

The Forge and the Crucible: Images of Alchemical Apparatuses on Manuscripts of the *Rasendramaṅgala*

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In 1984, Dominik Wujastyk's article "An Alchemical Ghost: The Rasaratnākara by Nāgārjuna" was published in *Ambix* (vol. 31, part 2, July 1984). In this article, Wujastyk clarified a mistake made by P. C. Ray in his *History of Hindu Chemistry* concerning the conflation of three different texts: the *Rasaratnākara* of Nityanātha Siddha, the *Rasendramaṅgala* of Nāgārjuna Siddha, and the *Kakṣapuṭa*, also of Nāgārjuna Siddha. Wujastyk's article drew on a number of manuscripts of these three texts. For the *Rasendramaṅgala*, he referred to a manuscript in the Bibliothèque Nationale in Paris. After the article's publication, Wujastyk started collecting digital images of surviving manuscripts of the *Rasendramaṅgala*. He described these in "The Surviving MSS of the Rasendramaṅgala of Nāgārjuna Siddha."¹ He also began work on transcriptions and collations of the manuscripts, and a critical edition of the fourth chapter of the text.² A first translation of the fourth chapter of the *Rasendramaṅgala*, based on this critical edition, will be published in an anthology of Indian alchemical texts.³

One of the interesting features of several of these manuscripts is the presence of line drawings of various apparatuses (*yantra*) used in alchemical processes. Dominik Wujastyk brought these to my attention a few years ago, when I was conducting research on Indian alchemical devices.⁴ In this article, I will draw on Dominik Wujastyk's archive of digital images of *Rasendramaṅgala* manuscripts to examine and identify these images and to discuss the implications of their presence in an alchemical manuscript.

1 Dominik Wujastyk 2022.

2 Wujastyk *et al.* (2022). Wujastyk's transcriptions of manuscripts of the *Rasendramaṅgala* by Nāgārjuna are deposited on github. See: <https://doi.org/10.5281/zenodo.6484115>. These transcriptions are being collated and processed through Charles Li's Saktumiva platform (<https://saktumiva.org/wiki/wujastyk/rasendramangala/start>) for producing and publishing critical editions of Sanskrit texts. See also the *Rasendramaṅgala* start page at that site. Research assistants who have worked on this project include Madhusudana Rimal, Deepto Chakraborty, Jane Allred, Vandana Lele and Harshal Bhatt. The project has received funding through the Singhmar Chair endowment grant and the Kule Institute for Advanced Study, both at the University of Alberta.

3 Dominik Wujastyk (forthcoming) in Dagmar Wujastyk (forthcoming a).

4 I used one of the images from 07 Jaipur 1 (J1) to illustrate the various forms apparatuses with the same name can take in my project blog at <http://ayuryog.org/blog/fourth-procedure-bringing-mercury-rise-utth%C4%81pana>.



Figure 5.1: A map of manuscripts of the *Rasendramaṅgala* held in archives in India as recorded in the NCC and in Dominik Wujastyk's private records. Map created by Keith Cantú for AyurYog, 2019.

The *Rasendramaṅgala*

References to alchemical, or transmutational practices occur in various Indic texts that pre-date alchemical literature proper by several centuries. These older texts refer to a metallurgical discipline called *dhātuvāda* that seems to have been devoted to making gold.⁵ From about the tenth century, a new literature arose, dedicated fully to a practice called *rasavāda*, *Rasaśāstra*, or *rasavidyā*. As these names suggest, this discipline focused on uses of mercury. Its early texts describe the making of mercurial elixirs which could be employed in the making of gold, but whose ultimate purpose was the transmutation of the human being. The *Rasendramaṅgala* is one of the foundational texts of this alchemical tradition. Opinions about its date vary widely,

5 Or the Apabhraṃśa *dhāuvāo*, as it is found in various Jain texts, such as the eighth-century *Kuvalayamālā*. See Balbir (1990 and 1992), Chojnacki & Nagarajaiah (2018), and Dagmar Wujastyk (forthcoming b).

with some scholars dating it as early as the seventh, eighth, or ninth century, which would make it the earliest of the currently known alchemical treatises.⁶ The early dates are partly contingent upon the attribution of the *Rasendramaṅgala*'s authorship to a Siddha Nāgārjuna. A reference in Al Biruni's *Kitāb al-Hind* (eleventh cent. CE) to an alchemist of that name could, for example, position the work in the ninth or tenth century.⁷ However, it is not clear which Nāgārjuna authored the *Rasendramaṅgala* or even whether the attribution to a Nāgārjuna may have been added later.⁸ David Gordon White considers the *Rasendramaṅgala* a "derivative source which borrows extensively from other Hindu alchemical tantras" and places it in the thirteenth to fourteenth centuries.⁹ Meulenbeld notes that the quotations from the *Rasendramaṅgala* in the *Rasasindhu* prove that the *Rasendramaṅgala* is earlier than the third quarter of the fourteenth century.¹⁰ Correspondences between the commentary (*tippana*) of the *Rasendramaṅgala* and Āḍhamalla's commentary (ca. fourteenth cent. CE) on *Śārīṅgadharasamhitā* 2.11.44–45¹¹ and 2.12.4cd–13ab corroborate this upper limit.

The opening verses of the *Rasendramaṅgala* state that the work consists of eight chapters. However, the manuscripts of the work that have been examined so far only give the first four, comprising about 400 verses.¹² The four chapters of the *Rasendramaṅgala* are called

1. The section on the purification of mercury and subsidiary mineral substances (*rasoparasasodhanādbhikāra*)
2. The section on the calcination and extraction of essences of diamonds, the liquefaction of mica and other substances, and the calcination of metals (*vajramāraṇasattvaṇābhikāra*)
3. Mercurial calcines (*bhasmasūtaka*)
4. The solidification of mercury into pills through the liquefaction of essences, "leech" (binding procedure), calcination, etc. (*guṭikāsattvadrutijalūkāmāraṇādirasabandhana*).

6 See Meulenbeld 2000b: 717, n. 93.

7 See Sachau 1910: 189 for Al-Biruni's brief reference to Nāgārjuna in his chapter "On Hindu sciences which prey on the ignorance of people." Al-Biruni notes there that Nāgārjuna lived one hundred years before his time.

8 See White 1996: 66–70 on the difficulties of differentiating between the various Nāgārjunas.

9 White 1996: 104.

10 Meulenbeld 2000a: 717.

11 The reference in Āḍhamalla's commentary on *Śārīṅgadharasamhitā* 2.11.44–45 only indirectly refers to the commentary of the *Rasendramaṅgala* here. Āḍhamalla gives a list of eighteen types of iron, stating that these are referred to by Nāgārjuna. Most, but not all of these are mentioned in a paragraph of the *Rasendramaṅgala*'s commentary that begins with "*atha rasāyane lobhādityādi*" and ends with "*evam aṣṭādaśalohajātayaṃ*." See Meulenbeld 2000b: 717, n. 98 on the types of iron mentioned by Āḍhamalla, but not in the *Rasendramaṅgala*'s commentary. Āḍhamalla on *Śārīṅgadharasamhitā* 2.12.4cd–13ab, however, contains a direct quote from the *Rasendramaṅgala*'s commentary.

12 Dominik Wujastyk 2022.

The titles of the missing chapters imply that they dealt with the treatment of diseases, the preparation of perfumes and ointments, poisons, and groups of substances.¹³

About half of the manuscripts collected by Wujastyk contain the commentary, which is sometimes anonymous, and sometimes attributed to a Govinda (Govindācārya, Govindacandra) and typically found appended to the main text after chapter four.¹⁴ Several of the manuscripts that include the commentary also add another section dedicated to an iron tonic (*loharasāyana*) formulated by Nāgārjuna. Meulenbeld reads this section as part of the commentary.¹⁵ But the manuscripts all clearly mark the end of the commentary with *iti raseṁdramam-gale ṭīpaṅakam samāptam*. The iron tonic section follows this and, in turn, it concludes with the words *iti śrīmannāgārjuno viracitāyām raseṁdramamgalaṁ sampūrṇam*. It is not clear to which chapter this section belongs.

Alchemical devices

Probably the earliest mention of alchemical devices in Indic texts occurs in Sanskrit medical literature: The ninth-century *Kalyāṅakāraka* by Ugrāditya, a Jain medical treatise, mentions the use of a cradle-device (*dolāyantra*), and different kinds of crucibles (*mūṣa*) in its twenty-fourth chapter, which deals with the preparation and application of mercurials. The early alchemical treatises, such as the tenth-century *Rasabṛdayatantra* or the eleventh-twelfth-century *Rasārṇava* mention several alchemical devices in the context of their descriptions of the processing of mercury and other substances. However, they mostly refer to the devices by name and often do not provide any further description of them other than mentioning them in the context of particular steps in the processing of materials. The *Rasārṇava* does list a number of devices as equipment an alchemist must have in its fourth chapter and there, we are given brief descriptions of them. The twelfth-thirteenth-century *Rasendracūḍāmaṇi* is the first of the alchemical works to provide detailed descriptions of the characteristics and functions of alchemical equipment. It lists a series of instruments and apparatuses in its third chapter, which describes the setup of the alchemical laboratory, and devotes its fifth chapter to the description of the apparatuses, giving measurements, descriptions of their shapes, the materials they are made of, and their functions. Its descriptions are reiterated in later alchemical works such as the *Rasaratnasamuccaya* and the *Rasakāmadhenu*.¹⁶ Similar to the *Rasabṛdayatantra* and the *Rasārṇava*, the *Rasendramangala* mentions the use of various alchemical devices through-

13 See Meulenbeld 2000a: 714–715 for an overview of contents.

14 Of the manuscripts described in Dominik Wujastyk 2022, Goṅḍal BP 34 (G), Udaipur IRS 1136 (U), Patan HJ 8930 (Pa), Koba GB 19113 (Ko 1), and Koba GB 26264 (KO 2) do not contain the commentary.

15 Meulenbeld 2000a: 718.

16 See Sauthoff (forthcoming a and b) on the set up of the laboratory in the *Rasendracūḍāmaṇi* and on alchemical devices in the *Rasakāmadhenu*.

out, but does not describe the apparatuses themselves.¹⁷ The commentary (*tippaṇa*) of the *Rasendramaṅgala* provides a list of alchemical equipment, including some twenty-six devices (*yantra*).¹⁸ Quite a few of these devices – or at least their names – seem to be unique to the *Rasendramaṅgala*'s commentary and are neither found in the *Rasendramaṅgala*'s chapters nor in other alchemical works that describe alchemical equipment. The images found in four of the *Rasendramaṅgala* manuscripts represent these devices.

The images

The use of images in several of the manuscripts of the *Rasendramaṅgala* is very striking, since technical drawings seem to be rare in Indian manuscripts altogether. Medical manuscripts of the ayurvedic tradition, for example, never contain illustrative drawings.¹⁹ There has been very little work to date on the history of technical drawings and diagrams in manuscripts of South Asian scientific works. J. Losty's *The Art of the Book in India* (1982) does not refer to diagrams or technical drawings at all. A. Keller's article "Making diagrams speak in Bhāskara I's commentary on the Aryabhatīya" (2005) offers a first exploration of geometrical figures in manuscripts of a seventh-century Sanskrit mathematical commentary. The manuscripts of this commentary probably date to the eighteenth century or later. It thus remains uncertain when such diagrams were first integrated into the text, though the way the text is formulated implies that drawings were an integral part of the text.²⁰ Early line drawings of tantric dia-

17 The *Rasendramaṅgala* mentions a *dolāyantra* in chapter 1 (1.32), an *adbordbhvāpātānāyantra* in 1.36, a *yātānāyantra* (or *pātānāyantra*?) in chapter 2.38, a *cakrayantra* in chapter 3 (3.64), a *pātānāyantra* in 3.80, a *śarkkaryantra* in 3.106, and a *garbhayantra* in 3.163 and 3.164. The text of the *Kaṣapaṭa*, which is part of the fourth chapter, mentions an *ūṣmayantra* in verses 37 and 46, and a *dhūmakulāyantra* in verse 63. The numbering here is based on Dominik Wujastyk's provisional edition at <https://saktumiva.org/wiki/wujastyk/rasendramangala/start>, consulted on May 2, 2022.

18 There is some variation in the lists of apparatuses in the commentaries, both in the numbers and names of apparatuses and the sequence in which they appear. See the Appendix. The manuscripts use the *anusvāra* for the nasal in *yantra* (*yaṁtra*). I use the more standard class nasal here instead.

19 This statement is somewhat anecdotal and relies on querying the members of the CATS working group and those of the Suśruta project at a meeting at the department of South Asian, Tibetan and Buddhist Studies at the University of Vienna (July 7–9, 2022). None of the people we asked, all of whom have worked extensively with Sanskrit medical manuscripts, ever saw technical drawings of any kind in the particular ayurvedic manuscripts they worked with. Some had seen images on medical works for horses and elephants. The famous "Ayurvedic Man" painting, with labeling using text passages from the sixteenth-century *Bhāvaprakāśa* (Dominik Wujastyk 2008) is an exception, though also technically not a manuscript of a full text.

20 Keller (2005: 284) describes how the orientation of geometric figures ("front," "left," "right") is given within the written text of Bhāskara's commentary, rather than as part of the diagram, which indicates that the author assumed a diagram was part of the text on the manuscript.

grams (*yantra*) accompanying tantric texts may date to the twelfth century.²¹ However, to date, there is no study of their first appearance in manuscripts.

Two articles by Fabrizio Speziale (2006, 2019) make note of two undated Perso-Indian manuscripts of medico-alchemical texts with images of apparatuses on them. The manuscripts refer to Sanskrit alchemical works, though not to the *Rasendramaṅgala*. The images of the Perso-Indian manuscripts are similar to the ones in the *Rasendramaṅgala* in that they are also diagrams consisting of line drawings and text. However, they are integrated into the text rather than added on as a separate section as in the manuscripts of the *Rasendramaṅgala*. In this, they are more similar to images I found in manuscripts of another Sanskrit alchemical text, the *Rasaratnākara*.²² This work also happens to be one of the Sanskrit alchemical works referred to in the Perso-Indian manuscripts, pointing to a possibly shared history of technical diagrams. The topic of diagrams on Indian manuscripts and on alchemical manuscripts specifically, deserves to be the subject of a larger study.

The images I will discuss here, which are line drawings of apparatuses (*yantra*), are found in the commentary section of four of the manuscripts of the *Rasendramaṅgala* collected by Dominik Wujastyk. These are:

1. Bombay BBRAS S.C.19/2
2. Ahmedabad LDI 9442
3. Bikaner RORI 1455/4099
4. Jaipur UIOMI 184: I.14.ii.2

Two of the manuscripts are dated: Ahmedabad LDI 9442 to 1681 CE, and Bikaner RORI 1455/4099 to 1777 CE. My conjecture is that the Bombay manuscript is the oldest of the four, due to the fact that the images of the Ahmedabad and Jaipur manuscripts seem to follow its sequence of images rather than the sequence of their own lists of devices, as will be discussed below.

The images of the apparatuses are not only placed within or adjacent to the commentary, but they also illustrate information given in the commentary rather than in the text of the *Rasendramaṅgala*. In the Bombay manuscript, the images are placed after a sentence from the commentary that lists the alchemical apparatuses shown in the drawings. In the Ahmedabad

- 21 In a personal communication (emails on July 7, 2022 and July 8, 2022), Prof. Diwakar Acharya pointed me to two manuscripts with tantric diagrams from the twelfth century held in the National Archives of Nepal in Kathmandu. One of them was a manuscript of the Jaina *Praśnavyākaraṇa*, the other from the Śaiva *saptāśatika Kālotara*.
- 22 Most of the *Rasaratnākara* manuscripts in question are held in the National Archives of Nepal in Kathmandu. Out of thirty-five manuscripts of the *Rasaratnākara* there, twenty-nine have images (albeit a few of tantric *yantras* rather than of apparatuses), and only six feature no images. There are two further *Rasaratnākara* manuscripts, held at Jamnagar and London respectively, that also feature diagrams.

manuscript, the images are found right at the end of the manuscript as a whole. In the Jaipur manuscript, the images are placed below a sentence following on from the list of apparatuses in the commentary. In the Bikaner manuscript, the images also follow the list of apparatuses in the commentary. However, the text that follows seems to first pick up an earlier section of the commentary, and then has some additional commentary not found in the other manuscripts.

The commentary provides quite extensive lists of laboratory equipment (*upaskara*²³), including different types of vessels, tubes, stoves, fire pits, and apparatuses. This section in the commentary seems to refer to verse twenty-four in chapter one of the *Rasendramāṅgala*:

tasmāt sūta vidā sārddham sabāyair nipuṇair yutaḥ |
sarvopaskaram ādāya rasakarma samārabhet || 24 ||

For that reason, one should commence the mercurial operations together with an expert on mercury, accompanied by skilled assistants, having assembled all equipment.

The commentary picks up on the topic of equipment, admonishing that success in alchemical operations necessitates knowledge about equipment. It then gives an inventory of equipment, listing names and the materials that instruments are made of (such as clay, iron, stone, termite mound clay, etc.), but not their measurements or uses.²⁴ In turn, the line drawings on the manuscripts do not seem to refer to the entirety of the commentary's list of equipment, but just to the sentences on apparatuses (*yantra*). There are no separate images of individual instruments like pots, plates, ovens, mortars, pits, etc.

The images of the Bombay manuscript broadly follow the sequence of apparatuses given in its commentary. The Bikaner manuscript features a very similar list of apparatuses in its version of the commentary. However, its twenty-eight images of apparatuses do not entirely follow the sequence of its own list or that of the Bombay manuscript. The Ahmedabad and Jaipur manuscripts both have a shorter list of apparatuses in their version of the commentary that also differ in their sequence from the Bombay one. However, for the images, they seem to initially draw on the list found in the Bombay manuscript, or otherwise, on the images of

23 The term *upaskara* is less common in alchemical literature than its synonym *upakaraṇa*. A keyword search in the Digital Corpus of Sanskrit only brings up three occurrences of *upaskara* in alchemical literature: once in the *Rasendracūḍāmaṇi* (chapter 3, verse 31), stating that good assistants should be wealthy, affable, and equipped with all instruments (*dhanavanto vadānyās ca sarvopaskarasamnyutāḥ*). This statement is repeated in *Rasaratnasamuccaya* 7.33. And *Rasaratnasamuccaya* 11.26 repeats *Rasendramāṅgala* 1.24 (*sarvopaskaram ādāya rasakarma samārabhet*).

24 The commentary's full section on equipment is repeated almost verbatim in Āḍhamalla's commentary on *Śārṅgadharasamhitā* 2.12.4–13. The *Śārṅgadharasamhitā*'s passage describes a method for cleansing mercury (*rasasōdhanakarman*), using a cradle device (*dolāyantra*) and an unnamed distillation device, consisting of two pots. It also describes a method for purifying sulphur using an iron vessel. Āḍhamalla's commentary elaborates on the idea of processing mercury, quoting from various alchemical works.

the Bombay manuscript more directly rather than on the lists given in their commentary. The images are not a total match, but Ahmedabad and Jaipur both show a *piṭḥayantra* and a *bhūdbharayantra*, for example, neither of which are featured in their commentary, but are part of the Bombay manuscript's. The Jaipur manuscript also features images of additional apparatuses (an *iṣṭikāyantra* and a *dābhikāyantra* on the final folio with images) that are not found on the Bombay or Ahmedabad manuscripts and are not mentioned in either the *Rasendramaṅgala*'s main text or in the commentary.

The images are schematics, i.e., representations of the elements of a system. They consist of two main elements: (1) a line drawing of the apparatus, and (2) text.

The line drawings (1) are diagrammatic representations of apparatuses that show the combination of various vessels and instruments, assembled into an integrated group to perform a particular function. They also show where various ingredients are placed within the equipment. Most of the line drawings seem to depict a cross-section, showing the inner workings of an apparatus. In some cases, the apparatus seems to be depicted from above, though the change of perspective is not always clear. There are different levels of abstraction in the diagrams: Some images show easily recognizable shapes of vessels, while others provide a representation of the principle of the apparatus rather than a mimetic depiction of what it looks like. The drawings are therefore less descriptive of what an apparatus looks like, and more about how all its elements relate to each other. They show a moment in time of dynamic processes.

Vertical lines between apparatuses visually mark a division between the images of apparatuses and in some cases indicate that the apparatus is inside a pit or larger vessel.²⁵ Double lines in the outlines of vessels may indicate a coating on the surface of the vessel, though this is not entirely clear.

The textual elements (2) fulfill three different functions: The first is a kind of heading or caption that gives the name of the depicted apparatus. It is in most cases placed above the drawing, though not all images are provided with such a caption. In the second function, the text gives information about where substances (e.g., mercury, water, sulphur) are placed within the apparatus. The word for the substance, sometimes abbreviated to just the first syllable, replaces an image of it within the apparatus. Hollow spaces (*gartā*) are marked in this way, too. In the Bombay manuscript, fire is sometimes represented by the word "fire" (*agni*), and sometimes represented graphically, through vertical wavy lines. Similarly, water is in one case represented by wavy horizontal lines, but more typically represented by the word "water" (*udaka*). In the third function of the text, the text gives additional information about the parts of the apparatus.

Although the images on the manuscripts are all found in or adjacent to the commentary section and three sets of images are placed in almost identical locations within the commen-

25 The image of the *kacchāpāyantra* on the bottom right of folio 20 of the Bombay manuscript is an example of the lines indicating a pit or container, since the bottom shows lines referencing water.

tary, with similar numbers of apparatuses depicted, there are significant differences between the manuscripts in the sets of images. These differences include which apparatuses are featured, the sequence of apparatuses, as well as the ways in which they are graphically represented.

In the following, I will give a brief description of each of the four manuscripts, and the sequences of images presented in them.

Bombay BBRAS S.C.19/2

This manuscript is held by the Bombay Branch of the Royal Asiatic Society, Mumbai, Maharashtra. It has been described by Velankar (1925–30: appendix B, p. 494) and by Dominik Wujastyk (2022). The undated manuscript names Govindacandra as the author of the commentary. The writing is Devanāgarī from western India, with *pr̥ṣṭhamātrā* vowels. The illustrations are found on folios 20v–21r, positioned within the commentary, underneath two lines of text from the commentary. The text at the top of folio 20v completes a section of the commentary in which various devices are listed.

The commentary lists the following twenty-six devices, which it numbers:

1. *śilāyantra* – rock device
2. *pīṭhayantra* – plinth device
3. *paṣāṇayantra* – stone device
4. illegible (probably *bbūdharayantra*) – in-ground device
5. *nalikāyantra* – tube device
6. *gajadaṃṭāyadānayanayantra* (?) – elephant tooth device
7. *dolāyantra* – cradle device
8. *adhabḥpātānayantra* – downward distillation device
9. *urdbvapātānayantra* – upward distillation device
10. *pātālayantra* – hole device
11. *niyāmakayantra* – restraint device
12. *ḍamarukayantra* – hourglass drum device
13. *tulāyantra* (?) – balance device
14. *kacchapayantra*²⁶ – tortoise device (still)
15. *cakratrayaṃ cākiyantra* – three-plate disc device
16. *vālukāyantra* – sand device
17. *agniṣomāyantra* – fire and water device
18. *gandhakakoyantra* – sulphur device
19. *mūṣāyantra* – crucible device

26 The manuscript reads *kacchapa-* here, which is the spelling one typically finds in print editions of alchemical texts. However, in other places, the alternative spelling of *kachapa* is found.

20. *baṇḍikāyantra* – earthen pot device
21. *kāṃsabbhājanayantra* – brass vessel device
22. *ghāṇāyantra* – nose (?) device
23. *gaḍuś cakrayantra* – water pot disc device
24. *sāraṇayantra* – potentiation²⁷ device
25. *jālikāyantra* – leech device
26. *vāraṇayantra* – elephant/strong (?) device

The existence of further apparatuses is acknowledged by ending the list with “etc.” (*ādyaḥ*).

These devices are represented by the line drawings on folios 20v to 21v. The images are presented in two rows on each folio. Most, but not all, images are labeled and numbered. Most of the diagrams have minimal text, with a few featuring more extensive written explanations. The writing that accompanies the images seems to be in the same hand as the rest of the text, albeit with slightly larger spacing between syllables. Read left to right, and top to bottom, the sequence of images broadly follows the sequence of the list of apparatuses given in the commentary. There are exceptions: For example, the *śilāyantra* is shown twice, once in profile at the beginning of the top row on folio 20v, then again, from above in the fourth image from the left.²⁸ The *nalikāyantra*, which should be the fifth image, is only featured after the *ḍamarukayantraṃ* on folio 20r. The text beneath the third image from the left in the second row on folio 20v, which is identified as a *pātālayantra* above, reads *nalikāyantra* at the bottom, together with the number 13.²⁹ However, in the commentary’s list of devices, number 13 corresponds to the *tulāyantra*.³⁰

- 27 The term *sāraṇa* is used for one of the alchemical procedures applied to mercury. In this step, mercury is empowered or potentiated further to enable it to transmute metals.
- 28 I would like to thank Dr. Borayin Larios, who pointed out the perspectives of the two images. This is somewhat clearer when comparing it with the image of the *śilāyantra* of Ahmedabad, which shows a larger stone at the bottom and a smaller one above in profile.
- 29 The appearance of alchemical apparatuses is not standardized across alchemical works. Different treatises can have quite different takes on what an apparatus should look like. See Hellwig 2009: 259–261 on the *nāḍikāyantra*, which I take to correspond to the *nalikāyantra* of the *Rasendramaiṅgala*’s commentary. However, also see Hellwig 2009: 283–284 on the *Rasakāmadbenu*’s (1.1.37–42 and 64–65) description of two types of *pātālayantra*, which are similar to the image on folio 20v. The *Rasaratnākara*’s *Rasakhaṇḍa* (7.54–56) seems to describe the use of a tube (*nālikā*) in a *pātālayantra* (Hellwig 2009: 230). Notably, however, this device is used to extract the essence of chalcopyrites (*mākṣika*), whereas the image on folio 20v gives mercury (*rasarāja*) as the content of the vessel.
- 30 This identification is somewhat uncertain, as the text is barely legible at that spot.

Bombay BBRAS S.C.19/2, folio 20v

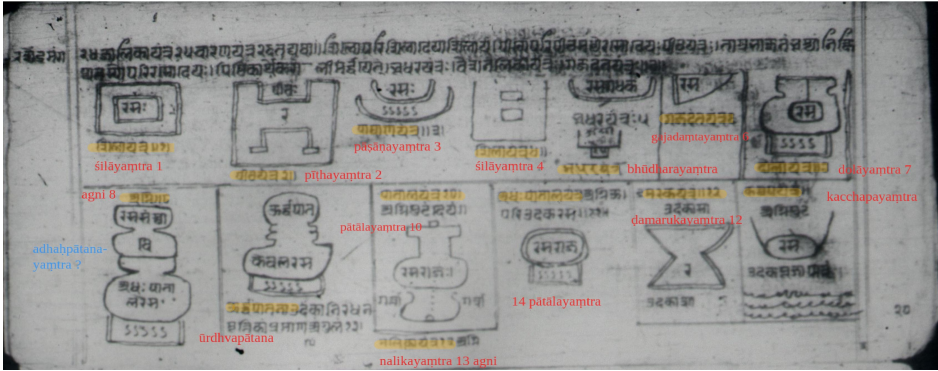


Figure 5.2: Folio 20v (Bombay BBRAS S.C.19/2)

The text at the top of folio 20v is part of the commentary. It begins with the end of the list of apparatuses and then gives some basic information on their use:

24 jālikāyantraṃ 25 vāraṇayantrādayaḥ 26 tadyathā | śilopari silādeyā śilāyantraṃ
 pīṭhopari pāṭhaṃ madhye rasādaya pīṭhayantraṃ | tāmrabhājanam bhūmyāṃ
 nikṣīpya tasyopari raso deyaḥ | piṣṭhikārthe karāṅguḷi marḍdayet |

The final three words of the line are not found in the commentary of the other manuscripts:

bbūḍharayantraḥ | vaṃśa³¹ nalikāyantraḥ | gajadantayantraḥ || o³²||

The top row on folio 20v shows the following from left to right: 1. *śilāyantra*, 2. *pīṭhayantra*, 3. *pāśāṇayantra*, 4. *śilāyantra* 5. *bbūḍharayantra*, 6. *gajadantayantra*, and 7. *dolāyantra*. The bottom row shows 8. [*adbhāṣṭātanayantra*]³³, 9. [unnumbered and not clearly labelled] *ūr-dhvapātānanayantra*, 10. *pātālayantra* (underneath, a label additionally reads *nalikāyantra*, which may refer to the bottom vessel of the apparatus). The image to the right seems to feature another variant or way to use a *pātālayantra*. The list in the commentary would call for a *niyāmakayantra* as the eleventh apparatus here. This is followed by 12. *ḍamarūyantra* and 13. [albeit unnumbered] *kacchāyantra*.

31 I would like to thank Dr. Andrey Klebanov for suggesting this reading.

32 The text seems to give a number here, which, however, is illegible. I have marked illegible parts of the texts with the symbol “o”.

33 The number 8 is given, but it does not follow the label *adbhāṣṭātanayantra*. However, the bottom part of the depicted apparatus reads “*adbhāṣṭānārāsa*”, so that the designation of *adbhāṣṭātanayantra* seems reasonable.

The rendering of what seems to be an *adbahpātayantra* is somewhat odd, in that it appears to be set on top of a fire at first glance (the graphic representation of this corresponds to that of the *dolāyantra*), but the text on top indicates that the fire was placed on top, making it more likely that the lines at the bottom indicate water to aid in the condensation of the mercury.

Bombay BBRAS S.C.19/2, folio 20r

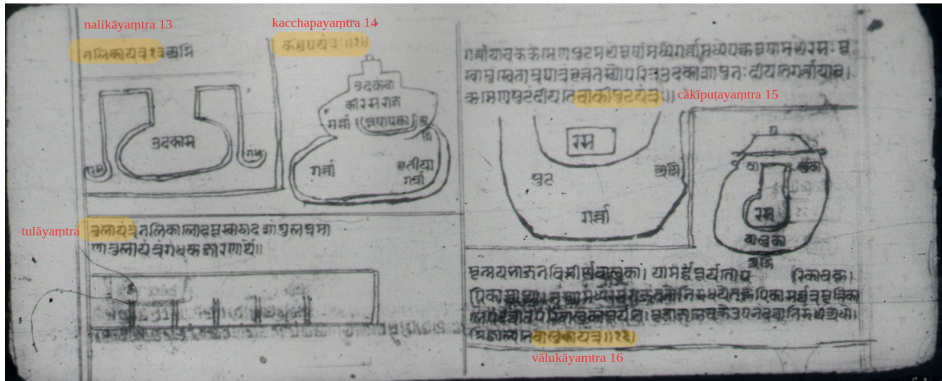


Figure 5.3: Folio 20r (Bombay BBRAS S.C.19/2)

Folio 20r presents five apparatuses. The folio is divided in half by a vertical line. The left half shows two apparatuses on top and one on the bottom; the right shows two further apparatuses, each with longer sections of added text. The apparatus on the top left is identified as a *nalikāyantra* and numbered 13. Apparatus 13 in the commentary's list of this manuscript is hard to decipher: I have surmised *tulāyantra*. The *nalikāyantra* is featured as the fifth apparatus in the commentary's list, so there is a discrepancy here in the sequence of the commentary's list and that of the images. However, it is notable that the image of the Ahmedabad manuscript that most closely resembles the *nalikāyantra* image here is labelled *tulāyantra*.³⁴

The apparatus to its right is labeled *kacchapayantra* and numbered 14, conforming to the commentary's list. The apparatus below is not labelled. The text above it reads:

tulāyaṃtraṃ nalikā lobamūkbā dvādaśāṅgulapramāṇā tulāyaṃtraṃ gaṃḍha-kajāraṇārthe ||

A balance device [consists of a] tube [and] an iron crucible measuring twelve fingerbreadths. The balance device is for digesting sulphur.

34 Ahmedabad manuscript, folio 24r, top row, second image from the right.

The image on the top right depicts a *cākīpuṭayantra*. Its numbering is only barely legible: it probably is a 15, which would conform with its numbering in the commentary list. The image on the bottom right is a *vālūkāyantra* and numbered 16. Both devices have a longer textual description in lieu of a single label.

The text above the *cākīpuṭayantra* reads as follows:

*garttāyāṃ cakraṃ kraṃeṇa puṭamadhye mūṣā madhye garttā madhye pakvamūṣā
madhye rasaḥ mūkbāmukhe tāmrapātraṃ vṛttaṃ tasyopari ca udakāsā punaḥ dīyate
garttāyāṃ ca | kraṃeṇa puṭam dīyate cākīpuṭayaṃtraḥ ||*

Emendations: line 1: *garttāyāṃ*] *garttāyā* ms. *cakraṃ kraṃeṇa*] *cakra kraṃeṇa*
ms. *mūṣā madhye*] *mūṣāṃ madhye* ms. line 2: *garttāyāṃ*] *garttāyā* ms.

Successively, a disc inside a hollow, a crucible inside a pit³⁵, inside it a hollow, in that a fired crucible, inside that the mercury, a copper lid placed at the opening of the crucible. And on top of it, a space for water is further placed in the hollow. In this manner, an enclosed firing is applied; this is a disc-pit apparatus.

Notably, the illustration does not indicate the use of water, and there is also no symbol for a copper lid, though the mercury is shown within a box, which may signal a closed vessel.

The text below the *vālūkāyantra* reads:

*mṛṇmayabbājanavistīrṇavālūkāṃ | yāṃ arddhaṃ pūryetopari kācakūpikāṃ [o³⁶]
madhye rasarāja tato nirumdbayet kūpikā sarvatra mṛttikā lepadatvā upari vālūkā
pūryate mṛdbbājane cakre upane³⁷ datvā nirudhya adho gñijvālyate vālūkayaṃtraḥ
|| 16 ||*

Emendation: line 3: *vālūkayaṃtraḥ*] *vālūkayaṃtra* ms.

An earthen vessel strewn with sand, one should fill it by half, on top a glass bottle. [o] In that, [pour] mercury. Then, one should seal the bottle all over, having smeared it with clay. Pour sand on top of it. Place it into a disc in an earthen pot,³⁸ seal it and fire it from below; this is a sand device.

35 Or: “A crucible is enclosed.” A *puṭa* can be a firing pit; it may also designate the covering of a bowl with another bowl or lid, enveloping whatever is inside; and finally, *puṭa* may also refer to a roasting process in which the substance to be roasted is enclosed in a vessel (as opposed, for example, to being roasted in an open pan).

36 The illegible section comprises circa five syllables.

37 The text seems to read *upane* or *upanaṃ* here, but the meaning is not clear. Perhaps this is a misspelling for *upāne* “on a plinth”? However, no plinth is featured in the image.

38 This translation omits the word *upane*.

Bombay BBRAS S.C.19/2, folio 21v

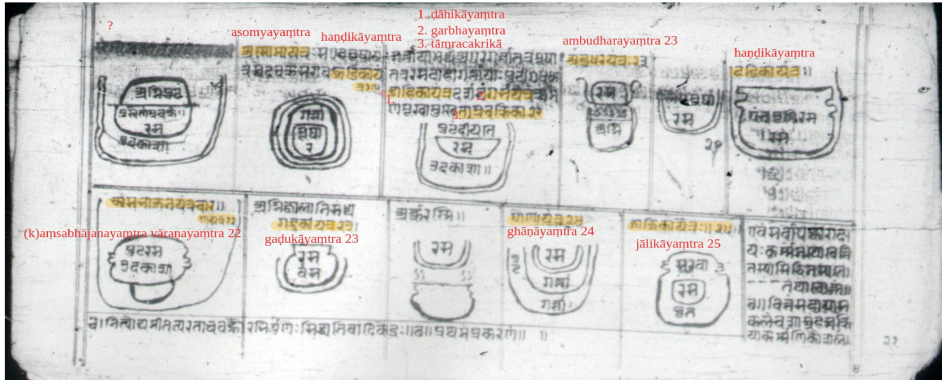


Figure 5.4: Folio 21v (Bombay BBRAS S.C.19/2)

Folio 21v returns to the two-row format of folio 20v, showing eleven devices. Here, however, the numbering and labelling of the devices no longer seems to follow the order of the commentary's list. The top row, from left to right depicts a device that is possibly a *vālukāyantra* again, although the writing is too smudged to be certain. This identification relies on the similarity of this image with one from the Ahmedabad manuscript, which is clearly labelled *adbognivālukāyantra* 16.³⁹ This would mean that apparatus 17. *agnīṣomāyantra* and apparatus 18. *gandhakakoyantra* of the commentary's list were skipped. The next apparatus seems to be a *mūṣayantra* (19), which curiously is also is labeled *asomyayantra* (?) and *haṇḍikāyantra*; or perhaps the image shows their combination in one device. The text above it reads:

agnisomayantraḥ sa eva mūṣayantraṃ svedacakrasarāvahaṇḍikāyantra 19

Emendation: *agnisomayantraḥ] asomyayantraḥ* ms.

A fire and water device. This is in fact a crucible device, an earthen device for steaming [consisting of] a disc and a shallow plate. 19

To its right is a device that is numbered 21 (or 22?), which would make it a *kāmsabbhājanayantra*, or *haṇḍikāyantra*, respectively, according to the commentary's list. However, in the explanatory text, neither a *kāmsabbhājanayantra* nor *haṇḍikāyantra* are mentioned. The text above mentions a *ḍāhikāyantra* and a *garbhayantra*, lidded with a copper disc:

*garttāyāṃ madhye aparagartā tatra mūṣā tatra rasadāhāgarttāyāḥ puṭiṃ eṣaka
ḍāhikāyantradarśanaṃ garbhayantraṃ krameṇa mūkhāmukhe tāmracarikā* 21

39 Ahmedabad manuscript, folio 24r, bottom row, second image from the left.

Emendation: *garttāyām*] *garttāyā* ms.

In the hollow, another hollow, in that a crucible, in that the mercury-roasting space enveloped (covered). This shows the firing device, a womb device, successively, a copper disc [placed] at the opening of the crucible. 21

The next device is labeled *aṃbudharayantra* (“water holder device,” “cloud device”) – a name that is not featured in the commentary’s list of devices and that is also not found in the text of the *Rasendramāṅgala*. It is numbered 23, which corresponds to the *gaḍuścakrayantra* in the commentary’s list. Next to it is an unlabeled image with the number twenty-one, corresponding to the *kāṃsabhājanayantra* in the commentary’s list. The final image on the top row is labelled a *haṇḍikāyantra*.

In the bottom row, problems with identification continue. The first device is labelled *aṃsabhājanayantra* (for *kāṃsabhājanayantra*?), but also *vāraṇayantra*. The image to its right is labeled *gaḍukāyantra* 23. To its right is an unlabeled and unnumbered device, consisting of a bowl with mercury in it, labelled *lepamūṣā* (crucible with a coating). This is followed by a *ghāṇayantra*, numbered twenty-four, which in the commentary’s list is the *sāraṇayantra*. The commentary’s list gives the number 22 for the *ghāṇayantra*. The final image is labeled *jālikāyantra* and given the number 25, corresponding to the commentary’s list. The bottom right field is filled with text instead of an image. A further line of text is found underneath the two rows of images. Together, these read:

*evaṃ sarvopakārādayaḥ karmaṇaṃ na yo vetti tasyāṃ sidhi na syāt | ---⁴⁰ tathā
coктаṃ || ॐ⁴¹ || vittam saḥāyab sakalaṃ ca śāstram hastakriyākarmaṇi kauśalaṃ
| ca | nityodyamā tatparatā ca vabne ebbir guṇaiḥ sidhyati vārttikendraḥ ||⁴² ॐ ||
prathamam prakaraṇam ||*

Emendations: line 2 *saḥāyab*] *saḥāyā* ms. line 3 *ebbir guṇaiḥ*] *abbirguṇaḥ* ms.
vārttikendraḥ] *vādikeṃdraḥ* ms.

Thus, all the instruments, etc. The one who does not know the work will not succeed. [gap indicated in the ms.] And so it is said. Wealth, assistance, the entire discipline, skilfulness in the execution of alchemical operations, as well as continuous effort and devotion to fire: with these qualities the alchemist succeeds. The first chapter.

40 The manuscript gives three horizontal lines here, indicating that the section was illegible to the scribe. See Einicke 2009: 115–116.

41 This symbol is a section marker. See Einicke 2009: 106.

42 A parallel passage is found in the *Yogarātnākara*, in the section on mercury. See Shetty, Suresh Babu 2011: 187, verse 3 and Kumari & Tewari 2010: 169, verse 1335; in the Digital Corpus of Sanskrit, it is given under YRĀ, Dh. verse 224. Unfortunately, Hellwig does not give the edition of the *Yogarātnākara* he used for his transcription.

Ahmedabad LDI 9442

This manuscript is held in the Lalbhai Dalpatbhai Institute of Indology, Ahmedabad and has been described by Puṅyavijayajī and Shah (1963–1938: v. 4, serial no. 1285, accession no. 9442) and by Dominik Wujastyk (2022). It is one of two manuscripts of our four exemplars that is dated: Folio 95v. notes that the manuscript was copied by the scribe Ratnavimāla, pupil of Varddhamāna Vimalagaṇi, in Ahmedabad, at Kālapura, on Saturday 6 śuklapakṣa of Māgha, samvat 1737, i.e., 1681 CE.⁴³

Ahmedabad LDI 9442, folio 2r

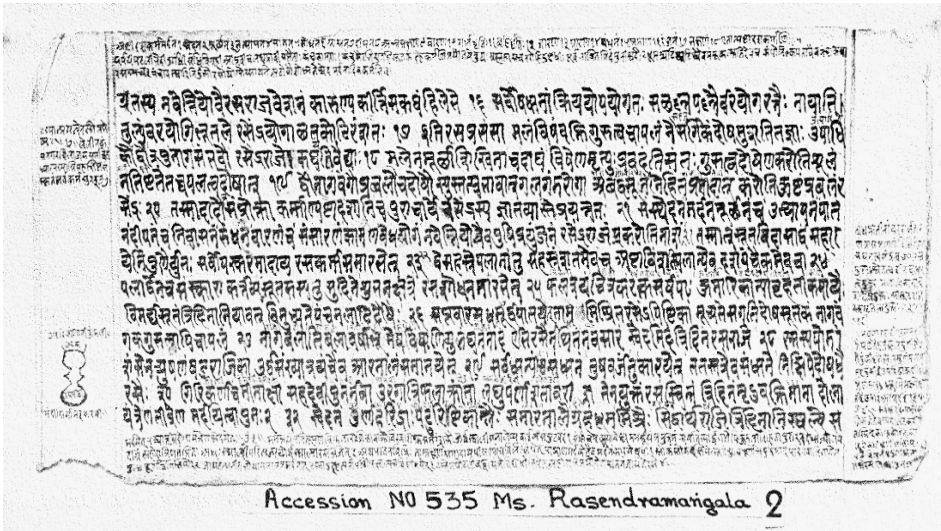


Figure 5.5: Folio 2r (Ahmedabad LDI 9442)

The illustrations are found on folios 2r (a single image on the left margin of the folio), and 24v–25v, positioned at the very end of the manuscript. The commentary seems to end on folios 23v–24r (*iti rasendramangale ṭṭipāṇakam samāptam*). A further section follows, dedicated to an iron tonic ascribed to Nāgārjuna (*vakṣye nāgārjunaproktaṃ lobasyaiva rasāyanam*).⁴⁴ The commentary’s list of apparatuses is significantly shorter than the list in the Bombay

43 See Dominik Wujastyk 2022: 5 for a transliteration and translation of the relevant passage on folio 24v (consulted on March 10, 2023).

44 Several medical works refer to an iron tonic recipe by Nāgārjuna. See *Cakradatta* 69,34; *Vaṅgasenasambhītā* Rasāyanādhikāra 474. There are some similarities between the *Rasendramangala*’s formula and those of the *Cakradatta* and *Vaṅgasenasambhītā*, but no intertextual overlap.

manuscript: it features only eighteen devices, omitting the *piṭhā-*, *pāṣāṇa-*, *bhūdhara-*, *pātāla-*, *gandbaka-*, *mūṣā-*, *haṇḍikā-* and *sāraṇayantras*, and adding a *pāṇayantra*.⁴⁵ Nevertheless, the images in this manuscript seem to follow the list of apparatuses given in the Bombay manuscript (or a list similar to it), rather than present a unique list of its own.

The image on folio 2r is part of a marginal note. It shows a distillation device with a mild fire below and a water container above. This corresponds to the text to its right on the folio (verse 26⁴⁶), which mentions *ūrddhvaṣṭānam*, upward distillation. The style of drawing seems different from the one employed for the set of images of apparatuses on folios 24r–25v. And unlike the images at the end of the manuscript, this image is directly relevant to the content of the main text of the *Rasendramaṅgala*.

Ahmedabad LDI 9442, folio 24v

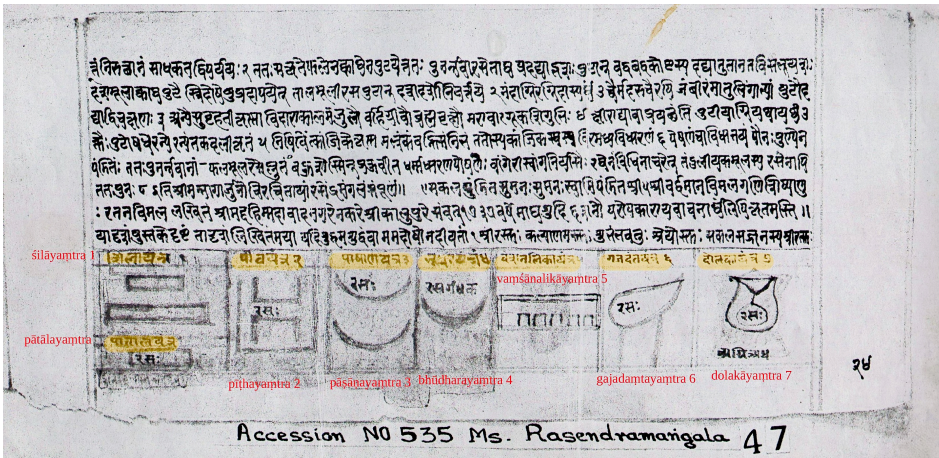


Figure 5.6: Folio 24v (Ahmedabad LDI 9442)

Folio 24v contains the final lines of the section dedicated to the above-mentioned iron tonic, starting with *t tam nirutcbānaṃ sādḥaka tad viparyayaḥ* 2 and ending with *iti śrīrīmānāgārjuno viracitāyāṃ rasendramamgalaṃ saṃpūrṇaṃ*: The added section seems to count as part of the main text of the *Rasendramaṅgala*, though it is not clear which chapter it belongs to. The Bombay manuscript has a parallel reading, but the Jaipur manuscript does not and ends with the commentary, as does the Bikaner manuscript. The final lines on folio 24v contain the colophon and end with *śrīr astuḥ kalyāṇam astuḥ śubham bhavatuḥ śreyo stuḥ sakalajanasya śrīr*

45 This manuscript also has some variant spellings for some of the shared apparatuses, such as *jālikāyantra* for *jālikāyantra*, or *gaḍakayantra*, instead of *gaḍuścakrayantra*.

46 Verse 26 on this manuscript corresponds to verse 28 of chapter one in Wujastyk’s provisional edition.

astuḥ. A row of images of seven numbered apparatuses and one unnumbered one (*śilāyantra* 1, *piṭḥayantra* 2, *pāṣāṇayantra* 3, *bhūdarayantra* 4, *vaṃśanalikāyantra* 5, *gajadantayantra* 6, *dolakāyantra* 7 and *pātālayantra*) is positioned underneath. Devices 1 to 7 follow the list of apparatuses given in the Bombay manuscript. The inclusion of the *pātālayantra* is surprising here, since it is featured in its proper place as the tenth apparatus on the next folio. Perhaps the idea is that the *śilāyantra* is placed inside the *pātālayantra*.

Ahmedabad LDI 9442, folio 24r

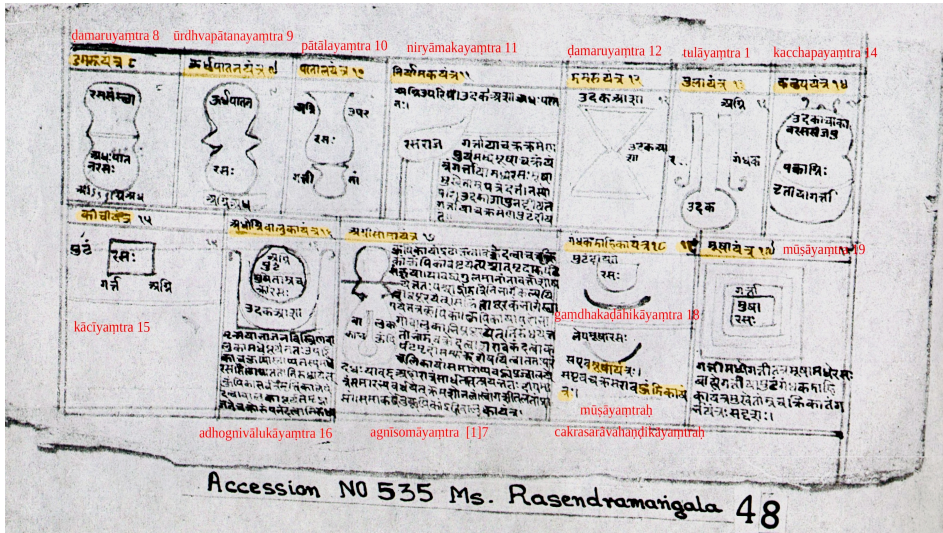


Figure 5.7: Folio 24r (Ahmedabad LDI 9442)

Folio 24r features two rows of images, with seven apparatuses in the top row, and six images in the bottom row. Reading them left to right, the top row’s devices are labeled and numbered as *damarūyantra* 8, *ūrdhvapātānanayantra* 9, *pātālayantra* 10, *niryāmakāyantra* 11, *damarūyantra* 12, *tulāyantra* 13, and *kacchāpāyantra* 14.

The labels on the second row give *kācīyantra* 15, *adhognivālukāyantra* 16, *agnisomāyantra* 17, *gandhakaḍāhikāyantra* 18, with an image of a *mūṣāyantra* (also identified as a *cakrasarāva-ḥaṇḍīkāyantra*) underneath, and *mūṣāyantra* 19 as the final image. There is quite a bit of text added to the images of the *niryāmakāyantra*, the *adhognivālukāyantra*, the *agnisomāyantra*, and the *mūṣāyantra*. The text underneath the *adhognivālukāyantra* seems to broadly correspond to the text accompanying the *vālukāyantra* found on folio 20r of the Bikaner manuscript. The text to the right of the *niryāmakāyantra* in turn corresponds to the text accompanying the *cākipuṭāyantra* on the Bikaner manuscript’s folio 20r, though it is not a complete match. Similarly, the text below the Ahmedabad manuscripts’s *mūṣāyantra* corresponds to folio 21v of the

Bikaner manuscript, middle of the top row, with some variation. The text for the Ahmedabad manuscript's *agnisomayantra*, however, has no parallel in the Bikaner or other manuscripts.

The *kācīyantra* is not featured in the Ahmedabad manuscript's list of apparatuses, nor indeed in any of the lists. However, a *cākīyantra* is found in the Bombay manuscript's list as the fifteenth apparatus, and the image of this apparatus on the Bombay manuscript (folio 20r, second image from the right) corresponds somewhat to that of the Ahmedabad manuscript's *kācīyantra*, albeit more in conceptual than graphic terms.

The numbering of the illustrations in the Ahmedabad manuscript corresponds to the numbering of apparatuses in the list of devices of the Bombay manuscript's commentary.

Ahmedabad LDI 9442, folio 25v

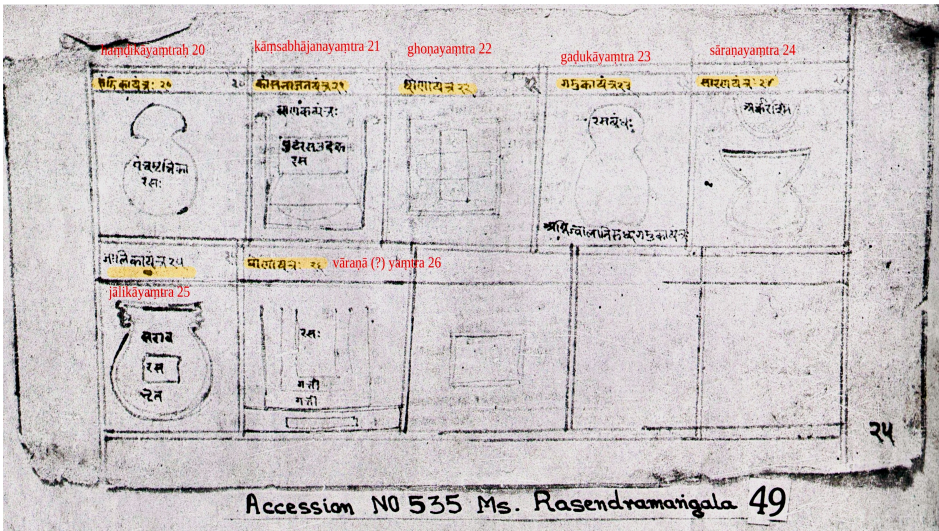


Figure 5.8: Folio 25v (Ahmedabad LDI 9442)

On folio 25v, a further seven apparatuses are shown in two rows. One image, which merely shows a rectangle, but gives no name, seems unfinished. And two spaces in the bottom row of the grid are left empty.

The top row (read left to right) gives the following labels and numbering: *haṇḍīkāyantra* 20, *kāmsabhājanayantra* 21, *ghoṇāyantra* 22, *gaḍukāyantra* 23, *sāraṇayantra* 24. The row below shows a *jālikāyantra* 25, and a *vāraṇāyantra* (or *ghoṇāyantra*?) 26. This is followed by an unlabeled image of a rectangle, and two more fields without images.

Notably, the images on the Ahmedabad manuscript follow the list given in the Bombay manuscript more closely than the images of the Bombay manuscript itself. There is one exception: on folio 24r, in the top row of images, apparatus 8 is designated *damarūyantra*, rather than *adbahpātanayantra*, as in Bombay's list. Here, the Ahmedabad manuscript follows its

own list of apparatuses, as the *ḍamaruyantra* is found in the eighth place in its list. However, the diagram actually is very similar to the Bombay manuscript's image of the *adhahpā-tanayantra* on folio 20v, bottom left. And the Ahmedabad manuscript shows a *ḍamaruyantra* that is properly numbered as the twelfth apparatus and placed accordingly in the top row on folio 24r.

Bikaner BORI 4099

This manuscript is held at the Motichand Khajanchi Collection of the Rajasthan Oriental Research Institute, at Bikaner. It has been described by Yati and Bishnoi (1990: 166, #1455/4099) and Dominik Wujastyk (2022). The manuscript is dated to 1777 CE and is thus about a century younger than the Ahmedabad manuscript.

The list of apparatuses given in its commentary section is the longest of all the manuscripts with thirty devices. However, the *pāṣāṇayantra* and *tulāyantra* are both featured twice. If we remove the second *pāṣāṇayantra* and the first *tulāyantra* from its list, the sequence of the Bikaner manuscript follows that of the Bombay manuscript quite closely with some spelling variants. It adds a *pabakayantra* (meaning uncertain, perhaps the correlate to the *pānayantra* of Ahmedabad and Jaipur?), and omits the *ghāṇayantra*, while the Bombay manuscript's *vāraṇayantra* becomes a *cāraṇayantra*. The sequence of its illustrations is not entirely consistent with the sequence of apparatuses given in the list, but features almost all the named apparatuses, with the exception of the *pabakayantra*. It also adds another apparatus: the *iṣṭikāyantra* (brick device), which is not found on any of the apparatus lists. The Jaipur manuscript features a diagram of an *iṣṭikāyantra* as well, though its rendering of the apparatus differs from the Bikaner manuscript.

Bikaner BORI 4099, folio 44v

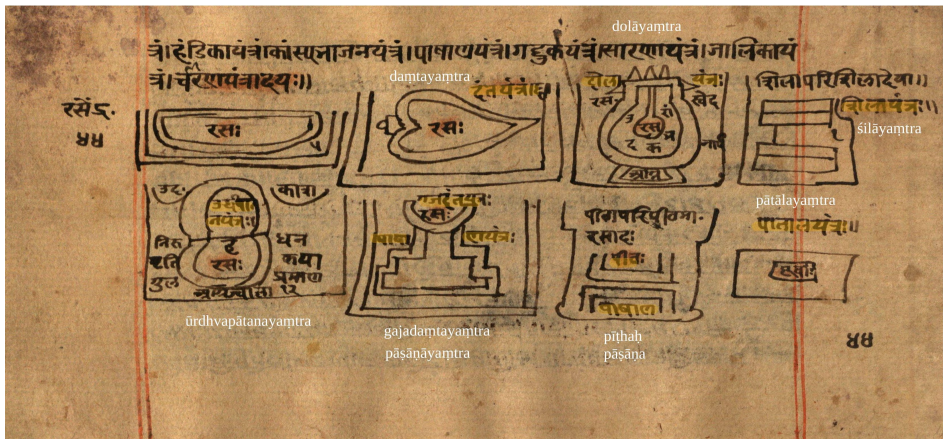


Figure 5.9: Folio 44v (Bikaner BORI 4099)

Folio 44v contains the final part of the commentary’s list of apparatuses at the top, from *baṇḍikā-* to *cāraṇayantra*. Below, illustrations of apparatuses are presented in two rows. The top left image is the only illustration not to receive a caption. It somewhat resembles Ahmedabad’s *pāṣāṇayantra* (folio 24v). On its right is a depiction of a *dantayantra*, presumably the *gajadantayantra*. Directly below it, an illustration of a *gajadantayantra* in combination with a *pāṣāṇayantra* is shown. Back in the top row, to the right of the *dantayantra*, there is an illustration of a *dolāyantra*. The final image on the right is a *śilāyantra*, similar in execution to Bombay’s second *śilāyantra* image, and most similar to the illustration of the *śilāyantra* in the Jaipur manuscript.

The bottom row shows an *ūrdhvaṣṭāyantra* on the left, with text that notes the device should be sealed with clay measuring a fingerbreadth (*aṅgulapramāṇa*), that there should be water above, and fire below. This image is followed by the above-mentioned combined *gajadanta-* and *pāṣāṇayantra*. The illustration to its right is not given a name, but is labelled with *pīṭha* and *pāṣāṇa*, while the text above instructs that a plinth is above a plinth, and that mercury is placed on this. The image resembles the illustrations of the *pīṭhāyantra* in the Bombay, Ahmedabad, and Jaipur manuscripts. The final image is a *pātālayantra*, which does not resemble that of the Bombay manuscript on folio 20v, or that of the Ahmedabad manuscript on folio 24r. If anything, it looks like the illustration of the *śilāyantra* on the Bombay manuscript, folio 20v.

Bikaner BORI 4099, folio 45r

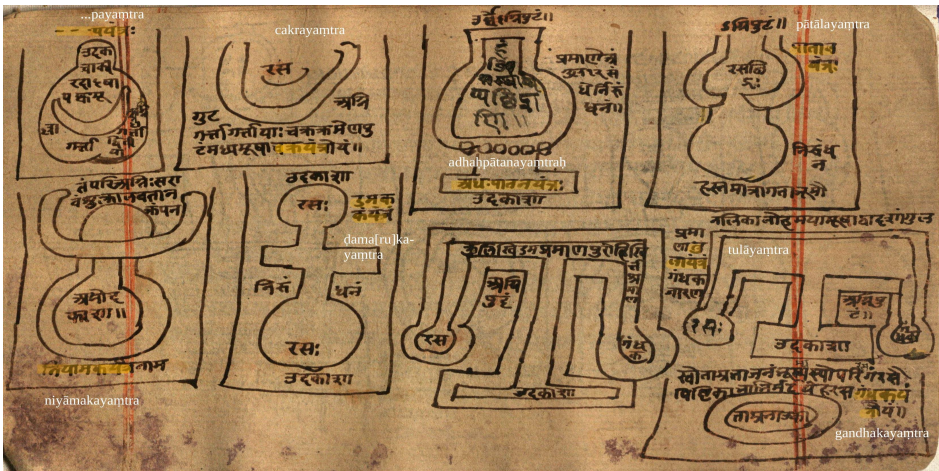


Figure 5.10: Folio 45r (Bikaner BORI 4099)

The illustrations on folio 45r are again presented in two rows. The image on the top left is incompletely labeled. If we follow the sequence of the list of apparatuses, this should be a *kaccchayantra* (spelled *kascapayamtra* in this manuscript), as the next image shows a *cakrayantra*.

The illustration somewhat resembles the *kacchapantra* of the Ahmedabad manuscript (folio 24r, top right).

The illustration of the *cakrayantra* is similar to the *cākipuṭayantra* of the Bombay manuscript, with an abbreviated version of its accompanying text. Next to it, a *ḍamarukayantra*⁴⁷ is featured. This is a fairly abstract rendering: the rims of the two vessels meeting in the middle are exaggerated. The illustration of the *ḍamaruyantra* in the Jaipur manuscript (folio 42v, top left) is similar in that respect.

To its right are two very similar illustrations. Only the one on the right is labelled as a *tulāyantra*. The accompanying text is the same as the text for the *tulāyantra* in the Bombay manuscript (folio 20r, bottom left), which is also found on Jaipur (folio 41v, top row middle). The Bikaner manuscript's image is very similar to the image labelled *nalikāyantra* in the Jaipur manuscript, folio 41r. The Ahmedabad manuscript presents a much less abstract form, though one can see how the illustrations on the Bikaner and Jaipur manuscripts relate to it. The image on the Bombay manuscript is the outlier here: its image seems to show something completely different.

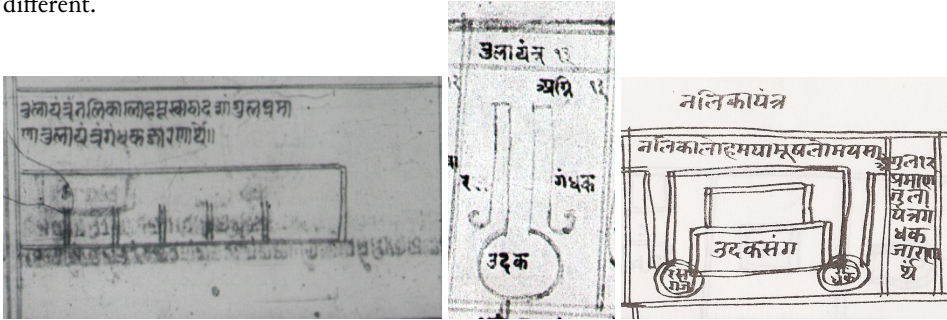


Figure 5.11: Images of a *tulā*- (or *nalikā*-)yantra on the Bombay, Ahmedabad, and Jaipur manuscripts

The bottom right shows a simple image of a *gandhakayantra*, accompanied by some explanatory text. The image corresponds to an image on the Bombay manuscript (folio 41v, second from the left, bottom row), which does not identify the device, but provides the caption “mercury and sulphur” (*rasagandhaka*) and labels the vessel as a copper pot (*tāmrabhājana*).

Bikaner BORI 4099, folio 45v

Folio 45v gives two rows of images, with an additional image on the bottom left. The text at the bottom of the folio is a variation of the text found on the final folio of images on the Bombay manuscript.⁴⁸

47 I assume that the label *ḍamakakayantra* is a misspelling for *ḍamarukayantra*.

48 *evaṃ sarvopaskārādayaḥ | karma ca yo na veti tasya siddhir na syāt tathā - - vittam sabāyā nikhilam ca śāstram hastakriyākarmaṇi kauśalatvaṃ nityodyamas tanāratā [for tatparatā?] ca vabner ebhir guṇaiḥ sidhlyati sūtakeṃdraḥ || iti prathamam ---*

in the Bombay manuscript, folio 20v labelled both a *pāṭalayantra* and a *nalikāyantra*. No tubes are shown on this image, but perhaps the dots between the lower and middle vessel signal that these are connected by a thick, perforated tube through which substances can pass.

Bikaner BORI 4099, folio 46r

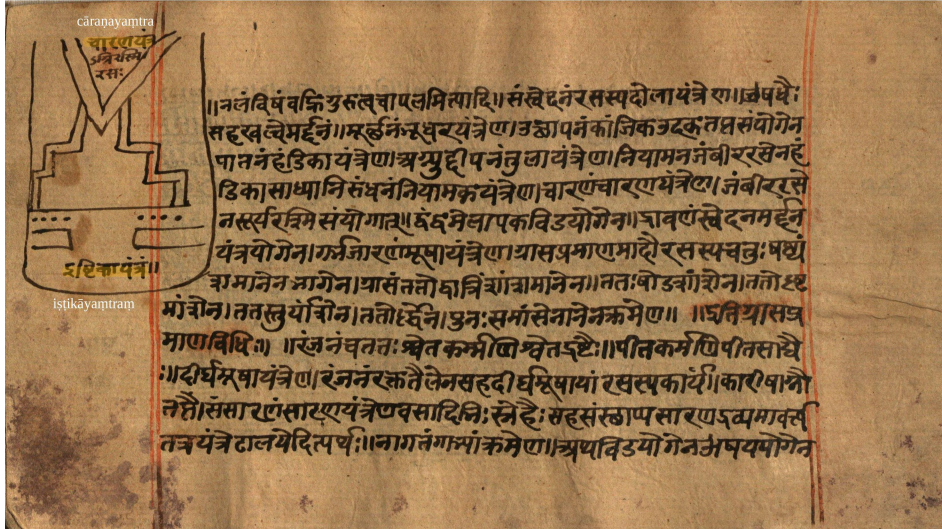


Figure 5.13: Folio 46r (Bikaner BORI 4099)

Folio 46r features one last illustration: a *cāraṇayantra*, combined with an *iṣṭikāyantra*. It is hard to tell from the image alone, but it seems that there are two bricks at the bottom, with something indicated by a row of dots above, and then a stepped plinth, which looks like the *pāṣāṇayantra* part of the combined *gajadanta*- and *pāṣāṇayantra* on folio 44v. The triangle on top holds the mercury and fire. The rest of the folio contains text, starting with a reference to the flaws of mercury listed in verse 18 of chapter 1 of the *Rasendramaṅgala*.⁴⁹ What follows is a part of the commentary that seems to be unique to this manuscript. It is a particularly interesting addition to the text, because it gives a concise delineation of what the various apparatuses are used for within the program of alchemical operations (*saṃskāra/rasakarman*)⁵⁰ – an explanation that is sorely missing in the other variants of the commentary: The steam-

49 This verse count refers to the provisional edition of Dominik Wujastyk (2022), which at this point (November 2022), does not take the text of the Bikaner manuscript into account.

50 On the program of alchemical operations, called *saṃskāra*, or *rasakarman* in the alchemical texts, see White 1996: 266–268 and Dagmar Wujastyk (forthcoming c). Some of these are listed in *Rasendramaṅgala* 1.22–23. The different readings in the manuscripts name between fourteen and eighteen of these procedures.

ing (*samsvedana*) of mercury happens in a *dolāyantra*; the rubbing (*mardana*) with herbs in a mortar (*kbalva*); thickening (*mūrchana*) in a *bbūdharayantra*; raising/evaporation (*utthāpana*) and condensation (*pātana*) in a *baṇḍikayantra*; kindling (*dīpana*) in a *tulāyantra*; *niyāmana* (restraint) and *nirundhana* (countering)⁵¹ in a *niyāmakayantra*; *cāraṇa* (feeding, i.e., adding materials) in a *cāraṇayantra*; *garbhajārana* (enclosed digestion/amalgamation) in a *mūṣāyantra* (crucible). The text then explains the procedure of *grāsapramāṇa* (measuring the morsel), another of the steps in the alchemical program. This concludes the systematic correlation of apparatuses with the *samskāras*. None of this is found in any of the other manuscripts.

Jaipur UIOMI 184: I.14.ii.2

This manuscript is held at the Universal Institute of Orientology and Museum of Indology, Prachya-Vidya-Path, 24 Gangwal Park, Jaipur, Rajasthan. It has been described by SRCPVPS Trust (Śarmā 1986: 63) and by Dominik Wujastyk (2022). The manuscript contains parts of the text of the *Rasendramāṅgala*, starting from chapter three, and the commentary. Folios 1–8 of this manuscript are from another work, but copied in the same hand as the whole manuscript. Illustrations of alchemical apparatuses are found on folios 41r–42v. These illustrations are rendered in abstract form: One cannot make out the actual shape of vessels in most cases, only their relations to each other. The style in drawing is most similar to the Bikaner manuscript, though the actual images diverge from each other.

Jaipur UIOMI 184: I.14.ii.2, folio 41r

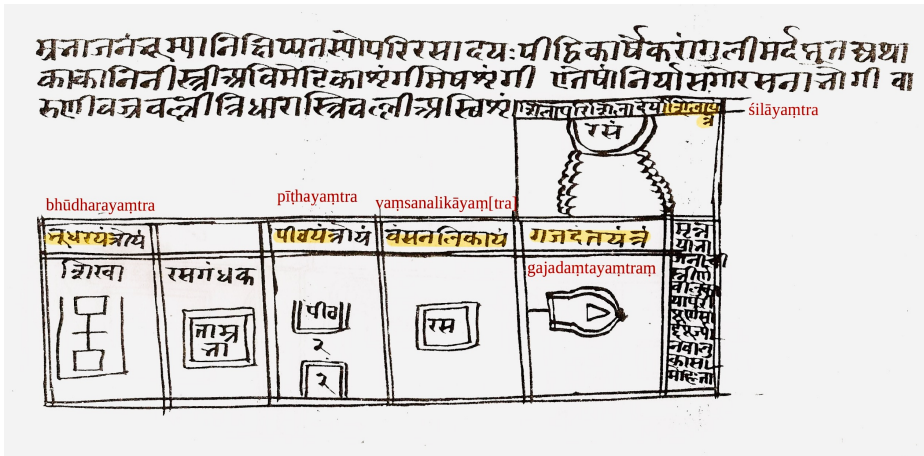


Figure 5.14: Folio 41r (Jaipur UIOMI 184: I.14.ii.2)

51 In other alchemical texts, this step in the alchemical procedures is called *rodhana* (countering) or *bodhana* (awakening). See White 1996: 267.

Folio 41r has three lines of text at the top, which are part of the commentary and refer to *Rasendramāṅgala* 2.11.⁵²

The illustrations are presented in two rows: one image at the top on the right, five in the row below, and one section filled with text on the bottom right. The image on the top right of a *śilāyantra* may have been added as an afterthought – it appears somewhat inconveniently placed, as it interrupts the sentence of the commentary to its left. The image also does not follow the example of the other manuscripts’ depiction of the *śilāyantra*. It does not merely give *śilāyantra* as a heading, but rather “*śilopari silādeyā śilāyantram.*” This is the beginning of the next paragraph of the commentary following on from the list of apparatuses. The illustration also departs visually from the images of the other manuscripts, showing a bowl with the word *rasa* (mercury) inside on top of an unidentified structure.

The bottom row (from left to right) shows a *bhūdbharayantra*; an unnamed device involving a copper vessel, mercury, and sulphur; a *piṭhayantra*; a *vamṣanalikāyan[tra]*; and a *gajadantayantra*. The *piṭhayantra* is not featured in this manuscript’s list of apparatuses. If we follow the Bombay manuscript’s sequence of devices, it should appear before the *bhūdbharayantra*. The *vamṣanalika-* and *gajadantayantras* are, however, in their expected places.

Jaipur UIOMI 184: I.14.ii.2, folio 41v

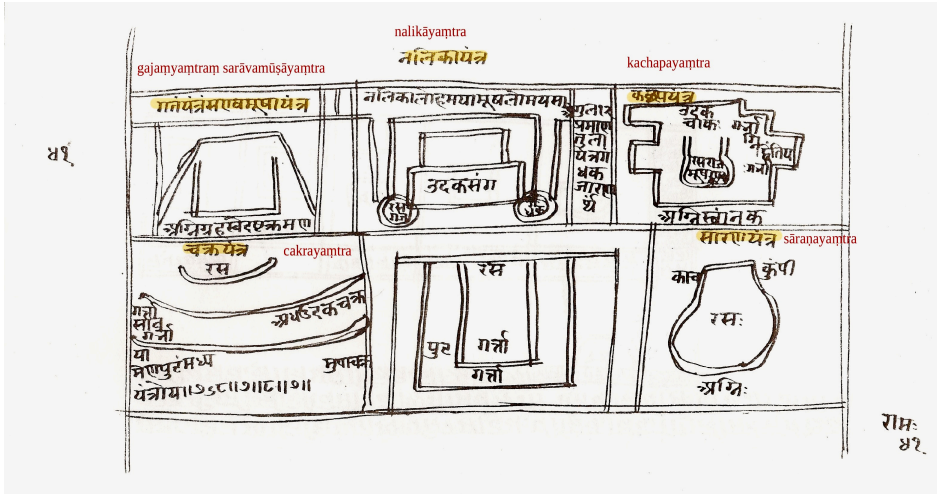


Figure 5.15: Folio 41v (Jaipur UIOMI 184: I.14.ii.2)

52 The final part of the sentence (*m̐khalā ity arthaḥ*) is missing. See the provisional edition by Dominik Wujastyk 2022. The text of the commentary picks up again on the folio after the images, but starts a line back with *-yasanā bboḡi vāruṇi vajravallī tridhārāstrivallī asthīr̥m̐khalā ity arthaḥ mabodadhi agastīḥ*.

The illustrations on this folio are presented in two rows, showing three apparatuses on top and three on the bottom. The top left image is labelled *gajayaṃtram sarāvamūṣāyaṃtra*. This illustration has no parallel on any of the other manuscripts as far as I can tell, even allowing for this manuscript's propensity for extreme abstraction. The text below (*agnigrahasvedaṣṭakramaṇa*) indicates that it has something to do with containing fire for a steaming (*sveda*) process, but it is impossible to tell from the image itself. The image to its right is labelled *nalikāyaṃtra*. It corresponds to the illustration of a *nalikāyantra* in the Bombay manuscript, top left on folio 20r. The text below the label reads *nalikālobamayā mūṣalomayā* (*sic*. This should perhaps be read *mūṣalobamayā sā*). It is continued on its right with *aṃgūlir pramāṇa tulāyaṃtra gaṃ-dhakajāraṇārtham*. This corresponds (more or less) to the text found below the *nalikāyantra* in the Bombay manuscript, folio 20r.

The final image on the top is labeled *kacchapaṃtra*, which again corresponds to the sequence of images in the Bombay manuscript. In terms of graphic representation, however, it is a challenge to derive the illustration on the Jaipur manuscript from the Bombay manuscript. The labeling inside the apparatus, indicating water (*udaka*) at the top, empty spaces (*gartā*, *dvitiya gartā*) below, and a vessel (*mūṣā*) filled with mercury (*rasarāja*) allows for the idea that the illustration in the Jaipur manuscript is based on the Bombay manuscript.

In the bottom row on the left, the illustration is labeled *cakrayaṃtra*. This corresponds to the image on the right of the Bombay manuscript, folio 20r, labeled *cākīpuṭayaṃtra* 15, giving an abbreviated version of the text found in the Bombay manuscript. The corresponding image in the Ahmedabad manuscript (folio 24r, bottom row on the left) is labeled *kācīyaṃtra* 15.

The illustration in the middle of the bottom is not labeled. It may show the same apparatus from another angle, or in a different way. The labeling does not seem quite right: the images in the Bombay and Ahmedabad manuscripts do not indicate a space (*gartā*) below the mercury (*rasa*), and also indicate fire (*agni*) to the right.

Finally, on the bottom right, the label on top states *sāraṇayaṃtra*, while the vessel depicted below is identified as a glass bottle (*kācakūpi*) with mercury (*rasa*) inside, and fire (*agni*) below. The corresponding image in the Bombay manuscript (folio 20r, bottom right) identifies the apparatus as a *vālukāyantra*, and provides a descriptive text. In the Ahmedabad manuscript, there is an *adbognivālukāyantra*, but the image that corresponds most closely to the Bombay manuscript's *vālukāyantra* and therefore to the Jaipur manuscript's *sāraṇayaṃtra*, is the image of *agnisomayaṃtra* 17 (Ahmedabad manuscript, folio 24r, bottom row, third image from the left).

As we have seen, there is a certain correspondence between the sequences of images of the Bombay manuscript and the Jaipur manuscript. However, the Bombay manuscript's image sequence was disrupted by the Jaipur manuscript's folio 41r in that the latter skipped a number of apparatuses from Bombay's list: the *dolā-*, *ūrddhvaṣṭāna-*, *adbhṣṭāna-*, *ṣṭāla-*, and *niyāmakayaṃtra*. These are now found in the Jaipur manuscript's folio 42r, albeit with an added *cokīyaṃtra*. The difference in sequence would be resolved if folios 41v and 42r were

swapped. However, the numbering of the folios seems to be in the same hand as the text on these folios, so that a swap would have had to happen before the scribe numbered the folios.

Jaipur UIOMI 184: I.14.ii.2, folio 42r

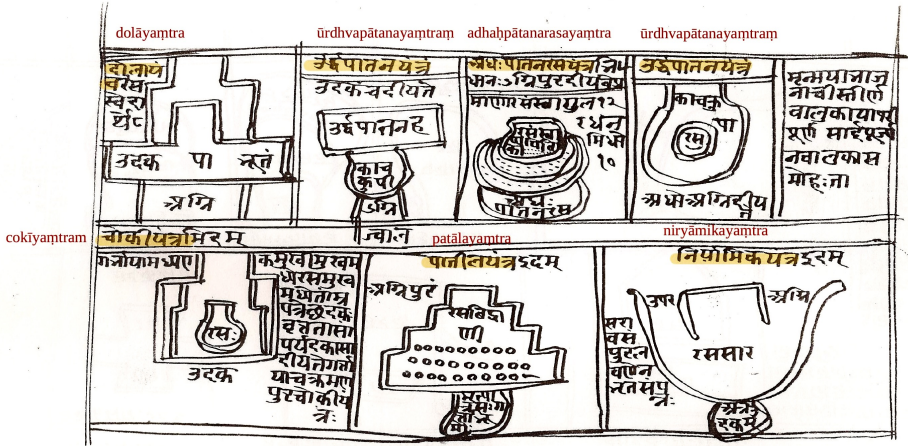


Figure 5.16: Folio 42r (Jaipur UIOMI 184: I.14.ii.2)

Here again, the execution of the illustrations is so abstract that the physical form of the depicted vessels cannot be discerned. The apparatuses can be identified through their labels, and their components are similarly communicated.

The top row (from left to right) shows an abstracted *dolāyantra*. The text to the left informs us that this is used to steam the mercury (*rasasvedārtha*), though the location of the mercury (normally in a pouch hanging from the rim of the vessel into the liquid) is not indicated. The abbreviation *pā* in the middle of the apparatus may be short for *pātra* (receptacle). This abbreviation is not used elsewhere in the images, however. Together with the *bbūtaṃ* next to it, it may mean “become a recipient,” perhaps in the sense that the mercury may drip into the vessel.

The next image is labeled an *ūrdhvapātanayantra*. This deviates somewhat from the *ūrdhvapātanayantra* of the Bombay manuscript, which shows two rimmed pots placed rim to rim, and set on top of a fire. The image on folio 42r of the Jaipur manuscript specifies that the lower vessel should be a glass container (*kācakūpi*) and notes that water should be placed on top. This is not shown in the Bombay manuscript’s illustration, but is mentioned in the text below.

To the right of this is a complicated illustration labeled *adbhāpātanarasayantra*, which, according to the accompanying text, should be placed in a firepit (*agnipita*). At a stretch, one can concede some correspondence between this apparatus and the *adbhāpātanayantra* of the Bombay manuscript, though the latter does not seem to be set in a firepit.

The next image seems to show another version of the *ūrdhvaṣṭāyantra*, though it corresponds most closely to the *vālukāyantra* on folio 20r of the Bombay manuscript. Additionally, the text next to it starts off the same as the text underneath the Bombay manuscript's depiction of the *vālukāyantra*. However, the text soon deviates from it.

The bottom row features a *cokīyantra* on the left. This seems to bear no relationship to the Bombay manuscript's *cākīyantra*, or the Ahmedabad manuscript's *kācīyantra*. The illustration in the field next to it is labeled *pātālayantra*. With this, the order of apparatuses as found in the list of devices in the Bombay manuscript is restored. However, the image does not seem to correspond to the image of the *pātālayantra* of the Bombay manuscript. There is some overlap in the labeling with the image of the *pātālayantra* in the Ahmedabad manuscript. The final image is labeled a *niryāmikāyantra*. The Bombay manuscript does not feature one, and the relevant image in the Ahmedabad manuscript does not resemble the Jaipur manuscript in the slightest. The *niyāmakāyantra* of the Bikaner manuscript (bottom left of folio 45r) is probably the closest match, but still not very similar.

Jaipur UIOMI 184: I.14.ii.2, folio 42v

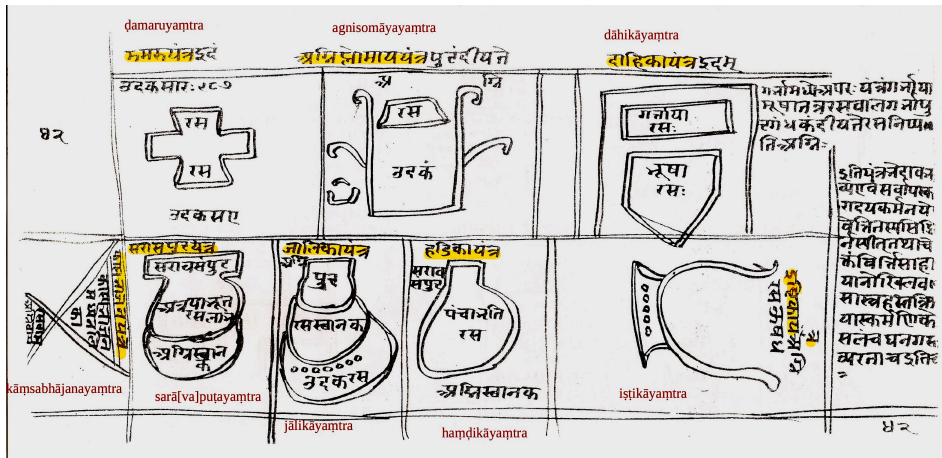


Figure 5.17: Folio 42v (Jaipur UIOMI 184: I.14.ii.2)

The final folio with illustrations continues the format of two rows of images, depicting eight different apparatuses. The top row begins with a *damaruyantra* on the left and an *agnisomāyantra*⁵³ in the middle. Since the final image on the folio before was labeled a *niryāmikāyantra*, this would seem to suggest the Bombay sequence of apparatuses is followed. After the *agnisoma* device, we would then expect a *gandhakāyantra*, a device for sulphur. Instead, we find a

53 The label reads *agnisomāyantra*, which I assume is just a misspelling.

dābikāyantra, which may be a different name for the *gandbakāyantra*. While the image for the *dābikāyantra* and its labels do not indicate the presence of sulphur, the text next to it does. Also, the other manuscript to refer to a *gandbakāyantra*, i.e., the Ahmedabad manuscript, calls it a *gandbakaḍābhikāyantra*. Its illustration is, however, very different from the one here.

The bottom row (from left to right) features a *kāṃsabhājanāyantra*, a *sarāvapuṭāyantra*⁵⁴, a *jālikāyantra*, and an *iṣṭikāyantra*. This sequence skips the *mūṣāyantra* and *haṇḍikāyantra* listed in the Bombay manuscript's apparatus list, and also omits the *gbhāyantra* and *gaḍuścakrāyantra* that follow on from the *kāṃsabhājanāyantra* of this list. The image labeled *sarāvapuṭāyantra* here would be a *sāraṇāyantra* according to the Bombay manuscript's list. Perhaps there is simply a misspelling here. This device is quite different again from the *sāraṇāyantra* depicted in the Ahmedabad manuscript (folio 25v, top right), which in any case does not give much information. The Bombay manuscript does not illustrate a *sāraṇāyantra* (or at least does not label any illustration as a *sāraṇāyantra*). The *sāraṇāyantra* in the Bikaner manuscript also does not resemble the Jaipur manuscript's rendering.⁵⁵

The next illustration depicts a *jālikāyantra*, number 25 in the Bombay manuscript's list. Again, the Jaipur manuscript's representation of this device does not correspond to the Bombay manuscript on folio 21v or the Ahmedabad manuscript on folio 25v, which are quite similar to each other. Next to it is a *haṇḍikāyantra*, which does not look much like the one shown on folio 21v of the Bombay manuscript, or the one on folio 25v of the Ahmedabad manuscript, but features the same labeling: *paṃcamṛtti(kā) rasa*.

The final illustration is labelled *iṣṭikāyantra*, a "brick device" that is not mentioned in any of the lists of apparatuses in the commentaries of the manuscripts examined here. The Bombay and the Ahmedabad manuscripts do not feature any *iṣṭikāyantra* in their illustrations and none of their images resembles the Jaipur manuscript;⁵⁶ the Bikaner manuscript, however, does. It is the last of its illustrations. Its drawing might suggest that the *iṣṭikāyantra* and *cāraṇāyantra* (which is found on the list of devices given in the commentary) may be the same device, or otherwise may be combined. This drawing does not correspond to that of the Jaipur manuscript.

Discussion

As we have seen from the above descriptions, there is a great deal of overlap, but also significant difference in how the various apparatuses are illustrated in the manuscripts, and indeed which

54 The label reads *sarāsapuṭāyantra*. I have surmised *sarāva* for *sarāsa*, because the text in the illustration below gives *sarāvāsaṃpuṭa* - two dishes placed together, forming a sphere.

55 See also Hellwig 2009: 349–351 on the different descriptions of *sāraṇāyantras* in the *Rasabhrdayāyantra*.

56 The drawing in the Jaipur manuscript is also rather different from the brick devices of the *Rasaratnasamuccaya* and *Rasapṛakāśasudhākara* described in Hellwig 2009: 169–170.

devices are represented as diagrams. We have seen that the manuscripts' illustrations do not necessarily follow the devices featured in their own commentaries' lists of devices, but instead seem to be oriented on the list found in the Bombay manuscript, or perhaps on another source with a parallel reading or parallel illustration to the Bombay manuscript. The latter hypothesis could explain the occasional differences in sequence.

Regarding the lists of apparatuses given in the commentary, it should be noted that, of the enumerated apparatuses, only four of the devices are mentioned in the *Rasendramaṅgala*'s text outside of the commentary. These are 1. *dolāyantra* (RM 1.32), 2. *adhahpātānayantra*, 3. *urdbvapātānayantra* (as *adhordhvāpātānāyantra*, RM 1.36 and *pātānayantra* in RM 3.80), and 4. *cakrayantra* (RM 3.64). Furthermore, even within the commentary, most of the listed apparatuses are referred to only once in the list, or are mentioned just once more elsewhere in the commentary. Four of the apparatuses are mentioned more often in the commentary: the *handikāyantra* is featured six times, the *vālukāyantra* four times, the *mūṣayantra* only once, while its synonym, *mūkbayantra*, is found six times. The *gaḍuścakrayantra* is mentioned only once, but a *gaḍūkayantra* five times, and a *gaḍakayantra* once. Conversely, apparatuses that are mentioned in the main text of the *Rasendramaṅgala*, such as the *śarkkara-*, *garbha-*, *ūṣma-* or *dhūmakulayantra* (see footnote 16), are not represented by illustrations.

Therefore, oddly, the illustrations show devices that do not seem directly relevant to the contents of the *Rasendramaṅgala*, or to the procedures elaborated in the commentary. That is, the devices may be what the authors of the *Rasendramaṅgala* and its commentary would have used for alchemical operations, but given the sparse information on their use, we can only speculate about this. The Bikaner manuscript is alone in offering some explanation of how the apparatuses were used within the scheme of the alchemical program, but its explanation also leaves out most of its listed apparatuses.

In those cases in which illustrations represent apparatuses mentioned in the commentary's list, we can argue that they function as a kind of commentary on the commentary, providing additional information on how the listed apparatuses were used and thus expanding the commentary. Yet, in those cases in which the illustrations do not follow the sequence of the manuscript's list of apparatuses, or show devices not mentioned in the text or commentary, the function of the illustrations is less clear. Perhaps they represent some local variations of apparatuses.

A comparison of how apparatuses are depicted creates further confusion in some cases. Apparatuses that look similar receive different labels or, conversely, those that look dissimilar are identified as the same device. (See the images of the *tulā-* (or *nalikā-*)*yantra* juxtaposed in Figure 5.11). In some cases, an explanatory text added to an image is found accompanying a different image on another manuscript.

Some of the inconsistencies may be attributable to the copyists of the manuscripts, who might not have known the apparatuses the illustrations depict. There are gaps in the labelling of the Bikaner manuscript's illustrations (for example, the device on the top left of folio 45r) that suggest someone unfamiliar with the device was copying illustrations from an older

manuscript and could not supplement information that was not legible on the manuscript they were copying.

Generally speaking, if one does not know the apparatuses and how they function beforehand, it is difficult – and in some cases impossible – to understand what the diagrams depict. Some of the illustrations, and those in the Bikaner and Jaipur manuscripts in particular, are almost extravagantly abstract, to the point that one may wonder whether the draughtsman knew the apparatus the image was based on. It is not certain whether the person who drew the line drawings was the same person who copied the text, though the lettering in the labels for the illustrations does not markedly differ from that of the main text in any of the manuscripts. I think it is fair to say that the illustrations lack artistic merit and are unlikely to have been executed by specially commissioned artists: These are fairly rough sketches that are clearly not meant to elicit aesthetic pleasure, but rather to convey technical information. However, the illustrations are only partially successful in conveying this information. In part, this is due to the nature of diagrams. Diagrams are shortcuts to information. They can show the principle of something, not just an object, but a process, and the relation of objects in space and time. However, they work best when accompanied by an explanation. Otherwise, you have to have some prior knowledge to understand what is going on in a diagram. As Baigrie puts it:

Line drawing – which is the simplest form of caricature in scientific illustration – lets the illustrator control exactly what the user sees. However, these devices are only useful for the initiated who can still see the caricature as a picture of a particular figure. The uninitiated may recognize that the picture is meant to caricature but not know what it is meant to portray. . . . Every diagram is a kind of encoding that demands a set of conventions that are shared by the illustration and the user. If the user is unfamiliar with the conventions at work, this compromises their utility.⁵⁷

The integration of symbols or text into the picture to label objects transforms the line drawing into a kind of map or plan, though again, the viewer needs to be initiated into the meaning of the symbols and the relevance of the words or technical terms to make the necessary inferences. In my opinion, the labelling of the illustrations on the examined manuscripts generally does not provide sufficient information.

It is not just the reader or viewer who may be one of the uninitiated here: As noted above, the copyists of the manuscripts may also not have been familiar with alchemical practice, and they also may not have been trained in drawing diagrams. This could lead to a kind of visual game of “Chinese whispers,” with later copies becoming less and less comprehensible. However, assuming that, at some point, the original drawings were based on someone’s expertise with alchemical practice and the depicted apparatuses, the question still remains what the

57 Baigrie 1996: XX–XXI.

illustrations' intended uses were. Were they meant to function as aide-mémoires or representations of procedural variations for those already versed in alchemical practice, or perhaps as didactic devices for students, probably accompanied by the oral explanations of a teacher? This could point to a didactic program in which a student would be given a theoretical introduction to the procedures before (or instead of?) witnessing or performing them. The same could be argued for the text as a whole, i.e., that it functions as theoretical preparation for actual practice. A practical demonstration by the teacher would seem rather more effective for teaching the subject, though perhaps prohibitive in terms of cost.

To my mind, it seems more likely that the illustrations address a knowledgeable viewer – a practicing alchemist with experience, who can parse the shorthand of the images. The *raison d'être* of the illustrations would then perhaps lie in their showing regional variations, or the original authors' preferences and usages that they wanted to share with other alchemists.

However, there is a further possibility: One might ask whether the text and its illustrations were in fact meant to inform practice at all, or whether they fulfilled a different function altogether. This is part of a larger question about the function of alchemical literature. The emergence of alchemical literature may have been part of an effort of alchemists to establish their discipline as a proper, authoritative field of knowledge, a *śāstra*, worthy of respect and study by scholars. And their early works may thus not have been formulated as manuals or textbooks, but as descriptions of an established science.⁵⁸ Indeed, the very act of producing a text on the subject – in the scholarly language of Sanskrit, no less – would have served to not only codify alchemical knowledge, but also to endow the practice with a heightened status, legitimacy, and authority.⁵⁹ In the case of the *Rasendramāṅgala* and its commentary, both text and image would aid in establishing the shastric credentials of the science, as it were.

However, the question remains at what point the inclusion of diagrams became a necessary, or at least, accepted element of conveying or representing authoritative knowledge; and whether the concept of visually representing information was widely adopted in *Śāstra* texts, or was specific to certain fields, with alchemical texts perhaps using diagrams most prominently. To answer these questions, a broader study of diagrams accompanying alchemical and other literature in South Asian manuscripts needs to be undertaken.⁶⁰ For now, we can only state

58 I base this speculation on experimentation with recreating some of the procedures described in the *Rasabhrdayatantra*, the earliest of the surviving alchemical works. Trying to follow the described procedures, it quickly became clear that the text did not supply sufficient information to follow the formulae. See <http://ayuryog.org/content/alchemy-reconstruction> for video documentaries of these recreations, and <http://ayuryog.org/blog> for accompanying commentaries on the experiments. My conclusion was therefore that this early text (and others like it) had a descriptive rather than prescriptive function.

59 See Pollock 1989: 18 on the idea of *śāstra* textuality, i.e., that the rules of a *śāstra* must be organized into a text.

60 See Bray *et al.* (2007) for a study of technical images and their relationship with written text in the production of technical knowledge in premodern Chinese treatises. A parallel study for Indic texts is a desideratum.

that illustrations were an established part of the transmission of the *Rasendramaṅgala* by the seventeenth century at the latest, and that diagrams may have been a feature of alchemical texts more broadly.

Appendix: Lists of apparatuses in the commentaries of the Bombay, Ahmedabad, Jaipur, and Bikaner manuscripts and the print edition of Āḍhamalla's commentary on *Śārṅgadbarasaṃbitā* 2.12.4cd–13ab

Bombay	Ahmedabad	Jaipur	Bikaner ⁶¹	Āḍhamalla
śilā	śilā	śilā	śilā	śilā
piṭha	gajadamtabhājana	gajadantabhājana	piṭhā	pāśāṇa
pāśāṇa	dolā	dolā	pahaka	bhūdhara
illegible	adhahpātana	adhah pātana	pāśāṇa	vaṃśanalikā
nalikā	pāna	pānatrayan (sic)	bhūdhara	gajadantabhājana
gajadamtā (...)	urddhvpātana	urdhvpātana	vaṃśanalikā	dolā
dolā	niyāmaka	niryāmaka	tulā	adhahpātana
adhahpātana	ḍamarū	ḍamaru	gajadantabhājana	ūrdhvpātana
urdhvpātana	cakratrayaṃ cāki	agniṣomāya	dolā	niyāmaka
pātāla	vālukā	cakra	adhahpātana	ḍamaruka
niyāmaka	tulā	cokī	ūrdhvpātana	kaṭāha
ḍamaruka	kaḷapa	vālukā	ūrdhvpātana	kāṃsyabhājana
tulā ?	agniṣomā	tulā	niyāmaka	pātāla
kacchapa	kāṃsabhājanam	kacchapa	ḍamaruka	tulā
cakratrayaṃ cāki	ghāṇa	kāṃsabhājana	tulā	kacchapa
vālukā	gaḍaka	ghāṇa	kascapa	cakra
agniṣomā	jalūkā	gaḍaka	cakra	cāki
gandhakako	vāraṇa	jalīkakā	cāki	vālukā
mūṣā		c(or v)āraṇa	vālukā	agnisoma
hamdikā			agniṣoma	gandhakaṭāhikā
kāṃsabhājana			gandhakāḍāhikā	mūṣā
ghāṇā			mūṣā	bāṇa
gaḍuścakra			haṇḍikā	garuḍa
sāraṇa			kāṃsyabhājana	sāraṇa
jālikā			pāśāṇa	jālikā
vāraṇa			gaḍuka	cāraṇa
			sāraṇā	
			jālikā	
			cāraṇa	

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