 'Faith in the Realm of Science', 'Science and Literature', 'Science and Religion' which tried to explore complementary and contrasting features of science and other subjects.

There were also long articles serialised over months, or even years. Krushna Prasad Choudhury's series on 'Self-reliance' presented examples from around the world about individuals who have made a mark through perseverance. Three of these articles (1909) dealt with scientists and their endeavours which led to successful industries. Biraj Mohan Senapati started writing on the plant sciences in 1922 and continued with a long series on agriculture and cropping practices. Ratnakar Pati's series on the theory of evolution was a comprehensive treatment of the subject and continued from 1924 to 1930. Starting in 1934 Banshidhar Samantaray wrote many articles on different aspects of botany and on general science and a long series on genetics.

In contrast to such long serieses all magazines carried sections on science titbits and short articles in children's section. The titbits were generally pieces of interesting information or reports on new findings and phenomena. However, these also carried many unsubstantiated sensational reports.

Most areas of science were covered by Oriya science writings. Among the major science articles collected, there was a preponderance of writings on the celestial events and bodies. This group was followed by the articles on plant sciences and health-related subjects. Even the subject of eugenics had caught the writers' fancy with views on both sides.

A database of all the writings on science in Oriya and their full text are provided in this compilation. Selected important and representative articles are summarised in [table 3](#) and some statistics about the articles in [table 5](#).

## The Writers of Oriya Science Articles

The early writers of science article in Oriya were the established literateurs of the period. The earliest identifiable author was Fakir Mohan Senapati, one of the founders of modern Oriya literature, who wrote a series of biographies of scientists in the book *Jeeban Charita* (1866). Most of the writings that followed were anonymous, a practice that was common in the field of Oriya literature. Many anonymous articles were found in most magazines even at later stages. But these were mostly shorter pieces which were contributed mostly by the editorial staff. Madusudan Rao, another founder of modern Oriya literature, wrote several science articles for *Utkal Darpan* in 1873. Fakir Mohan wrote other articles like the Sun, the Universe and Comet for *Baleswar Sambad Bahika* between 1875 and 1881. After *Utkal Darpan* ceased publication, most of Madhusudan's science writings were published in his books and the major articles were part of *Prabandha Mala* (1880/1886/1898). Other articles written most likely during the 1880's and 1890's formed part of the books *Balabodha*, *Shishubodha*, *Sahitya Kushuma* and *Sahitya Prasanga*.

Science writers active from the late 1890's till about 1910 were Jalandhar Deb, Shyam Sundar Nanda, Sachidananda Deb, Mrutyunjaya Rath, Tarini Charan Rath, Mohini Mohan Senapati, Nilakantha Das, Krushna Prasad Choudhury, Sashibhushan Ray and Gopal Chandra Praharaj who were all well known essayists. They were all better known for their contributions to other areas of Oriya literature and served well to introduce science writing into Oriya literature. Jalandhar Deb and Sachchidanand Deb were from the ruling family of Bamanda State which had a strong literary tradition. Sachchidanand had a strong interest in science and had set up astronomical and meteorological observatories. Under their rule the state had adapted many modern technologies, including the setting up of a printing press.

During the first decade of the twentieth century teachers like Madhusudan Dash and Jagannath Tripathy took up science writing. The latter wrote in an entertaining manner on many different topics and was active till the 1930's. In 1909 he discussed the problem of scientific terminology (*paribhasha*) in Oriya language. Shyam Sundar Sathia, an avid photographer, wrote a long and comprehensive series of articles on photography. Gangadhar Meher, a well-known poet whose work is noted for sensitive reflection of nature, contributed a poem on the the life process of plants (*Tarubara*, 1899) and another on the moon and stars (1914). Meher wrote numerous poems on the raising of various crops which were popular among the village folk.

By the second decade of the twentieth century Oriya persons with higher education in science and other fields started teaching in the Ravenshaw College, Cuttack, and took up other jobs in the Government. Several of them tried writing on science for Oriya magazines. In 1913 Pranakrushna Parija, a noted Botanist who went on to be first Vice-Chancellor of the Utkal University, started writing on a wide range of subjects. Although he wrote on botany topics later, his first writings were related to astronomy. He also wrote articles like 'Science in Everyday Life' and "Eugenics". He was joined by college teachers and professionals like Sachchidananda Ray, later Principal of Ravenshaw College; Chintamani Acharya, later Vice-Chancellor of Utkal University; Nilakantha Das and Godabarisha Mishra, both educationists at the Satyabadi School and socio-political workers; Banabihari Pattnaik, doctor and medical professor.

Other college teachers and professionals who wrote during the 1920's to early 1940's were Gurucharan Mohanty (Chemistry), Agani Das (Teacher), Shyamachandra Tripathy (Physics), Isac Santra (Medicine), Prasanna Kumar Das, Biraj Mohan Senapati (Agriculture) and Ratnakar Pati (Philosophy), Haribandhu Mohanty (Physics), Basant Kumar Nanda (Doctor), Radhacharan Panda (Doctor), Jagat Mohan Sen (Teacher), Banshidhar Samantaray (Botany) and Basant Kumar Behura (Zoology). During 1946-47 two new writers joined the field - Gokulananda Mohapatra (Chemistry) and Gadadhar Mishra (Botany) - who proved to be very prolific and remained active into the twentyfirst century. They were also involved in organisational activities relating to science writing and in the preparation of glossaries of scientific and technical terminology.

Available details about these writers are summarised in [table 4](#).

## **Oriya Science Articles - A Statistical View (Table 5)**

Examination of the collected science articles in Oriya between 1850 and 1950 shows that about 100 persons contributed these. Interestingly, about half (53) of the 100 authors published only one article each and 30 authors published 2 to 5 articles each. Thus of the 361 articles with identifiable authors 226 were written by the remaining 17 authors. Seven authors contributed ten or more articles each accounting for a total of 129 articles. Bansidhar Samantaray had the highest number of articles (39 over 20 years) and was followed by Gokulananda Mohapatra (26 in 5 years). The latter, however, continued his writing over the next fifty years with an astounding productivity.

Several persons, although credited with only a small number of articles, have contributed significantly in their editorial capacities of various magazines. Some of them were Nilamani Bidyaratna (*Utkal Madhupa*), Agani Das (*Panchamruta*) and Chintamani Acharya (*Panchamruta, Jhankar*), Balakrushna Kar (*Jahnamamu, Sahakar*).

## **Supporting Activities**

Science writing activity reached a regular phase by 1920 and a need was felt for interaction among the writers as well as between the writers and the public. An organisation named **Orissa Science Association** was formed in November 1921 in Cuttack. The membership was by subscription and was solicited by open advertisement. The first secretary of the association was Biraj Mohan Senapati, an agricultural scientist and a prolific writer on farming.

The activities of the association included "Demonstration lectures every Saturday evening in the Town Hall" as was advertised in the press. A news report on one of the meetings mentions a discussion on the use of green manure in paddy cultivation. Another meeting held a demonstration on soap making and offered guidance to anyone interested in taking it up as a cottage industry. The programme for its annual function was to be held at the Ravenshaw College. The meeting there would be followed by demonstrations of scientific instruments in the botany, physics and chemistry laboratories and by lecture with magic lantern slides.

The Association probably did not continue for long as no news of its activities are found later. Some announcements and reports on the Association are given in the compilation which can be accessed by clicking [here](#).

By late 1940's science writing in Oriya had reached a degree of maturity and the number of writers had grown significantly. The writers of that time were mostly college professors and professionals who came in close contact with each other. Some of the more active writers started planning for an organised forum for their activity. An association by the name "Utkal Bigyan Parishad" was proposed in 1948, but it never came into formal existence. A second attempt by some professors of the Ravenshaw College and the Cuttack Medical College resulted in the formation of "Bigyan Prachar Samiti" in Cuttack on the 7th August 1949. The group met regularly to read and discuss their articles and held symposia on various subjects the proceedings of which were published in book form. The publication activities of the Samiti gathered momentum during the 1950's and hence is outside the purview of this compilation. The Samiti is still active today after sixty years of its formation.

## **Technical terms in Oriya**

Writings on science topics started appearing when prose writing in Oriya was still very young. Thus the science writers had to face the compositional problems as faced in general writings. In addition, they had to search for the appropriate terms to convey the science concepts which were entirely new and foreign to the language. While many English scientific terms were adapted as such or with slight modifications, newer ones were also coined. The process was, however, highly dependent on the background of the individual writers and there was little scope for standardisation.

Attempts were made in the 1920's to include glossaries of the new/adapted terms used in the articles. But this was followed in very few cases. The problem was not severe as long as the number of writers was small and most subjects were dealt by single authors. Confusing situations arose as the number of science writers grew and newer writers had difficulty in keeping track of all other writings. Increased interaction among the writers and the introduction of Oriya language science text books during the 1940's helped in the process of standardisation.

## Summing up

The present attempt towards locating and compiling science writings in Oriya language between 1850 and 1950 yielded 765 articles contributed by about 100 authors. These covered a wide range with respect to length, content and style. The writings were distributed among various periodicals (672 articles), collected works (35), and two works of reference - Bhashakosha and Ratnakosha (58). All these articles have been included in this electronic compilation along with a comprehensive database/index in Oriya which hyper-links each record to the actual recomposed article in full.

In addition to the articles, 52 science books and 3 works of reference with significant science content were also published during the period under study. Digital copies of all the available books have been included in the compilation along with selected pages/entries of the reference books.

Summary of the books and 80 selected articles is given in tables 2 and 3. Table 4 presents the available information about the authors, which have been very hard to gather and large gaps still exist that need to be filled up in future. Some statistical highlights of the compilation are given in table 5. These include periodical-wise, length-wise, period-wise and author-wise distribution of the articles.

For the curious, the article compilation, not including the books, spans about 6,00,000 words, with numerous illustrations and several tables.

## IMPORTANT END NOTE

This compilation is based on all the periodicals that could be located. Although most of the major magazines have been found, gaps exist in a number of places. Some of the magazines not seen are less likely to have carried science writings because of their specialised nature and literary/religious emphasis. It is estimated that at least 80% of the likely sources for science articles have been covered in this study. We propose to carry on the search and bring out updates when significant new findings are made.

In view of the difficulty faced in finding old Oriya periodicals and books, we have digitised all the copies that came to our hands. Thus a very valuable collection is now available to the students of Oriya literature as a byproduct of this compilation.

## REFERENCES

### General Background, Notes on Periodicals and Books

01. *Odia Bhashacharcha'ra Parampara*, Gaganendranath Dash, The Institute of Oriya Studies, Cuttack, 1983
02. *Adhunika Odia Sahityara Samkhipta Parichaya*, Brundabanchandra Acharya, 1974, 1977.
03. *Adhunika Odia Sahityara Bhittibhumi*, Natabara Samantaray, Friends' Publishers, Cuttack, 1964.
04. *Odia Sahitya: Bikashara Prusthabhumi*, Natabara Samantaray, G. Samantaray, Bhubaneswar, 1979
05. *Adhunika Odia Sahitya*, Janaki Ballabh Mohanty, Grantha Mandir, Cuttack, 1963, 1971.
06. *Odia Sahityara Itihasa*, Pathani Pattnaik, Nalanda, Cuttack, 1978.
07. *Adhunika Odia Gadyasahitya (1811-1920)*, Srinibas Mishra, Vidyapuri, Cuttack, 1978, 1995.
08. *Odia Sahityara Itihasa*, Bauribandhu Kar, Friends' Publishers, Cuttack, 3rd Ed., 2004.
09. *Odia Patra Patrika Sahitya*, Bansidhar Mohanty, Konarka, No.49, pp.77-84, 1982.
10. *Odia Prakashana O Prasaranara Itihasa*, Sridhar Mohapatra Sharma, Grantha Mandir, 1986.
11. *Sambada Patra'ru Odisha'ra Katha*, Sudhakar Pattnaik, Grantha Mandir, Cuttack, 1972.
12. *Odishara Bikashare Patra Patrikar Pravab*, Gopal Chandra Mishra, J. Mishra, Cuttack, 1979.
13. *Odisha'ra Patrapatrika O Adyaprakashita Pustaka*, Pathani Pattnaik, Orissa Sahitya Akademi, Bhubaneswar, 1982.

### Science Writing in Oriya Language

14. *Odia Bigyana Sahitya*, Gokulananda Mohapatra, Dagar, **20**(1), 13-16 (1956-57).
15. *Odia Bhashare Baigyanika Tatha Teknologiya Sahitya*, Gokulananda Mohapatra, Orissa Sahitya Akademi, Bhubaneswar, 1982.
16. *Gata Pachishabarsha Madhyare Rachita Baigyanika Sahitya: Eka Samikhya*, Debakanta Mishra, Konarka, No.49, pp.37-60, 1982.
17. *Odia Bhashare Bigata Ardhasatabdira Bigyan-Sahitya*, Snigdha Pattnaik, Bigyanaloka, pp.1-4, May-June 1997.
18. *Odia Bigyan Sahityara Bikasa*, Kulamani Samal, Orissa Bigyan Lekhaka Samukhya (Bhubaneswar) Smaranika, pp.7-11, 2002.

### Biographical

19. *Odishara Bigyana Lekhaka*, Bigyan Prachar Samiti, Cuttack, 1997.
20. *Odia Lekhaka Parichaya [Adhunika Bhaga, 1850 Masiha Parabarti]*, Orissa Sahitya Akademi, Bhubaneswar, 2004.
21. *Odia Charita Kosha, Vol. 1.*, Nagendra Nath Mohanty, Pratima Nath Trust, New Delhi, 2005.  
*Vol. 2 & 3*, Nagendra Nath Mohanty, (In Press).

### Reprints and Compilations

22. *Atharasha Chhasathi (Utkala Dipika)*, Bansidhar Mohanty, Ed., Friends' Publisher, Cuttack, 1978.
23. *Prabodha Chandrika (1856)*, Bansidhar Mohanty, Comp., Utkal University, Bhubaneswar, 1984.
24. *Odishara Prathama Sahityapatra: Utkal Darpan*, Arabinda Giri, Ed., Pragati Utkal Sangha, Rourkela, 2007.
25. *Unabinsha Satakara Duiti Bismruta Sahityapatra*, Sudarshana Acharya, Ed., Pragati Utkal Sangha, Rourkela, 2009.
26. *Prathama Odia Sishupatrika Pravata O Reba Roy*, Maheswar Mohanty, Ed., Sishu Sahitya Lekhaka Sammelan, Cuttack, 2009.
27. *Bhaktakabi Madhusudan Granthabali*, Gayatri Prakashani, Cuttack, 1996, 2008
28. *Fakir Mohan Granthabali, Vol.3*, Krushnacharan Behera, Debendra Kumar Dash, Ed., Grantha Mandir, Cuttack, 2008.
29. *Odia Bhasha Sadhana Vol.1*, E-Bhashakosha, Electronic Version of Purnachandra Odia Bhashakosha (1931-1940), Srujanika, Bhubaneswar, 2006.
30. *Odia Bhasha Sadhana Vol.3*, Electronic Compilation of Oriya Dictionaries 1811-1942, Srujanika, Bhubaneswar, 2009.

TABLE 1  
SOME IMPORTANT ORIYA PERIODICALS IN PUBLICATION BEFORE 1950

<i>Sl.</i>	<i>Title</i>	<i>Started</i>	<i>First Editor/Promoter</i>	<i>Frequency / Place</i>
01.	Kujibara Patra	1830's	Sadhusundar Das	Kujibara
02.	Gyanaruna	1849	Rev. C. Lacey	Cuttack
03.	Prabodha Chandrika	1856	Rev. W. C.Lacey	Monthly, Cuttack
04.	Arunodaya	1861		Monthly, Cuttack
05.	Utkal Dipika	1866	Gourishankar Ray	Weekly, Cuttack
06.	Baleswar Sambad Bahika (Initially published as Bodhadayini O Baleswar Sambad Bahika)	1868	Fakir Mohan Senapati, Gobinda Chandra Pattnaik	Monthly/Fortnightly/ Weekly, Baleswar
07.	Utkal Darpan	1873	Indra Ballav Bhattacharya	Monthly/Weekly, Baleswar
08.	Utkal Putra	1873	Peari Mohan Acharya	Fortnightly, Cuttack
09.	Bideshi	1873	Dinanath Banarjee	Fortnightly, Cuttack
10.	Utkal Madhupa	1878	Krushnachandra Pattnaik	Monthly, Cuttack
11.	Mayurbhanja	1879	Srihari Prasad Das	Fortnightly, Baripada
12.	Purusottam Patrika	1882	Haradhana Roy	Weekly, Puri
13.	Taraka	1883	W. Miller, H. F. Hill	Monthly, Baleswar
14.	Sebaka	1883	Bhabagrahi Das, Chaturbhujia Pattnaik	Monthly, Cuttack
15.	Samskaraka	1884	Bhabagrahi Das	Monthly/Weekly, Cuttack
16.	Pradeepa	1885	Sarat Chandra Mukhejree	Monthly, Cuttack
17.	Shikshabandhu	1885	Jogendranath Jena, Madhusudan Rao	Monthly, Cuttack
18.	Odia O Naba Sambada [incorporating Naba Sambada (1887), Odia (1887)]	1888		Weekly, Baleswar
19.	Asha	1888	Sadhu Charan Ray, Reba Ray	Monthly, Cuttack
20.	Sambalpur Hiteishini	1889	Nilamani Bidyaratna	Weekly, Bamanda
21.	Utkalprabha	1891	Chaitanya Prasad Ray	Monthly, Baripada
22.	Utkal Sahitya	1897	Viswanath Kar	Monthly Cuttack
23.	Utkal Madhupa	1900	Nilamani Bidyaratna	Monthly, Bamanda
24.	Mukura	1906	Brajasundar Das	Monthly, Cuttack
25.	Prabhat (Children's Magazine)	1909	Reba Ray	Monthly, Cuttack
26.	Asha	1913	Shashibhusan Rath	Brahmapur
27.	Satyabadi	1915	Gopabandhu Das	Monthly, Brahmapur
28.	Sahakara	1919	Laxmi Narayan Sahu Balakrushna Kar	Monthly, Cuttack
29.	Samaj	1919	Gopabandhu Das	Weekly/Daily, Cuttack
30.	Panchamruta (Children's Magazine)	1920	Chintamani Acharya	Monthly, Cuttack
31.	Baruni	1925	Raj Kishor Das	Quarterly, Cuttack
32.	Prajatantra	1930	Harekrushna Mahatab	Weekly/Daily, Cuttack
33.	Bhanja Pradeepa	1931	Radhagobinda Das	Monthly, Baripada
34.	Jahnamamu (Children's Magazine)	1932	Balakrushna Kar	Monthly, Cuttack
35.	Jugabina	1933	Harihar Mohapatra	Monthly, Cuttack
36.	Nababharata	1934	Nilakantha Das	Monthly, Cuttack
37.	Dagaro	1936	Laxmikanta Mohapatra	Fortnightly, Bhadrak
38.	Shankha	1945	Mayadhar Mansingh	Monthly, Bamanda
39.	Chaturanga	1946	Kalindi Charan Panigrahi	Monthly, Bolangir
40.	Jhankara	1949	Harekrushna Mahatab	Monthly, Cuttack

TABLE 2

**PRE-1950 SCIENCE BOOKS & REFERENCE WORKS**

(All available pages, mostly complete, have been included in the compilation.  
Click on the serial number in [blue](#) to access the relevant file.)

GENERAL BOOKS

<u>Sl.</u>	<u>PubYear</u>	<u>Author</u>	<u>Title and Notes</u>
01.	1830-32	Amos Sutton	<i>Padarthabidya Sara</i> , v.1&2, Elements of Natural Philosophy, Oriya & English, 2nd Ed., 1840, pp.144+144
<a href="#">02.</a>	1866	Fakir Mohan Senapati	<i>Jibana Charita</i> , 68pp., Reprinted 1993, Translation of portions of Eshwar Chandra Vidyasagar's Bengali work, which was a translation from a book of biographies in English. Includes biographies of Copernicus, Galileo, Herschel, Newton, Linneus and others.
03.	1867	John Short	<i>Tikadeba Bisayaka Bidhana</i> , "Vaccination Practices"
04.	1871	Dwaraknath Chakraborty	<i>Jada Bigyan</i> , "Physical Science"
<a href="#">05.</a>	1872	Gowree Sunker Roy	<i>Prakruta Bhugola</i> , 2nd edn., ~110pp., A general reader on Geography.
06.	1874	Prabhakar Chudamani	<i>Swasthyaraksha</i> , "Health & Hygiene" (Radhika Prasanna Mukhopadhyaya)
07.	1876	Bholanath Das	<i>Pranitattwa</i> , v.1, "Biology"
08.	1878	Bholanath Das	<i>Sarala Jada Bigyan</i> , "Simple Physical Science"
09.	1878	Bhubaneswar Dutta	<i>Sarala Rasayana</i> , "Simple Chemistry"
<a href="#">10.</a>	1879	W. D. Stewart	<i>Padartha Bigyan</i> , 72pp., "Elementary Physics"
11.	1885	Ramakrushna Sahu	<i>Shishupalana O Shishusiksha</i> , "Childcare and Children's education"
12.	1886	Chaturbhuj Pattnaik	<i>Swasthya Sadhana</i> , "Health Resources"
13.	1886	Ramakrushna Sahu	<i>Sharira Raksha</i> , "Care of the Body"
14.	1887	Ramakrushna Sahu	<i>Jhadakai Rogara Chikitsa</i> , "Treatment of Diarrhoea"
<a href="#">15.</a>	1890	Jogeshchandra Roy	<i>Sarala Padartha Bigyan</i> , "Elements of Physics", 4th ed. 1897, 104pp.
16.	1892	Nilamani Bidyaratna	<i>Godhan Raksha</i> , "Cattle Care"
17.	1892	Nilamani Bidyaratna	<i>Bisuchika Chikitsa</i> , "Treatment of Cholera"
<a href="#">18.</a>	1891	Shyamsundar Pattnaik	<i>Swasthya Sadhana</i> , iv+78pp., "The Way to Health: A Sanitary Primer" - A general guide on health, hygiene and medical problems.
<a href="#">19.</a>	1895	Sitanath Ray	<i>Swasthyasadhanara Prashnottar</i> , 4th edn., 22 pp., A question-answer guide on general health for students, junior health workers.

<u>Sl.</u>	<u>PubYear</u>	<u>Author</u>	<u>Title and Notes</u>
20.	1911	H. Armitstid	<i>Udhcha-prathmika Bigyana-patha</i> , iv+32 pp., Science text-book for upper primary classes and a generally informative reader with many illustrations.
21.	1915	Sachchidananda Deb	<i>Brusti Bijnan</i> pt.I, 80pp., The first full science book in Oriya. A book on meteorology for the common man. The part one was to serve as a background reader for the second part with local data collected by the author in his own observatory. But the second part was never published and the manuscript, if completed, remains untraced.
22.	1915	Nilamani Bidyaratna	<i>Jibana Bandhu</i> , ii+19pp., A booklet about water. The importance of water for life, water sources, contamination, protection and purification.
23.	1917	- -	<i>Prakruti Parjyabekshana Patha</i> , 24pp., A nature study guide for students, but with material of general interest.
24.	1918	Jagannath Garabadu	<i>Padartha Patha</i> , iv+20pp., A study guide for physical sciences containing material of general interest.
25.	1920	Madanmohan Pradhan	<i>Krushak Bandhu</i> , vi+129pp., A guide book on agriculture for the public. Contains background material on plant and soil science and medical problems of live stock.
26.	1927	S. Nayak	<i>Basantaroga Pratikara</i> , iii+17pp., A guide book on small pox.
27.	1927	S. Nayak	<i>Olautha Pratikara</i> , 3rd edn., iii+24pp., A guide book on cholera.
28.	1929	Banabihari Pattnaik	<i>Basanta</i> , pp., A treatise on Smallpox.
29.	1929	Banabihari Pattnaik	<i>Bishuchika</i> , xxiv+137pp., A treatise on cholera.
30.	1929	Radhacharan Panda	<i>Maleria</i> , "Malaria"
31.	1930	Chandramani Mohapatra	<i>Jeebana, Aloka O Parichhanata'ra Prasnottara</i> , ii+46pp., Questions and answers on hygiene.
32.	1930	Ramakrushna Mohapatra	<i>Swasthya Bigyan</i> , ii+70pp., General book on health science.
33.	1932	Chandrasekhar Mishra	<i>Samanta Chandrasekhar</i> , ix+270pp., A biography of Samanta Chandrasekhar (1835-1904), the naked-eye astronomer noted for his highly accurate ephemerical computations. One of the most celebrated scientific personalities of Orissa. This is one of the earliest comprehensive biographies in Oriya language and is also notable for its extensive discussion of the person's work along with his life story.

<u>Sl.</u>	<u>PubYear</u>	<u>Author</u>	<u>Title and Notes</u>
34.	1932	Radhashyam Das	<i>Swasthya Shikshya</i> , xiv+134pp., A general book on the science of the human body and on ways to take care of the same through physical exercise.
35.	1933	Radhashyam Das	<i>Khadya</i> , vi+ ~90pp., Discusses the nutritional aspects of various food stuff and diets in relation to health and diseases.
36.	1933	Rajendra Charan Pradhan	<i>Soura Jagat</i> , "Solar System"
37.	1934	Banabihari Pattnaik	<i>Sishu Swasthya</i> , iv+47pp., A book on infant hygiene.
38.	1934	Krushnachandra Kar	<i>Prakrutipatha Siksha</i> , ii+18pp., A primer on nature study with short descriptions of many plants.
39.	1935	Aaram Patra	<i>Udvida Bigyan</i> , ii+133pp., "Plant Science"
40.	1937	Banchhanidhi Satapathy	<i>Rogara Atmakatha</i> , x+238pp., Their own story as told by the diseases. Causes and management of various common diseases described in first person from the point of view of the diseases and their causative organisms.
41.	1940	Banabihari Pattnaik	<i>Aama Deha</i> , xi+123pp., 3 plates, A general reader on human physiology and anatomy.
42.	1940	Padmacharan Pattnaik	<i>Odia'ra Khadya O Swasthya</i> , xiv+274pp., A discussion on the nutritive value of common foods consumed by the people of Orissa and their relation to health and disease. Discusses ways to health through physical activities and supplementation with easily available nutritional food.
43.	1943	Gopalchandra Pattanayak	<i>Malaria</i> , viii+48pp., Discusses the medical, social and management aspects of malaria in a way useful for the common man and field health workers.
44.	1947	Prasad	<i>E Jugara Asura</i> , ii+23pp., "The demon of this era". Presents the dropping of atom bomb in form of a story.
45.	1947	Raghunath Padhi	<i>Sadharana Bigyana</i> , viii+88, One of the earliest science text books in Oriya written in the modern style, shortly after Oriya language was accepted as the medium for school science curriculum.
46.	1948	M. V. Apparao	<i>Malaria Patha</i> , v+108pp. + 40pp. illustrations and colour plates. A heavily illustrated handbook on malaria.
47.	1949	Gopalchandra Pattanayak	<i>Swasthya Sathi</i> , v+136 pp. (new edition), A lucid text on health sciences for upper primary classes, but useful for a general reader.

<u>Sl.</u>	<u>PubYear</u>	<u>Author</u>	<u>Title and Notes</u>
48.	1949	Gokulananda Mohapatra	<i>Bigyana Bishmaya</i> , viii+100pp., Probably the first popular science book in Oriya. A compilation of the author's articles published in various magazines. The author is the first popular science writer to have written extensively on wide-ranging topics in Oriya.
49.	1950	Gokulananda Mohapatra	<i>Bigyana Krutitwa</i> , xxx+150pp., illustr.+plates, The second compilation as above with a set of different articles.
50.	1950c.	Godabarisha Mishra	<i>Pilanka Kahinki I, II</i> , (7th ed. 1999) vii+64+76pp., A noted educationist and literateur, Godabarisha Mishra taught at the Satyabadi Bana Vidyalaya - a nationalist and reformist centre for education. This book, which grew out of that experience, is a compendium of questions commonly asked by the children along with their scientific answers
51.	1950c.	Godabarisha Mishra	<i>Ghatantara</i> , 56pp., "Change of Body". A science fiction story inspired by Dr. Jekyll and Mr. Hyde.
52.	1950c.	Godabarisha Mishra	<i>Nirbasita</i> , 174pp., "Banished". A science fiction novel.

WORKS OF REFERENCE (Sample science-related entries and pages given in the compilation)

R1.	1931-40	Gopal Chandra Praharaj	<i>Purnachandra Odia Bhashakosha</i> , v.1-7, ~9500pp. Encyclopedic Lexicon with many entries on science subjects. Lists about 1300 plants with their Botanical names and has entries of varying length on many science subjects.
R2.	1935	Bhagirathi Mahapatra	<i>Ratnakosha ba Bruhat Bibidha Sangraha</i> , ~450pp. A compendium of facts and notes on various subjects.
R3.	1941	Balakrushna Kar	<i>Sishu Sankhali - Bichitra Jiba Jagat</i> , xxii+400pp. Part of a multi-volume encyclopedia each volume of which was on a single theme. Profusely illustrated, with some in colour.

TABLE 3

## SELECTED SCIENCE ARTICLES IN ORIYA PUBLISHED BETWEEN 1850 AND 1950

(Clicking on the [title](#) will display the full article)

<b>Title/Author</b>	<b>Year / Periodical</b>	<b>Subject matter (word count)</b>
1. Blood Circulation ( <i>Rakta Chaliba Bisaya</i> )	1856 Prabodh Chandrika	Blood circulation through veins and arteries, blood purification, function of the heart. (451)
2. Science Association in Calcutta ( <i>Kalikatara Gotie Bigyanasabha</i> )	1869 Utkal Dipika	News of preparations for the establishment of a Science Association by Dr. Mahendralal Sarkar (326)
3. Lightning Conductor ( <i>Bidyut Parichalaka Loharagaja</i> )	1869 Utkal Dipika	Nature of lightning and electricity, functioning and utility of a lightning conductor. (135)
4. Light and Ether ( <i>Alokara Upadana Ithar</i> )	1869 Utkal Dipika	Tindal's ideas about transmission of light through vibration of all pervasive, elastic ether, colour and wavelength. (101)
5. Science Education ( <i>Bigyana Shastra Shiksha</i> )	1871 Utkal Dipika	Value of science in day to day life, benefits of scientific awareness in improving living conditions. (562)
6. The Moon and Stars ( <i>Chandra O Tara</i> ) Madhusudan Rao	1873 Utkal Darpan	Conversation among the stars on the changing appearance of the moon and a comet. (763)
7. Life on other Planets? ( <i>Grahamane Pranimananka Abasabhumi Ki Na?</i> )	1873 Utkal Darpan	Are there living beings on other planets? Can life there be detected through a powerful telescope? Considers the requirements for life and if these exist on the other terrestrial planets. (1114)
8. Sun ( <i>Surjya</i> ) Fakir Mohan Senapati	1875 Baleswar Sambadbahika	Sun as the centre of solar system, its shape, size, distance from the earth, energy, and motion. (289)
9. Science and its Benefits ( <i>Bigyana O Sethira Upakarita</i> )	1880 Baleswar Sambadbahika	Summary of a public lecture on the nature of science, prevalence of scientific thought in India in the past and some modern inventions benefiting the society. (1109)
10. Comet ( <i>Dhumaketu</i> ) Fakir Mohan Senapati	1881 Baleswar Sambadbahika	Comments on the visible comet, its distance from sun, size of the head and tail, origin of comet, periodicity. (577)
11. Cooking by Solar energy ( <i>Surjyarashmi Dhari Randhana Karjya</i> )	1881-82 Mayurbhanj	News of cooking by solar energy since the fossil fuels are getting exhausted. (24)
12. Astonishing Property of Oil ( <i>Tailara Ki Ashcharjya Guna</i> )	1882 Purusottam Patrika	A story about how a bit of oil can prevent boiling over of dal being cooked because of its surface tension altering property. Suggests that oil can also calm the waves in a large body of water. (338)

<b>Title/Author</b>	<b>Year / Periodical</b>	<b>Subject matter (word count)</b>
13. Venus Transit ( <i>Shukra Sanchara Uttara</i> )	1882 Purusottam Patrika	The upcoming transit of venus will not be visible from Orissa. (114)
14. 'Bigyan Darpan' ( <i>Patrika Prapti - Bigyana Darpana</i> )	1882 Baleswar Sambadbahika	Review of the 4th issue of the science magazine in Oriya. "Carries articles on Science of Aryans, Charles Darwin..." (87)
15. Mosquito ( <i>Mashakajati</i> )	1884 Utkal Dipika	Types of mosquitoes, their breeding habits and life cycle. (78)
16. Planet Venus ( <i>Shukra Graha</i> )	1884 Taraka	Seen as evening and morning stars, its distance from sun, diurnal and annual periods, atmosphere, no satellites... (221)
17. Asteroid Palas ( <i>Palasa Graha Punja</i> )	1884 Taraka	Hundreds of mini planets between Mars and Jupiter, Palas being the largest. Origin of the asteroids. (116)
18. Observation and Experiment ( <i>Paridarshana O Pariksha</i> )	1885 Pradeepa	Function of science is to find the causes of natural phenomena, observation and experimentation are its tools, explained with examples like evaporation and condensation of water. (823)
19. The Infinite Universe ( <i>Brahmandara Asimatwa</i> )	1888 Odia O Nabasambada	Just as a town is a small part of the earth, the solar system is a tiny speck in the Universe. Extremely large distances between the stars and the vastness of the Universe are hard to comprehend. (467)
20. The Earth ( <i>Pruthibi</i> )	1890 Sambalpur Hiteishini	Facts and phenomena relating to earth as a planet, its origin, shape, size, motion etc. With illustrations. (1500)
21. Science ( <i>Bigyana</i> )	1893 Asha	Nature of science, its divisions, facts about cloud, lightning, thunder, rain, storm, cyclone, air etc. (513)
22. Musings on the Eclipses ( <i>Grahana Bichara</i> ) Jalandhar Deb	1896 Sambalpur Hiteishini	Discusses the causes, features and locational circumstances of lunar and solar eclipses. Questions the practice of fasting and observing other rituals even by the educated persons during the eclipses. (1400)
23. Star ( <i>Tara</i> )	1897 Sambalpur Hiteishini	Nature of a star, number of stars seen with the naked eye as well as through a telescope, cataloguing of stars by Hoselter, Gelami, William and John Herschel and others. Stars are much larger suns. (869)
24. Benjamin Franklin ( <i>Benjamin Franklin</i> ) Shyamasundar Nanda	1897 Utkal Sahitya	Life sketch of Benjamin Franklin emphasising his early struggles. (526)

<b>Title/Author</b>	<b>Year / Periodical</b>	<b>Subject matter (word count)</b>
25. Bodies of Water ( <i>Jalarashi</i> ) Madhusudan Rao	1898 Prabandhamala	Water covers a much larger part of earth's surface, supports diverse plant and animal life, helps man with industry and transportation, inland and ocean water, water cycle, composition of water. (491)
26. Photography ( <i>Alokachitra Ba Photography</i> ) Shyamasundar Sathia	1902-03 Utkal Sahitya	Nine-part serial on all aspects of photography both in theory and practice. Discusses light and camera. (9514)
27. Degeneration and extinction ( <i>Jibamanankara Apagamana O Lopa</i> ) Tarinicharan Rath	1905 Utkal Sahitya	Changes in the physical form of organisms through evolution and adaptation, loss of capability because of disuse and parasitism, extinction more common among larger animals. (1241)
28. Light ( <i>Aloka</i> )	1906 Mukura	Light, its propagation and properties, X-rays, radioactive rays, radium and its miraculous properties. (1982)
29. Plants and Light ( <i>Aloka Sahita Udvidara Samparka</i> )  Mrutyunjaya Rath	1907 Prabandha Patha	Effects of light on the growth, colour and response of plants. Mechanism of folding up of mimosa leaves. (781)
30. Chemical Principles ( <i>Rasayan Tattwa</i> ) Satyakumar Ray	1908 Mukura	Discusses atom, elements, chemical transformation, phlogiston theory, works of Ray, Boyle and Priestley on combustion and oxygen, chemical composition of air, water, vermilion. (1140)
31. Chats between Grandfather and Grandson ( <i>Aja Nati Rahasya</i> ) Jagannath Tripathy	1908-09 Mukura	A multipart series dealing with various scientific questions and explanations presented as lively chats. The topics include: vaporisation and condensation of water, clouds, rain, fog, dew; steam engine and trains; Newton, gravitation and earth's revolution, hail stone, rock and soil; pebbles, diamond and glass; lightning, electricity, telegraph. (3953)
32. Surprising Function of Dust ( <i>Dhulira Ashcharjya Karjya</i> )	1909 Prabhata	An early science article in the first children's magazine. Dust present everywhere upto very high in the atmosphere, responsible for diffuse light, colourations of the sky, redness of the rising and setting sun. With diagram (633)
33. Scientific Terminology ( <i>Baigyanika Paribhasha</i> ) Jagannath Tripathy	1909 Utkal Sahitya	Problems of presenting scientific ideas in local language, reactions of the literateurs to new words. (609)

<b>Title/Author</b>	<b>Year / Periodical</b>	<b>Subject matter (word count)</b>
34. Halley's Comet ( <i>Helira Dhumaketu</i> ) Jalandhar Deb	1909 Sambalpur Hiteishini	Announces the forthcoming naked eye visibility of Halley's comet. Encourages people to see the comet and decries the fear of comets and eclipses. Discusses the common characteristics of comets, periodicity, appearances and the current movements of Halley's comet. (1054)
35. Earthworm and Other Living Manures ( <i>Jiyanala (Mahilata) Prabhruti</i> <i>Ketoti Jibita Sara</i> ) Gopal Charan Pattnaik	1910 Mukura	Habit and habitat of earthworms and dung beetles, their role in farming, top soil enrichment, nitrogen fixation by leguminous plants. (925)
36. Science and Literature ( <i>Bigyana O Sahitya</i> ) Shashibhushan Ray	1911 Utkal Sahitya	Discusses the eternal question of which is superior - science or literature, explores the strengths, weaknesses of both and finds them complementing each other for the benefit of the society. (934)
37. Teaching of Zoology ( <i>Jibabigyan Shiskha</i> ) Tarini Charan Rath	1913 Utkal Sahitya	Discusses nature and method of science, of zoology and its divisions like morphology, physiology, classification, in comparison to other branches of science. (1527)
38. Science in Everyday Life ( <i>Sadharana Jibanare</i> <i>Bigyana</i> ) Pranakrushna Parija	1914 Utkal Sahitya	How science has progressed through man's questioning and seeking answers. Man needs to apply the results of science to reap its benefits. Open mind free from blind beliefs and vanity of education would lead to progress. (1210)
39. Acharya Jagadish Chandra ( <i>Acharjya Jagadisha Chandra</i> ) Chintamani Acharya	1915 Utkal Sahitya	Biography of J. C. Bose with highlights of his work and achievements. (2569)
40. Plant Mysteries ( <i>Udvida Rahasya</i> ) Nilakantha Das	1915-17 Satyabadi	A series on various aspects of plant science. Includes origin of plants, plant propagation, diversity, physiology. (10195)
41. Amoeba ( <i>Paribartti</i> ) Banabihari Pattnaik	1918 Satyabadi	Structure and life process of the tiny single-celled organism. (683)
42. Life Story of Diamond ( <i>Hirara Jibana Kahani</i> ) Gurucharan Mohanty	1920 Utkal Sahitya	Three-part series on the formation and chemistry of diamond in a story form. A diamond is burnt to produce Carbon-dioxide which gets captured by a plant and is converted into sugar, the sugar is used in an experiment to produce artificial diamond through a series of long chemical processes. (2680)

<b>Title/Author</b>	<b>Year / Periodical</b>	<b>Subject matter (word count)</b>
43. Sundial ( <i>Surjyaghadī</i> ) Shyamachandra Tripathy	1921 Panchamruta	For children. Instructions for making a sundial and calculations for marking the hour angles. (486)
44. Sexuality in Plants ( <i>Udvidara Jaunattwo</i> ) Biraj Mohan Senapati	1922 Sahakar	Seed production in plants through pollination, structure of the male and female flowers, fertilisation. (1616)
45. Travels Around the Universe ( <i>Bishwabhramana</i> ) Narayan Prasad Sathiya	1924 Mukura	An imaginary account of space travel at enormous speed. Describes the objects seen during the travel - Mars, Jupiter, Saturn, Uranus and comets at the boundary of the solar system. (2108)
46. Can Insects hear? ( <i>Pokamane Ka'an Shuniparanti?</i> )	1926 Baruni	Generally believed that insects have no hearing organ, yet they can manage to survive and feed without any problem. Discusses examples of how insects communicate otherwise. Illustrated. (905)
47. Theory of Evolution ( <i>Bibarttanabada</i> ) Ratnakar Pati	1924-1930 Utkal Sahitya	A long series of articles on the theory of evolution, including inorganic evolution. (21,700)
48. Science Question & Answers ( <i>Bigyana Prashnottara</i> )	1926 Panchamruta	Why do we feel breathless? (255) What is fainting? (242) Why can't we see in the dark? (557) Why does a swan not get wet? (197) Short discussions for children.
49. Light and Sensing It ( <i>Aloka O Tahara Anubhuti</i> ) Haribandhu Mohanty	1927 Utkal Sahitya	What is light, sense of vision and the eye, corpuscular and wave theories of light, ether and propagation of light, physiology of vision and sensory processing in the brain, colour perception. (2932)
50. Plant Science in Ancient India ( <i>Prachina Bharatara Uvidya Bidya</i> ) Upendra Chandra Mishra	1928 Utkal Sahitya	Well developed because of its utility in in Ayurveda, plants classified in many different ways based on form, utility, location etc., plant diseases and some remedies. (2176)
51. Poison Plants ( <i>Bishabruksha</i> ) Pranakrushna Parija	1930 Panchamruta	Article for children on some poisonous plants and their action on the body. (480)
52. Science in Orissa ( <i>Odishara Bigyana Charchcha</i> ) Radha Charan Panda	1931 Sahakar	Science education in Orissa should cover broader areas and should be changed to encourage creativity. Teachers and other educated people do not read science. They need to continue their development through reading and discussions. (1999)
53. Sir Chandrasekhar Venkataraman ( <i>Sir Chandrasekhar Venkataraman</i> ) Agani Dash	1932 Utkal Sahitya	Biography of C. V. Raman detailing his life and personality, academic career, research work, achievements and his work for spreading science in India. (1740)

Title/Author	Year / Periodical	Subject matter (word count)
54. The Digestive Apparatus ( <i>Khadya Paripakakriya Sahajyakari Jantrabali</i> ) Basanta Kumar Nanda	1932 Sahakar	Discussion primarily on teeth, their role in digestive process, problems and care of teeth. Brief mention of the tongue, Parotid, Submaxillary and Sublingual glands. (1679)
55. Airship ( <i>Bayupota</i> ) Jagannath Tripathy	1932 Sahakar	Sketches the development of flying machines through balloon, dirigible, glider, monoplane and biplane stages. Illustrated. (1652)
56. Medical Sciences ( <i>Chikitsabigyana</i> ) Jayakrushna Mohanty	1932 Sahakar	Medical sciences in ancient India, Ayurveda, interaction with the Greeks and Arabs, modern medical practices, reasons for low acceptance of modern medical education in India, future outlook. (2481)
57. Heavy Hydrogen, Uranus, Neptune and Pluto ( <i>Guru Udjana, Uranus, Neptune O Pluto</i> )	1933 Rasachakra	Short articles on these new discoveries. (318)
58. Sun-rays, Plants and the Living World ( <i>Surjyarashmi, Udvida O Jibajagata</i> ) Banshidhar Samantaray	1934 Naba Bharat	Sun-rays support life on earth by supplying energy which is captured and converted by the plants. (1032)
59. Story of Colour ( <i>Rangara Katha</i> ) Basant Kumar Behura	1934 Jahnamamu	Colour explained for children. Sunlight has seven colours and gives colour to everything by getting absorbed or reflected partially. Colours can mix to give different colours. (784)
60. Heredity ( <i>Bamshanuguna</i> ) Banshidhar Samantaray	1934-35 Sahakar	A long series on heredity and genetics with illustrated details of chromosome distribution and formation of hybrids.
61. Carnivorous plants ( <i>Mamsasi Udvida</i> ) Bansidhar Samantray	1935 Sahakar	Describes with illustrations various carnivorous plants. (2470)
62. Meteor ( <i>Ulkapata</i> ) Banshidhar Samantaray	1936 Utkal Sahitya	Origin and composition of the meteors, meteor shower, Leonid meteor shower of 1866. (1258)
63. Indian Science Congress ( <i>Bharatiya Bigyana Kangress</i> ) Bhagaban Pati	1937 Sahakar	A report on the 25th Indian Science Congress along with background of its formation, its objectives, summary of the addresses by the Viceroy and President of the Congress Sir James Jean. (2072)
64. Predictions for Birds ( <i>Pakhi Samudrika</i> ) Jagatmohan Sen	1938 Bhanja Pradeepa	Deducing the food habits and life styles of some birds by looking at their claws. Illustrated. (1660)
65. Pasteur and Bacteria ( <i>Bigyana O Baigyanika</i> ) Banshidhar Samantaray	1939 Utkal Sahitya	Biography of Louis Pasteur with details of his work on isomers, bacterial fermentation, antiseptics, diphtheria etc. (2158)

<b>Title/Author</b>	<b>Year / Periodical</b>	<b>Subject matter (word count)</b>
66. Physical and Mental Growth ( <i>Sarira Abhibrudhhi Manara Manara Abhibrudhi</i> ) Nilamani Behera	1941 Naba Bharat	Part of a series on the importance of handwork education. Discusses the functional areas of brain and how these control the hands and the need for timely training of the hand movements for proper development of mental faculty. (1387)
67. Three Gods of Health ( <i>Swasthyara Tini Debata</i> ) Gopal Chandra Pattanayak	1941 Jahnamamu	Role of Sun light, heat and air in keeping us healthy, explained for children. (1515)
68. The Brain and Intelligence ( <i>Mastiska O buddhi</i> ) Ramakrushna Nanda	1941 Bhanjapradeepa	Relationship of brain structure and size with intelligence in different animals, common perception about intelligence and method of measuring it. Illustrated (1868)
69. Creation and Extinction of the Living World ( <i>Jibajagatara Srusti O Bilaya</i> ) Gadadhar Mishra	1941 Naba Bharat	Creation of the earth, development of life-supporting environment, origin and evolution of life, eventual extinction of all life with the cooling of the sun. (1161)
70. Story of evolution ( <i>Bibarttanabadara Katha</i> ) Basant Kumar Behura	1942 Bhanjapradeepa	How Darwin formulated the theory of evolution from living and fossil records, inspiration from Malthus, countering Lamarckism, work of Wallace, publication of "Origin of Species", concept of natural selection. (1564)
71. Vitamins ( <i>Khadyaprana Samuha</i> ) Narayan Das Dutta	1945 Sankha	Different vitamins, their occurrence and role in human health, minerals needs of our body. (1538)
72. Contribution of Coal-tar to Modern Science ( <i>Adhunika Bigyanaku Alakatarara Sahajya</i> ) Gokulananda Mohapatra	1946 Sankha	Description of nearly 200 useful chemicals like dyes, plastics, explosives, drugs etc. present in coal-tar. (3580)
73. Cyclone ( <i>Ghurnibatya</i> ) Brundaban Chandra Acharya	1946 Sankha	Atmospheric disturbances arising out of sun's heating and earth's rotation leads to wind flow. Cyclone and typhoon are caused by large variations in atmospheric pressure. (1504)
74. Artificial Diamond ( <i>Krutrima Upayare Hira</i> ) Gokulananda Mohapatra	1947 Chaturanga	Chemical composition of diamond, details of the attempts to produce diamond in the laboratory. (1434)
75. Expedition to the Moon ( <i>Chandra Abhimukhe Abhijaan</i> ) Kumudini Mohapatra	1947 Sankha	Conditions on moon's surface and how to face these safely, possible ways to travel to the moon, from cannon balls to V-2 rockets, nuclear or cosmic ray powered crafts. (1293)

Title/Author	Year / Periodical	Subject matter (word count)
76. The Moon ( <i>Chandra</i> ) Sadasiba Mishra	1948 Sahakar	Physical characteristics and features of the moon, view of the earth from moon, phenomena like the eclipses and tides due to the moon. (1308)
77. Science and its Uses ( <i>Bigyana O Tahara Byabahara</i> ) Radhanath Rath	1948 Sahitya Sourabha	Remarkable advance in science has proven to be beneficial as well as destructive, faster travel and means of communication has won over distance, but missiles and nuclear bombs are devastating. Man is responsible for the uses and abuses of science, hence public awareness is important. (1324)
78. Son or Daughter ( <i>Pua Na Jhia</i> ) Shyamananda Pattnaik	1949 Subarna Smaraki	Describes chromosomal aspects of human reproduction leading to a male or female offspring. Explains the process of fertilisation and distribution of X and Y chromosomes with illustrations. (1294)
79. The New Age of Science ( <i>Bigyanara Nutana Juga</i> ) Haribandhu Mohanty	1950 Satyabadi (Naba Parjyaya)	Starts with the devastating power of the nuclear bomb, explores the relationship between matter and energy from ancient times to Einstein and harnessing of nuclear energy. (2668)
80. Progress of Science in the Next Half-century ( <i>Asanta Arddha Satabdi Madhyare Bigyanara Gati</i> ) Sarat Chandra Routray	1950 Sahakar	An adaptation of Bertrand Russell's article, 'The Next Fifty Years' along with a life sketch of Russell. Outlines the advances made in science in the immediate past and predicts likely developments in cosmology, biology and psychology as well as in public consciousness about science. (2223)

TABLE 4  
SCIENCE WRITERS IN ORIYA LANGUAGE (1850-1950)

Arranged in order of the authors' earliest writings

<u>Sl</u>	<u>Name</u>	<u>Life Span</u>	<u>Background / Later Position</u>	<u>Writing Period</u>	<u>No. of Articles</u>
01.	Madhusudan Rao	1853-1912	Literateur, Educationist	1873-1900	11
02.	Fakir Mohan Senapati	1843-1918	Literateur, Administrator	1875-81	3
03.	Jalandhar Deb	1872-1952	Literateur	1896-46	10
04.	Shyamasundar Nanda		Literateur	1897-1906	6
05.	Madhusudan Dash	1868-1949	Teacher	1897-99	3
06.	Gangadhar Meher	1874-1924	Poet	1898-1914	2
07.	Gopal Chandra Praharaj	1884-1945	Law, Literateur	1900-17	2
08.	Shyamsundar Sathia		Photographer, Ayurvedic doctor	1902-03	9
09.	Gopabandhu Bandopadhyaya			1902-03	1
10.	Mrutyunjaya Rath	1882-1924	Literateur	1902-1921	7
11.	Sachchidananda Deb	1872-1916	Literateur	1903-15	3
12.	Tarini Charan Rath	1883-1922	Literateur	1903-1914	8
13.	Mohini Mohan Senapati	1881-1945	Philosophy Professor, Literateur	1905-06	1
14.	Krushna Prasad Choudhury	1865-1927	Teacher, Essayist	1906-10	5
15.	Satya Kumar Ray			1908-09	2
16.	Jagannath Tripathy	1883-	Teacher	1908-33	16
17.	Gopal Charan Pattnaik			1910	3
18.	Madan Mohan Pradhan		Agriculture Director	1910	1
19.	Shashibhushan Ray	1876-1953	Literateur	1911-42	6
20.	Pranakrushna Parija	1891-1978	Botany Professor, Vice Chancellor	1913-41	11
21.	Sachchidanand Ray		Education Administration	1914	2
22.	Nilakantha Das(h)	1884-1967	Philosophy	1915-50	8
23.	Chintamani Acharya	1891-1955	History, Law, Vice Chancellor, Editor	1918-19	1
24.	Godabarisha Mishra	1886-1956	Economics, Socio-political Activist	1918-19, 1950	2
25.	Banabihari Pattnaik	1895-1971	Medical Professor	1918-22	2
26.	Sribatsa Panda	1870-1943		1919-20	1
27.	Gurucharan Mohanty	1893-1986	Chemistry Professor	1920-24	4
28.	Jutashri Prakash			1921	1
29.	Shyamachandra Tripathy	1894-1951	Physics, Deputy DPI, Bihar-Orissa	1921	1
30.	Prasanna Kumar Das			1922-23	3
31.	Biraj Mohan Senapati	1889-1979	Agriculture Scientist	1922-23	3
32.	Isac Santra	1892-1968	Doctor, Leprosy worker	1922-23	2
33.	Banshidhar Samantaray	1912-1996	Botany Professor	1922-41	39
34.	Bikram Deb Barma	1869-1951		1923-24	1
35.	Narayan Prasad Sathia			1924	1
36.	Ratnakar Pati	1889-1969	Philosophy Professor	1924-31	16
37.	Jayakrushna Pattnaik		Agriculture Administration	1925	1
38.	Mayadhar Mishra			1925	1
39.	Lakshminarayan Sahu	1890-1963	Socio-political worker	1926-27	1
40.	Padarabinda Mohanty			1926-27	1
41.	Rajkishore Mohanty			1926-27	2
42.	Srikrushna Mohanty			1926-27	1

<u>Sl</u>	<u>Name</u>	<u>Life Span</u>	<u>Background / Later Position</u>	<u>Writing Period</u>	<u>No. of Articles</u>
43.	Agani Dash		Teacher	1926-38	3
44.	Haribandhu Mohanty	1904-1991	Physics, Science Administration	1927-50	6
45.	Upendra Chandra Mishra		Oriya Professor	1928-29	1
46.	Narayan Mohan Das			1931-32	1
47.	Basanta Kumar Nanda		Doctor	1931-34	4
48.	Radhacharan Panda	1898-1974	Doctor, Literateur	1931-36	2
49.	Balakrushna Kar	1887-1959	Literateur, Magazine Editor	1932-33	1
50.	Baikoli Mohapatra	1908-1977	Astrologer	1932-33	2
51.	Jayakrushna Mohanty	1909-1994	Medical Professor	1932-33	2
52.	Bhagaban Pati	1903-	Journalist	1932-38	2
53.	Aswini Kumar Ghosh	1892-1962		1933	1
54.	Basudeb Kar	1913-	Essayist	1933-34	1
55.	Jagatmohan Sen	1906c.-1940	Teacher	1933-41	4
56.	Banshidhar Parija	1911-	Botany Professor	1934	1
57.	Suryamani Kar			1934-35	1
58.	Jogesh Chandra Mitra			1934-36	2
59.	Basant Kumar Behura	1922-	Zoology Professor	1934-51	9
60.	Ras Behari Das			1935	1
61.	Baidyanath Rath			1935	1
62.	Ramprasad Singh	1904-		1935-36	3
63.	Kalikinkar Samanta			1935-36	1
64.	Raghunath Mohanty	1921(?)	Raghu Dibakar (1910-1941)?	1935-36	1
65.	Purnachandra Mohanty	1903-1956	Physics, Scientist	1935-36	1
66.	Dayanidhi Pattnaik			1936-37	2
67.	Haraprasad Deb			1937	1
68.	Banamali Mishra	1897(?)		1938	1
69.	Gunanidhi Dash			1939-40	1
70.	Haribandhu Sharma			1940	1
71.	Nilamani Behera			1940	1
72.	Brahmananda Mishra		Physics Professor	1940-41	1
73.	Gopal Chandra Pattanayak	1903-1985	Doctor, Health Administration	1940-45	5
74.	Ramakrushna Nanda	1906-1994	Headmaster, Magazine Editor	1941	1
75.	Shradhhakar Supkar	1914-1993	Socio-political worker	1941	1
76.	Gadadhar Mishra	1923-2008	Botany Professor	1941-48	8
77.	Harischandra Badal	1904-1995	Science graduate, Railway Service	1942-43	1
78.	Brundaban Chandra Acharya	1921-	Geography	1946	2
79.	Prabhas Chandra Sarkar			1946	1
80.	Gokulananda Mohapatra	1922-	Chemistry Professor	1946-50	26
81.	Kumudini Mohapatra	1930-2006		1947-48	1
82.	Sadashiba Mishra	1909-1994	Economics Professor	1947-48	4
83.	Radhanath Rath	1920-	Psychology Professor	1948	1
84.	Shyamananda Pattnaik		Botany, Director Soil Conservation	1949-50	2
85.	Kailash Chandra Tripathy	1945-2009		1950-51	1
86.	Sarat Chandra Routray			1950-51	2

(16 other writers made single minor contribution each. 102 identifiable authors in all.)

TABLE 5  
ORIYA SCIENCE WRITINGS: SOME STATISTICS

TABLE 5a: Number of articles found in the major periodicals

<u>Magazine</u>	<u>Period Checked</u>	<u>Articles &lt;=200 words</u>	<u>Longer Articles</u>	<u>Total</u>
Baleswar Sambad Bahika	1872 - 1892	42	25	67
Baruni	1926 - 1927	3	14	17
Bhanja Pradeepa	1935 - 43	0	8	8
Chaturanga	1947	0	1	1
Dagaro	1936-1950	0	2	2
Jahnamamu	1932-36, 1940-42	5	54	59
Janmabhumi	1941	0	1	1
Mayurabhanja	1880 - 1882	1	1	2
Mukura	1906 - 1925	0	20	20
Nababharat	1934 - 1951	2	37	39
Odia O Nabasambad	1888 - 1904	23	3	26
Panchamruta	1920 - 1930	1	11	12
Prabhata	1909 - 1914	0	7	7
Prabodha Chandrika	1856	0	2	2
Pradeepa	1885	0	5	5
Purusotam Patrika	1882	8	3	11
Rasachakra	1933 - 1934	1	5	6
Sahakar	1921 - 1951	13	98	111
Sambalpur Hiteishini	1889 - 1909	19	22	41
Sankha	1945 - 1948	0	18	18
Sanskaraka O Sebaka	1884 - 1885	1	3	4
Satyabadi	1915 - 1920	0	10	10
Satyabadi Nabaparjyaya	1950	2	5	7
Taraka	1884	2	5	7
Upahar	1935 - 1938	0	5	5
Utkal Darpan	1873	0	5	5
Utkal Dipika	1866 - 1910	46	22	68
Utkal Madhupa	1879, 1900-01	5	1	6
Utkal Sahitya	1897 - 1941	4	99	103
Misc. Publications		4	33	37
Bhashakosha - Ratnakosha	1931-1940	32	26	58

TABLE 5b: **Distribution of articles according to their length**

<u>Length (Words)</u>	<u>No. of Articles</u>
<= 100	112
101 - 200	70
201 - 300	45
301 - 500	98
501 - 1000	159
1001 - 2000	162
2001 - 3000	47
> 3000	9

(Excludes Bhashakosha and Ratnakosha data)

TABLE 5c: **Number of articles published over different periods**

<u>Period</u>	<u>Articles &lt;= 200 words</u> <u>Number</u>	<u>Longer Articles</u> <u>Number</u>	<u>Total</u> <u>Number</u>
1856 - 1880	45	31	76
1881 - 1890	56	45	101
1891 - 1900	42	42	84
1901 - 1910	11	59	70
1911 - 1920	9	26	35
1921 - 1930	9	76	85
1931 - 1940	13	127	140
1941 - 1950	6	110	116

(Excludes Bhashakosha and Ratnakosha data)

TABLE 5d: **Number of articles published by different authors**

<u>No. of Articles</u> <u>Authored</u>	<u>Number of</u> <u>Authors</u>	<u>Total No.</u> <u>of Articles</u>
Anonymous/Pseudonymous	--	347
1	54	54
2	17	34
3	7	21
4	6	24
5	3	15
6 - 10	8	63
>10	7	149

(Excludes Bhashakosha and Ratnakosha data)