

HISTORICAL NOTE

NANDIGRĀMA OF GAṆEŚĀ DAIVAJÑA

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One of the tasks of the history of science in India, or of any other history for that matter, is to lift the veil of legend and myth and ascertain solid facts. We shall probably never know what exactly Āryabhaṭa's relation to Kusumapura was¹ or where exactly the Aśmaka region lay.² It is of course legitimate to attempt to find new material or new interpretation of these issues within the realm of reasonable probability, but must one keep on repeating ad nauseam that Āryabhaṭa was the Vice-chancellor of Nalanda University or the Director of Nalanda Observatory?

1. In his *Gaṇakatarāṅgiṇī*,³ published in the last decade of the nineteenth century, Sudhakara Dvivedi⁴ collected valuable biographical material on several important *gaṇakas* (astronomers, astrologers and mathematicians) of India. About the same time Shankar Balakrishna Dikshit brought out his comprehensive history of the astral science in Marathi, where he provided additional biographical information.⁵ In recent times David Pingree enlarged this material in manifold ways with copious references to original sources. By discussing the teacher-pupil lineages within a family and even outside, Pingree showed how the *Jyotiḥśāstra* was cultivated and transmitted throughout India.⁶ Thanks to the efforts of these scholars, *gaṇakas* do not remain any more mythical figures like Kālidāsa, but become real historical personages. In fact, today we know more about the lives and works of the writers of *Jyotiḥśāstra* than about the writers of any other branch of Sanskrit learning. It must be added that unlike other Sanskrit writers, many *gaṇakas* mention in their works the years of their birth or epochs that are closer to their own times. Moreover, in the medieval period, *gaṇakas* began to add, in the concluding chapters of their works, short accounts of their families and places of residence.⁷

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2. One of the celebrated *gaṇakas* of the sixteenth century is the polymath Gaṇeśa Daivajña (b. 1507) of Nandigrāma. In the concluding chapter (*Upasamhārādhikāra*) at the end of his immensely popular *Grahalāghava* (composed in Śaka 1442= AD 1520), Gaṇeśa gives an account of himself and his family. His descendants and those of his pupil Divākara of Golagrāma likewise describe briefly the life and work of Gaṇeśa. In particular, his pupil and nephew Nṛsimha (b. 1546) enumerates seventeen titles authored by Gaṇeśa.

On the basis of this information, David Pingree prepared the entry on Gaṇeśa for the *Dictionary of Scientific Biography*.⁸ His *Census of Exact Sciences in Sanskrit* (CESS)⁹ contains enormous amount of valuable material on Gaṇeśa's works and their manuscripts with copious citations. He also explained the main features of the *Gaṇeśapakṣa* or Gaṇeśa's school of astronomy in his *History of Mathematical Astronomy in India*.¹⁰ Here and elsewhere, Pingree identifies Gaṇeśa's Nandigrāma with Nandod in Gujarat.¹¹ This identification is rather problematic and needs re-examination.

Gaṇeśa mentions that his ancestors and he himself lived at Nandigrāma in the kingdom/country of Aparānta (*nandigrāma ihāparāntaviṣaya*).¹² Pingree apparently took *aparānta-viṣaya* as the entire west coast of India and placed Gaṇeśa at Nandod in Gujarat. In this he appears to have followed the view of J. F. Fleet, to be cited below. But this identification goes against the other statements made by Gaṇeśa and his descendants in their various works regarding their place of residence, statements which Pingree collected meticulously and made available to us in his monumental CESS.

Though it literally means western extremity or border, *aparānta* specifically designates the Konkan. Apparently J. F. Fleet thought that *aparānta* meant the Konkan, Northern Gujarat, Kathawar, Kutch and Sind, but P. V. Kane contests this view on the evidence of several ancient works and declares: "That *aparānta* usually means the Konkan admits of little doubt".¹³

But as far as Gaṇeśa's *aparānta* is concerned, we have an unambiguous identification with the Konkan by a near-contemporary Nṛsimha Daivajña (b. 1586), who was the grandson of Gaṇeśa's pupil Divākara of Golagrāma. In his *Vāsanāvārttika* commentary (Śaka 1543 = AD 1621) on the *Siddhāntaśiromaṇi* of Bhāskara, Nṛsimha refers to his own grandfather Divākara as *śrīmat-koṅkaṇavāsi-keśava-suta-prāptāvabodha*, "one who received enlightenment (*avabodha*) from the illustrious son of Keśava (i.e. Gaṇeśa), the resident of Konkan."¹⁴

3. Moreover, Gaṇeśa and other members of his family repeatedly state that their Nandigrāma is situated on the eastern shore of the western sea, which is known today as the Arabian Sea. These statements are reproduced below. Note that these are all gleaned from David Pingree's CESS.

Gaṇeśa, *Buddhivilāsini*, a commentary (Śaka 1467 = AD 1545) on the *Līlāvati* of Bhāskara, penultimate verse (CESS 2, p. 104): *kṣārāmbudheḥ¹⁵ prāktate nandigrāma ihāvasan ...*

Gaṇeśa, *Vivāhadīpikā*, a commentary (Śaka 1476 = AD 1554) on the *Vivāhavṛndāvana* of Keśavārka, the penultimate verse (CESS 2, p. 105): *sāgarapūrvavarttitatage grāme 'tra nandyādime ...*

Keśava (Gaṇeśa's father), *Grahakautuka* (Śaka 1418 = AD 1496), last verse (CESS 2, p. 66): *nandigrāma ihāparodadhitate ...*

Nṛsiṃha (b. 1548) (Gaṇeśa's nephew and pupil), *Grahakaumudī* 4.11 (CESS 3, p. 203): *sahyādrer adharāparāntaviṣaye kṣārāmbudheḥ prāktate grāme nandipurādime ...*

Nṛsiṃha, *Grahadaśāphala*, verse 86 (CESS 3, 203): *parodadheḥ pūrvagatī rasansthaḥ / śrī nandipurayāṃ ...*

Nṛsiṃha, *Harṣakaumudī*, a commentary on the *Grahalāghava* of his uncle Gaṇeśa, penultimate verse (CESS 3, p. 203): *kṣārāmbhonidhipūrvatī-rakagatāyāṃ nandipurayāṃ ...¹⁶*

All this shows clearly that Gaṇeśa's Nandigrāma was situated right on the coast of the Arabian Sea in the Konkan region and therefore cannot be equated with Nandod (Lat. 21° 87' N, Long. 73° 31' E) in Gujarat which is far from the sea coast.

4. The correct identification of the Nandigrāma was made long ago by Shankar Balakrishna Dikshit. Writing about Gaṇeśa's father Keśava, Dikshit stated: "he was a resident of Nandigrāma on the sea coast of Konkan. This is, at present, a village in the Janjeera state and is known as Nāndgāon. It lies about 40 miles to the south of Bombay."¹⁷ This Nāndgāon on the Konkan coast lies at Lat. 18° 22' 60" N, Long. 72° 55' 0" E.¹⁸

5. This identification of Nandigrāma with Nāndagāon on the Konkan coast is corroborated by the internal evidence¹⁹ in Gaṇeśa's *Pratodayantra* which was edited, translated and annotated in an exemplary manner by Yukio

Ôhashi.²⁰ The *Pratodayantra* is a small work of 13 verses on the construction and use of the column dial. In his commentary on verse 7, Ôhashi remarks as follows: "It appears that Gaṇeśa assumed that the midday altitude of the sun is 90° when the length of daytime is 32 *nāḍīs*, and that the observer's latitude is 18° , because the zenith distance of the midday sun at the equinoctial day becomes $(32 - 30) \times 9 = 18^\circ$ by this rule. This latitude agrees with the latitude of Nandigrāma where Gaṇeśa resided, which is about 40 miles to the south of Bombay according to S. B. Dikshit."²¹

6. In Gaṇeśa's time, his village lay in the territory of the Sultanate of Ahmadnagar. Malik Amber (1546-1626), the Abyssinian slave who rose to be virtual ruler of Ahmadnagar erected an impregnable fort on a small island to the south-west of Nandigrāma. The island is called Janjeera or Janjira (from Arabic *jajīrah*, lit. island). Later on, Janjira Fort and the surrounding areas, including Nāndgāon, became part of the princely state that bore the same name.

The *Gazetteer of Bombay Presidency*, produced at the end of the nineteenth century, describes the Na'ndagaon as follows: "Na'ndgaon, which lies about four miles north of Janjira, is chiefly made up of detached houses in cocoa and betel gardens. It is about two miles long and a mile broad. The trade is small, mainly the export of timber and firewood to Bombay. It is the head-quarters of a *mahalkari* and has a school. A yearly fair in honour of Gadba Devi is held on the *Chaitra* (April) full-moon. It is attended by about 2000 persons and has a sale of sweetmeats, bangles, and toys."²²

7. Today, after the abolition of the princely states, Nāndgāon falls in the Raigad District in the state of Maharashtra. The Janjira Island Fort is now a tourist resort, and the tourist literature extols the nearby Nāndgāon for its pristine beaches.

End-Notes

1. In his *Āryabhaṭīya* 2.1, Āryabhaṭa states that in his work he will present the [astronomical] knowledge honoured in Kusumapura. This Kusumapura is generally identified as modern Patna in the state of Bihar, but the questions remain whether he was born there, whether he studied astronomy there or whether he was merely teaching the astronomy of Kusumapura school.
2. In his commentary on the *Āryabhaṭīya*, Bhāskara I says repeatedly that Āryabhaṭa was from Aśmaka. Cf. *Āryabhaṭīya of Āryabhaṭa*, ed & tr. Kripa Shankar Shukla and K. V. Sarma, New Delhi 1978, Introduction, pp. xvii-xix. But so far nobody has been able to explain satisfactorily where this Aśmaka region lay.

3. *Gaṇakatarāṅgiṅī*, originally printed serially in *The Pandit* 14 (1892); reprinted in book form, Benares 1902; reprinted again, Benares 1933.
4. For an excellent bio-bibliographical account, see Radha Charan Gupta, "Sudhākara Dvivedī (1855-1910), Historian of Indian Astronomy and Mathematics," *Gaṇita Bhārati* 12 (1990) 83-96.
5. Shankar Balakrishna Dikshit, *Bhāratiya Jyotiḥśāstra* (in Marathi), Poona 1896; reprinted, Poona 1931; Hindi translation by Śivanātha Jhārakhaṅī, Lucknow 1957; English translation by R. V. Vaidya, *English Translation of Bharatiya Jyotish Sastra (History of Indian Astronomy)*, Part I: History of Astronomy during the Vedic and Vedanga Periods, Delhi 1969; Part II: History of Astronomy during the Siddhantic and Modern Periods, Delhi 1981.
6. David Pingree, *Jyotiḥśāstra: Astral and Mathematical Literature*, Wiesbaden 1981, pp. 123-130.
7. Sometimes these sections or chapters are designated as *upasaṃhārādhyāya* or *grathā laṃkāra*, cf. S. R. Sarma, "Granthālaṃkāra, *Brahmavidyā: Adyar Library Bulletin*, 68-70 (2004-06) 271-278.
8. See David Pingree, "Gaṇeśa", in Charles Coulston Gillispie, *Dictionary of Scientific Biography*, New York, 1970-1980; now available as e-book, s.v.
9. David Pingree, *Census of the Exact Sciences in Sanskrit*, Series A, vol. 1 (1970), vol. 2 (1971), vol. 3 (1976), vol.4 (1981), vol. 5 (1994). American Philosophical Society, Philadelphia.
10. David Pingree, *History of Mathematical Astronomy in India*, in: *Dictionary of Scientific Biography*, 15 (1978) 533-633.
11. Thus David Pingree, *Jyotiḥśāstra: Astral and Mathematical Literature*, Wiesbaden 1981, p. 36: "Nandigrāma in Gujarat"; CESS 2 (1971) 94-107, esp. 94: "resident of Nandigrāma (Nandod, Gujarat)"; *Mathematical Astronomy*, p. 624: "...after its creation near the west coast, in Gujarat, the Gaṇeśapakṣa spread ..."
12. *Grahalāghava* (Śaka 1442= AD 1520), *Upasaṃhārādhyāya*, verse 5 (CESS 2, p. 100).
13. P. V. Kane, "Ancient Geography and Civilization of Mahārāshtra," *The Journal of the Bombay Branch of the Royal Asiatic Society*, 24 (1917)613-657, esp. p. 632, n. 2: "... By *Aparānta*, Dr. Fleet understands the Konkan, Northern Gujarat, Kathiawar, Kutch and Sind (J.R.A.S., 1910, p. 417). But this opinion of Dr. Fleet seems to ignore the indications offered by the *Arthaśāstra*, the *Mahābhārata*, the *Raghuvaṃśa* and the inscription of *Rudradāman*."
14. Last verse at the end of the *Gaṇitādhyāya* (CESS 3, p. 206).
15. The CESS reads erroneously *kṣīrāmbudhi*, the mythical Ocean of Milk, instead of *kṣārāmbudhi*, the salt water sea.

16. The CESS has *kṣīrāmbudhi* for *kṣārāmbudhi*.
 17. *English Translation of Bharatiya Jyotish Sastra (History of Indian Astronomy)*, Part II, p. 128.
 18. For the geographical coordinates of places in India, there is now an excellent online tool "Directory of Cities, Towns, and Regions in India" at <http://www.fallingrain.com/world/IN/>
 19. I am highly obliged to Professor Takao Hayashi for drawing my attention to this internal evidence.
 20. Yukio Ôhashi, "The Cylindrical Sundial in India (Sanskrit, English translation and exposition in terms of modern Mathematics," *IJHS*, 33 (1998) S147-205, esp. 174-186.
 21. *Ibid*, p. S 184.
 22. *Gazetteers of Bombay Presidency, Kolaba District*, originally published 1883, reprinted 1989, e-Book edition 2006. <http://raigad.nic.in/DG/1883/janjira.html#20>
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