

**SELECT PALM LEAF MANUSCRIPTS IN ORISSA STATE MUSEUM, BHUBANESWAR
ON ASTRONOMY AND MATHEMATICS***

Large number of ancient Indian manuscripts are available in palm-leaves. These PLM were specially made in order to transfer knowledge to the future generation(s) and as well as to preserve the acquired and accumulated knowledge for centuries. The heritage of Orissa, more popularly known as Kaliṅga or Utkala or Odra in different historical periods¹, is not limited to tangible items like built structures (temples, etc.), it has extensive component of intangible heritage as well. During the period c 2nd BC to c 1550 AD, the various Rājgirs of Orissa had played the sterling role of benign *pratipālaka* apart from the imperial Gajapati for over one and half millennia². The *pratipālita* scholars had generated a tome of research work which were scripted on palm leaves. The palm leaf, engraved with metalloferous stylus withstands torrid tropical climate for 150-250 yrs. The original manuscripts were copied and re-copied on palm leaf over the centuries and passed on from generation to generation following *guru-śisya paramparā*, a human chain that held on to them as does a mother to her child.

Hindu astronomy and mathematics are clubbed under the broad 'heads' of Siddhānta and Gaṇita. Pandit Nilamani Misra Curator of Sanskrit studies and of the manuscript section of the Orissa State Museum, Bhubaneswar was the brain behind such massive and invaluable collection of MSS. In memorium of Panditjee and in tune with his wish, the author in this article made a survey of a few select PLM on *Jyotiṣa* (siddhānta/naked eye astronomy) and *Gaṇita* (mathematics) as are preserved in the Orissa State Museum (OSM), Bhubaneswar. The Orissa govt. under a centrally funded project is now working towards setting up a new air-conditioned PLM reading room in the premises of the Orissa State Museum, so that scholars from across the world may use these primary sources. The shelving and retrieval system(s) have been up-dated. The list, below, mention first the author's name followed by the name of the work/manuscript in italics, call number in acronym OSM-PLM No. Jy/G.... (Orissa State Museum-Palm Leaf Manuscript Number, Astronomy/Mathematics).

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Sl. No.	Author	Title	Call No.
1.1	Āṇanda Suṇdari	<i>Māsādi Phala</i>	OSM-PLM, No. Jy. 58B,
1.2	<i>Grahagati Phala</i>	OSM-PLM, No. Jy. 58C,
1.3	.....	<i>Pālaka Phala</i>	OSM-PLM, No. Jy. 58 & 108.
1.4	.....	<i>Ānanda Sūndarī</i>	OSM-PLM, No. Jy. 283.
2.1	Adara Pattanāyak	<i>Gaṇita</i>	OSM-PLM, No. G-14, 20 & 121.
2.2	.....	<i>Khāḍi Pothi</i>	OSM-PLM, No. G. -112.
2.3	.....	<i>Gopi-Gopāla Puspatoḷa</i>	OSM-PLM, No. G-49.
3.1	Aṇḍha Bikrama	<i>Gaṇita</i>	OSM-PLM, No. G. 10, 28 & 38.
3.2	.....	<i>Pāṭha Samudra</i>	OSM-PLM, No. G.13.
3.3	.....	<i>Nala Cālisā</i>	OSM-PLM, No. G. 39.
3.4	.....	<i>Chatisa Barga Kotā</i>	OSM-PLM, No. G. 138.
4.	Āṇanda Dwija	<i>Gaṇita Lekhā Sūtra</i>	OSM-PLM, No. G. 159.
5.	Ārta Dās	<i>Gaṇita</i>	OSM-PLM, No. G. 104.
6.1	Bhaskarācārya	<i>Bīja Gaṇita</i>	OSM-PLM, No. G. 1.
6.2	.....	<i>Pāṭi Gaṇita</i>	OSM-PLM, No. Jy. 355E.
6.3	.....	<i>Līlāvati</i>	OSM-PLM, No. G. 4, 17, 23.
6.4	.....	<i>Siddhānta Śiromaṇi</i>	OSM-PLM, No. Jy. 149-6 & 282.
6.5	.....	<i>Grahagama Kutūhala</i>	OSM-PLM, No. Jy. 277 G.

7.	Bhagata	<i>Gaṇita</i>	OSM-PLM, No. G. 61.
8.	Bhagabān Mahānti	<i>Gaṇita</i>	OSM-PLM, No. G.6.
9.1	Bhatta Utpala	<i>Harāsat</i> <i>Pañcaśikā Bibruti</i>	OSM-PLM, No. Jy. 23,222,430.
9.2	.....	<i>Samhitā Bibruti</i>	OSM-PLM, No. Jy. 325 (others mss).
10.1	Bhoja Deva	<i>Rājmārtaṇḍa</i>	OSM-PLM, No. Jy. 29A, 47B.
10.2	.....	<i>Narapati</i> <i>Jayacandra</i>	OSM-PLM, No. Jy. 276.
10.3	.....	<i>Bhūja</i> <i>Balanibandha</i>	OSM-PLM, No. Jy. 34,119,412.
10.4	.....	<i>Vira Siṃha</i>	OSM-PLM, No. Jy. 62.
11.1	Braja	<i>Pātha Samudra</i>	OSM-PLM, No. G. 127.
11.2	.....	<i>Dharāṇ</i>	OSM-PLM, No. G. 19.
11.3	.....	<i>Rasakeli Cautisā</i>	OSM-PLM, No. G. 88.
12.	Braja Bandhu	<i>Gaṇita</i>	OSM-PLM, No. G. 24.
13.	Brajasuṇḍara Pattanayāk	<i>Kaṭpāya</i>	OSM-PLM, No. Jy. 51B
14.1	Banamāli	<i>Gaṇita</i>	OSM-PLM, No. G. 48.
14.2	.....	<i>Khadi Pothi</i>	OSM-PLM, No. G 112.
15.	Baṅchānātha	<i>Bancānāthia</i> <i>Jyotiṣa</i>	OSM-PLM, No. Jy. 339.
16.	Bāmadeva	<i>Gaṇita Brutahata</i> <i>Nala</i>	OSM-PLM, No. G. 91
17.	Basudeva	<i>Gaṇita</i>	OSM-PLM, No. G.3 61.
18.1	Balabhadra Nāyak	<i>Gaṇita</i>	OSM-PLM, No. G. 8, 28,61

18.2	.....	<i>Sodhi</i>	OSM-PLM, No. G. 106.
18.3	.....	<i>Bīja Mālikā</i>	OSM-PLM, No. G. 128.
18.4	.....	<i>Sudhi Sūtra Bhāṣya</i>	OSM-PLM, No. G. 136A.
19.1	Bikrama	<i>Nala Gaṇita</i>	OSM-PLM, No. G 29, 48, 63.
19.2	.....	<i>Dharāṇ</i>	OSM-PLM, No. G. 19.
19.3	.....	<i>Pāṭha Samudra Cautisā</i>	OSM-PLM, No. G. 7,27,47.
19.4	.....	<i>Saṅkhāli Cautisā</i>	OSM-PLM, No. G. 28.
20.	Biswabāsū	<i>Dharāṇ</i>	OSM-PLM, No. G. 19.
21.	Bruṇḍāban Simha	<i>Gaṇita</i>	OSM-PLM, No. G. 77.
22.1	Baisya Krusna	<i>Nala Sāgara</i>	OSM-PLM, No. G. 32.
22.2	.....	<i>Śīsū-bodha Gaṇita</i>	OSM-PLM, No. G. 92.
23.	Caitanya Dās	<i>Dhāran</i>	OSM-PLM, No. G. 19.
24.	Cakra Sūdarsana	<i>Śrīkhaṇḍa Kāvya</i>	OSM-PLM, No. Jy. 322D.
25.	Caitanya Rājguru	<i>Laghu Siddhānta</i>	OSM-PLM, No. Jy. 4.
26.	Chakadi Naṇḍa	<i>Siddhānta Sāra</i>	OSM-PLM, No. Jy. 197.
27.	Dāsarathi Dās	<i>Gaṇita</i>	OSM-PLM, No. G. 48.
28.	Dinakrusna Mahanti	<i>Līlavatī Anubāda</i>	OSM-PLM, No. G. 5.
29.1	Debi Dās	<i>Dhāran</i>	OSM-PLM, No. G. 19.
29.2	.....	<i>Nayā Khadāṇa</i>	OSM-PLM, No. G. 12, 20, 28, 34.
29.3	.....	<i>Nayā Khadāṇa</i>	OSM-PLM, No. G. 22.
29.4	.....	<i>Khaḍi Pothi</i>	OSM-PLM, No. G. 122.
29.5.	.....	<i>Pāṭha Samudra Cautisā</i>	OSM-PLM, No. G. 7,19.

29.6	.....	<i>Bīja Mālikā</i>	OSM-PLM, No. G. 128.
29.7.	.....	<i>Graha Dhruvadhikāra</i>	OSM-PLM, No. Jy. 314.
29.8	.....	<i>Udayikā Tīkā</i>	OSM-PLM, No. Jy. 393-A.
30.	Dhani Dās	<i>Jyotiṣa Kāṭpāya</i>	OSM-PLM, No. Jy. 234 & Dh. 11233E.
31.	Dhanajayacharya	<i>Jyotiṣa Candradoya</i>	OSM-PLM, No. Jy. 40,395.
32.	Dhaṇanjaya Dwija	<i>Pāṭī Gaṇita</i>	OSM-PLM, No. G. 5.
33.	Dharanidhara Nāyaka	<i>Gaṇita</i>	OSM-PLM, No. G. 20,36,39,135,144.
34.	Dharāma	<i>Gaṇita</i>	OSM-PLM, No. G. 8.
35.	Dina Krusna Dās	<i>Samudrikā Boli</i>	OSM-PLM, No. Jy. 251.
36.	Dāsaratha Misra	<i>Jyotiṣa Sāra Saṃgraha</i>	OSM-PLM, No. Jy. 60,142,143.
37.	Gangādhara	<i>Gaṇita</i>	OSM-PLM, No. G. 69,139.
38.	Ganesa Daivjnān	<i>Līlāvati (Budhi vilasini tikkā)</i>	OSM-PLM, No. G.4.
39.	Gopāl Subudhi	<i>Gaṇita</i>	OSM-PLM, No. G. 20.
40.	Gobinda Nāyak	<i>Khadi-ratna Cautisā</i>	OSM-PLM, No. G. 26A.
41.	Gaurānga	<i>Dhāraṅ</i>	OSM-PLM, No. G. 19.
42.	Ghanasyām	<i>Gaṇita</i>	OSM-PLM, No. G. 76.
43.	Hari Ojhā	<i>Pāṭha Samudra</i>	OSM-PLM, No. G. 127.
44.	Hari Nāyaka	<i>Gaṇita</i>	OSM-PLM, No. G. 62.

45.	Harihara Acārya	<i>Sūrya Siddhānta</i>	OSM-PLM, No. Jy. 391.
46.1	Harihara Bhatt-acharya	<i>Samaya Pradīpa</i>	OSM-PLM, No. Jy. 120,124 & 1133.
46.2	.....	<i>Sūrya Siddhānta</i>	OSM-PLM, No. Jy. 396.
47.	Hrudānanda	<i>Gaṇita</i>	OSM-PLM, No. G. 19.
48.	Jagaṇāth	<i>Gaṇita</i>	OSM-PLM, No. G. 34.
49.	Janmejaya Carita	<i>Gaṇita</i>	OSM-PLM, No. G. 12,85.
50.	Kalidāsa Caini	<i>Kāṭapaya</i>	OSM-PLM, No. Jy. 55E & 244.
51.	Karāta Das et al.	<i>Sindhū Siṅgāra Cautisā</i>	OSM-PLM, No. Jy. 43.
52.	Krisna Candra Jyotisa	<i>Kāla Nirnaya</i>	OSM-PLM, No. Jy. 43.
53.	Krusna Misra Māhāmahopādhyāya	<i>Naksatra Cūḍāmaṇi</i>	OSM-PLM, No. Jy. 83.
54.	Kuṅjabana Pattanāyak	<i>Śīsū-bodha Gaṇita</i>	92
55.	Lambodara	<i>Gaṇita</i>	OSM-PLM, No. G. 20,76.
56.	Lingarāj	<i>Gaṇita</i>	OSM-PLM, No. G. 153.
57.1	Māguni Pāthi	<i>Bīja Gaṇita</i>	OSM-PLM, No. G. 1.
57.2	.....	<i>Graha Sutadhikāra</i>	OSM-PLM, No. Jy. 277D.
58.	Madhusudana	<i>Gaṇita</i>	OSM-PLM, No. G. 19.
59.	Mādhava Das	<i>Gaṇita</i>	OSM-PLM, No. G. 77.
60.	Mukuṇḍa Nāyak	<i>Gaṇita</i>	OSM-PLM, No. G. 8,67,69.
61.	Mūrāri Pasāyat	<i>Lilavati (Odīā Anuvāda)</i>	OSM-PLM, No. G. 5.

62.	Narhari	<i>Gaṇita</i>	OSM-PLM, No. G. 101.
63.	Nārāyan Ojha	<i>Gaṇita</i>	OSM-PLM, No. G. 24,28,34.
64.	Nārāyan Divyajyan	<i>Sūta Darpaṇa</i>	OSM-PLM, No. Jy. 358.
65.	Nimba Deva	<i>Gaṇita</i>	OSM-PLM, No. G. 84.
66.	Nilakantha	<i>Gaṇita</i>	OSM-PLM, No. G. 20.
67.	Punja Rāja	<i>Saravati Prakriyā</i>	OSM-PLM, No. G. 259.
68.	Phakira Ojhā	<i>Gaṇita</i>	OSM-PLM, No. G. 20.
69.	Raghunāth Nayak	<i>Gaṇita</i>	OSM-PLM, No. G. 48, 69.
70.	Rāma Hari	<i>Dharāṇ</i>	OSM-PLM, No. G. 19.
71.	Sataṇanda	<i>Bhāsvatī</i>	OSM-PLM, No. Jy. 1A, 285 & 408B.
72.	Siva	<i>Muhūrta Racanā</i>	OSM-PLM, No. Jy. 63D.
73.1	Siva Mahānti	<i>Gaṇita</i>	OSM-PLM, No. G. 22,99.
73.2	.....	<i>Gaṇita Cutisā</i>	OSM-PLM, No. G. 43.
74.	Sri Caṇdana	<i>Gaṇita</i>	OSM-PLM, No. G. 28.
75.	Sridhara Māhāpatra	<i>Pātī Gaṇita Tīkā</i>	OSM-PLM, No. G. 17.
76.	Srinātha	<i>Gaṇita</i>	OSM-PLM, No. G. 85.
77.	Saranga	<i>Gaṇita</i>	OSM-PLM, No. G. 131.
78.	Uchavānanda	<i>Khaḍi Pothi</i>	OSM-PLM, No. G. 112.
79.	Utpala Bhaṭṭa	<i>Br̥hat Jātaka Vṛtti</i>	OSM-PLM, No. Jy. 209.
80.1	Varāhamihira	<i>Horāvṛtti</i>	OSM-PLM, No. Jy. 332A.
80.2	.....	<i>Bālabodhini</i>	OSM-PLM, No. Jy. 271B.
80.3	.....	<i>Sūrya Siddhānta</i>	OSM-PLM, No. Jy. 5,31C19A.

80.4	.....	<i>Brhadjātaka</i>	OSM-PLM, No. Jy. 148.
80.5	.....	<i>Jyotiṣāra</i> <i>Saṅgraha</i>	OSM-PLM, No. Jy. 50,156,169,240.
81.	Ventaka Bipra	<i>Sāmudrikā</i>	OSM-PLM, No. Jy. 42.
82.	Vipra Nimba Dās	<i>Sūrya Siddhānta</i>	OSM-PLM, No. Jy. 5 & 31C.
83.	Yagna Misra	<i>Jyotiṣa-Cintāmaṇi</i>	OSM-PLM, No. Jy. 13 & 258A.

Apart from these there are collections of another 50 authors in the domain of astrology and palmistry³. Some authors in the list above have contributed both in astronomy and as well as in mathematics. Some use mathematics extensively to discuss and explain (naked eye) positional astronomy. Many mathematical MSS are in Oriya script. This points to the direction of popularity of vernacular mathematics in the locale.

A large number of PLMs are also available in private holdings⁴. A public awareness campaign is needed to organize a innovative conservation-cum-research scheme. Let us contribute towards conservation first and then set about to study these manuscripts. Efforts might be made for new editions and spread the contents and assess their importance for correct picture of heritage in Science. The manuscript survey (original source) is not exhaustive.

NOTED AND REFERENCES

1. V.S. Apte's, *The Practical Sanskrit English Dictionary*, Ed. Gode & Karve, Poona, 1957, Vol I, p. 547. The term *Kalinga* means 'cleaver', *Utkala* means 'excellence'. Also see author's article in *Smaranika* of Samanta Chandra Sekhar, 2005 & 2006 respectively.
2. The author is the direct descendant of Siddhānta lineage which is why Pandit Nilamani Misra thought it fit to issue such an advice.
3. Nilamani Misra, ed., "An alphabetical Catalogue of Authors", in the Collections of Orissa State Museum, Kalyan Press, Cuttack, 1983.
4. Orissa State Museum, Survey done in 2006, c/o Superintendent, Bhubaneswar.