

TOOLS OF THE LAPIDARY ACCORDING TO THE AGASTYASAMHITĀ

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India is credited with the discovery that the diamond can be ground with its own powder.¹ Yet there are no accounts of the diamond or gem industry in India prior to the writings of the seventeenth century European travellers.² Neither the eight text on the *Ratnaparīkṣā* published by the French Indologist Louis Finot in his *Les Lapidaires Indiens*,³ nor those subsequently brought to light,⁴ deal with the art of the lapidary, namely grinding and polishing of the precious stones. The reason for this silence is not far to seek. These texts are meant primarily for the *ratna-parīkṣaka* who, after examining the qualities (*guṇa*), flaws (*doṣa*) and provenance (*ākara*) of the gems, determines their price and thus acts as a broker in the market or advises the king on the gems to be acquired for the treasury.⁵ Cutting and

* This paper, as published in *Āmbhṛṇīyam: Acharya Ramesh Chandra Shukla Felicitation Volume*, Badaun 1983, pt. 5, pp. 44-52, was fully typos. Here it is retyped and some of the references are updated.

¹ Cf. G. F. Herbert Smith, *Gemstones*, revised by F. C. Philipps, 13th edition, London 1958, pp. 155, 257. See also *Agastimata* 78 (in Finot, *Les Lapidaires Indiens*, p. 90):

abhedyam anyajātīnām loharatnādisamnidhau |
na cānyabhedasāmarthyam vajraṃ vajreṇa bhidyate ||

Kāmandakīyanūṭisāra VIII.67: *vajraṃ vajreṇa bhidyate |*

² See especially, Jean-Baptiste Tavernier, *Travels in India*, tr. V. Ball, second edition, edited by William Crooke, London 1925, ii, 44-45; John Freyer, *A New Account of East India and Persia, being Nine Years' Travels 1672-1681*, ed. William Crooke, London 1909, I, 284-285; Surendranath Sen (ed), *Indian Travels of Thevenot and Careri*, New Delhi 1946, p. 138.

³ Louis Finot, *Les Lapidaires Indiens*, Paris 1896. It contains 1. Buddhahatṭa's *Ratnaparīkṣā*; 2. Varāhamihira's *Bṛhatsamhitā* (chs. 80-83); 3. *Agastimata*; 4. *Navaratnaparīkṣā*; 5. *Agastīya Ratnaparīkṣā*; 6. *Ratnasamgraha*; 7. (*Laghu-*)*Ratnaparīkṣā* and 8. *Maṇimāhātmya*.

⁴ For a list of such works, see Gy. Wojtilla, 'Contributions to the Sanskrit Sources of the Knowledge of Precious Stones' in: *Prof. K. V. Sarma Felicitation Volume* (= *Vishveshvaranand Indological Journal*, vol. XVIII, pts. i-ii, 1980), pp. 396-402, which is by no means exhaustive. Not mentioned here are medical *Nighaṅṭus*, *āgamas*, Apabhraṃśa works on gems and so on. For the last category, see Agarchand Nahata and Bhanwarlal Nahata (ed), *Ratnaparīkṣā*, Calcutta 1963.

⁵ In Budhasvāmin's *Bṛhatkathāślokaśaraha*, XVIII.368-386, Sānudāsa exercises both these functions. It is interesting to note that the honorarium he receives for evaluating a gem is 0.1 per cent of its price (ibid., XVIII.375, 383).

polishing gems, on the other hand, is the province of artisans and was not discussed in the manual for the *ratna-parīkṣaka*.⁶

The *Agastyasamhitā* (henceforth AS)⁷ published recently from Kathmandu, differs considerably from these works. Not only is its classification of gems different from the traditional system, but it also contains valuable information on jeweller's and lapidary's art not found in other works. The edition of the AS is based on a single manuscript copied in Nepālika Saṃvat 455 (= AD 1334-35) in a place called Phaṇapīgu⁸ during the reign of Mahārāuta Jaitasiṃdeva by a Maharashtrian Pandit Dāmodara at the instance of Prince Rāuta Jīvasiṃhadeva. The manuscript was copied from another belonging to a merchant named Jayasīha Bhāroka, son of Sīhaṇyaka of Tetava.⁹

Agastya, patron saint of Tamil Nadu where he is venerated as the first teacher of science and literature,¹⁰ is traditionally regarded even in the North as a teacher of *Ratnaparīkṣā*.¹¹ It is well known that in the early centuries of the Christian era, Kaveripattinam was an important centre of maritime gem trade. We may assume that the knowledge acquired in the gem marts of this port town and also of Madurai was gradually developed in systematised into the full-fledged science of *Ratnaparīkṣā*. This assumption is strengthened

⁶ This explains why this branch of learning was more often called *Ratnaparīkṣā* rather than *Ratnaśāstra*. Thus in the *Kādambarī* (ed. M. R. Kale, fourth revised edition, Delhi 1968, p. 126), *Ratnaparīkṣā* is included among the various sciences and arts studied by the prince Candrāpīḍa. In his *Kāvyamīmāṃsā* (GOS, no. 1, third edition, Baroda 1934, p. 40), Rājaśekhara mentions *Ratnaparīkṣā*. See also the quotations in note 11 below. The expression *ratnaparīkṣā* itself seems to be an abbreviation of *Kośa-praveśya-ratnaparīkṣā* (examination of the precious stones to be acquired for the royal treasury), the title given by Kauṭilya to the eleventh section of the second book of his *Arthaśāstra*.

⁷ *Agastyaproktā Agastyasamhitā Buddhabhaṭṭaviracitā Ratnaparīkṣā ca*, ed. Buddhisāgaraśarmā and Kṛṣṇaprasāda Bhaṭṭarāi, Vīra pustakālsaya, Kathamandu VS 2020. Chapters 46 and 47 were published with a German translation in: Wilhelm Rau, *Die Brennlinse im alten Indien*, Abhandlungen der Geistes- und Sozialwissenschaftlichen Klasse, Jahrgang 1982, Nr. 6, Akademie der Wissenschaften und Literatur, Manz, Franz Steiner Verlag GMBH, Wiesbaden, 1982, pp. 12-19.

⁸ Modern Pharping, according to the editors, see AS, p. *kha*.

⁹ AS, p. 40.

¹⁰ See *Encyclopaedia of Religion and Ethics*, s. v. Agastya.

¹¹ Cf. Merutuṅga, *Prabandhacintāmaṇi*, ed. Jinavijaya Muni, Santiniketan 1933, p. 69: *adhūtāgastyabauddhamatādi-ratnaparīkṣāsamgrahaḥ*; *Thakkura Pherū's Rayanaparikkhā: A Medieval Prakrit Text on Gemmology*, translated with an Introduction, Sanskrit Chāyā and Commentary by Sreeramula Rajeswara Sarma, Aligarh 1984, *puvviṃ rayanaparikkhā saramaṃti-agattha-buddhabhaṭṭehiṃ vihiyā*; *Ratnaparīkṣāṭīkā* (an anonymous and incomplete commentary on Buddhabhaṭṭa's *Ratnaparīkṣā*), ed. Buddhisāgaraśarmā, Vīra Pustakālaya, Kathmandu, VS 2020, p. 2: *tathā ratnaśāstram agasti-brhaspatyādi-viracitam*.

by the earliest traces of this science to be found in the *Shilappadikāram* of Ilango Adigal, written about the end of the second century AD. This is the first text to mention the classification of the diamond into four castes (*varṇa*) and the technical terms for the flaws in the diamond, viz., *kākapada*, *kalaṅka*, *bindu* and *rekhā*.¹² It is probably this mass of knowledge developed in South India which came to be known as the *Ratnaparīkṣā* of Agastya's school in contradistinction to the contributions by Buddhahatṭa and Varāhamihira. Even in the later centuries, it is chiefly the southern texts which classify the diamond and other gems into four *varṇas*, whereas Varāhamihira does not recognise this division. Several apocryphal works on the *Ratnaparīkṣā* bear Agastya's name. Two such works entitled *Agastimata* and *Agastīyaratnaparīkṣā* were published by Finot. The AS is the third known work ascribed to Agastya.¹³

The colophon at the end of the text proclaims the AS as *dvādaśasāhastrī*,¹⁴ but the present edition contains just a little over 1200 verses. Since the edition is based on a single manuscript, the text is extremely corrupt and abounds in lacunae. Following the fashion of medical *saṃhitās*, the work is divided in *sthānas* which are further subdivided into *adhyāyas*. At the beginning of the work, twenty-five *sthānas* are enumerated (p. 1, lines 7-11),¹⁵ but this sequence is not maintained always in body of the work. The *adhyāyas* are not always correctly numbered and sometimes not numbered at all. Several colophons at the *adhyāyas* are wanting. Nevertheless, the total number of *adhyāyas* seem to be around fifty. While some *sthānas* are divided into many *adhyāyas*, some others are not divided at all and are designated both as *sthāna* and *adhyāya*.

¹² *Shilappadikāram (The Ankle Bracelet)* by Prince Ilango Adigal, tr. Alain Daniélou, London 1967, pp. 97-98; *Chilappadiharam (Adi Tamil Mahākāvya)* of Ilango Adigal in Hindi, tr. S. Shankar Raju Naidu and S. N. Ganesan, Madras 1979, pp. 191-192.

¹³ The *Hālasyamāhātmya* is said to be a part of the *Agastyasaṃhitā* which again is a part of the *Skandapurāṇa*. The colophon of the manuscript no. 10260, described in *A Descriptive Catalogue of the Sanskrit Manuscripts in the Tanjore Mahārāja Sarfoji's Sarasvatī Mahal Library, Tanjore*, ed. P. P. S. Sastri, vol. XV, pp. 7025-26, reads thus: *iti śrīskānde purāṇe agastyasaṃhitāyāṃ hālasyamāhātmye ratnadānakriyā nāma trayoviṃśo 'dhyāyah*. Even if this *Agastyasaṃhitā* really existed, it may not have been exclusively devoted to precious stones. Extracts from the 23rd chapter of the *Hālasyamāhātmya* are included in the *Ratnaparīkṣā*, ed. V. Gopala Iyengar, Tanjore 1969. But they have nothing in common with our AS.

¹⁴ P. 40: *ity āgastye ratnaśāstre mahāsaṃhitāyāyāṃ dvādaśasāhasryāṃ sārattattvasamuccaye kārulābhavikalpandhyāyah || samāptam agastyaratnaśāstraṃ ratnasamhitā samāptā |*

¹⁵ Henceforth, after each citation the numbers in the brackets refer to the page and lines of the AS.

The AS contains much that is mythological or ritualistic. It describes various rites to be performed when one wishes to locate a gem-bearing mine or when one desires to attain beneficent or maleficent powers through the aid of certain gems. More interesting is, however, the information regarding trade, treatment and mounting of gems. That the gem trade was regarded as the best of all trades is evident from these lines:

*vāñijyaṃ ratnajaṃ muktvā kim anyad iha śaśyate | --
alakṣmīnāśanaṃ puṇyaṃ ratnavāñijyam ucyate || (17.32-33).*

The text praises the art of the lapidary (*kāru, śilpin, vaikaṭika*) which dazzles and delights even the gods. The lapidary should be honoured with flowers and sandal paste because the divine artisan Viśvakarman is directly manifest in him. He should also be encouraged through gifts of clothes, jewellery and villages so that he may improve his skill further. This emphasis on the artisans and their techniques leads us to suppose that the AS, though attributed to the legendary Agastya, may have in fact emanated from the circle of jewellers or lapidaries rather than from the theorising *paṇḍitas*. This explains why this work, unlike the other manuals of *Ratnaparīkṣā*, contains, among other technical details, a whole section on the tools of the lapidary.

The principal tools of the lapidary are grinding disks or wheels (*śāṇa*) for grinding and polishing the gems and drills with a diamond point (*vajrāṇi*) for boring and engraving. In the forty-sixth *adhyāya* entitled *Śāṇā-vajra-vibhāgādhyāya* (32.21-33.17), which constitutes at the same time the seventeenth *sthāna* called *Śāṇābandhanasthāna*,¹⁶ the AS describes nine varieties of grinding wheels and six types of diamond-tipped tools. The first five varieties of grinding wheels are cast with a mixture of shellac (*lakṣā*) and *kuruvinda*.

Now *kuruvinda*, the *ratnaśāstrakāras* say, is a sub-variety of the ruby (*māṇikya, padmarāga*). But there is no agreement about its exact shade. While the *Bṛhatsaṃhitā* declares that it is variegated (*śabala*), has dull lustre (*manda-dyuti*) and contains mineral inclusions (*dhātubhir viddha*),¹⁷ the later writers usually attribute to it a yellowish red colour.¹⁸ The AS

¹⁶ 33.17: *iti (y) āgastye ratnaśāstre śāṇāvajravibhāgādhyāyaḥ samāptaḥ | samāptaṃ śāṇābandhanasthānam |*

¹⁷ *Bṛhatsaṃhitā* 82.2.

¹⁸ *Agastimata*, verse 209 (in Finot, op. cit., p. 111); *Navaratnaparīkṣā*, verse 109 (in Finot, op. cit., p. 159); see also Finot, op. cit., pp. xxxvii-xxxix.

(6.28-29) states that the *kuruvinda* is bright red (*ati-lohita*), of the colour of the flowers of the *Butea frondosa* (*palāśa*), or of the cochineal insect (*indragopa*), or it is variegated (*śabala*) and contains mineral inclusions (*dhātuparipūrta*).

Be that as it may, it is certain that the *kuruvinda* used in the manufacture of grinding wheels cannot be the transparent gem-quality ruby, but the opaque crystallised corundum. With a hardness of 9 on Mohs' scale, corundum is the hardest known mineral after diamond, and it is crushed and used as an abrasive.¹⁹ This substance is known as *kuraṇḍ* or *kurunḍ* in Hindi, *kuruvindamu* in Telugu and *kurandam* in Tamil. All these words are derived from the Sanskrit *kuruvinda*. The English word 'corundum' and the German 'Korund' are derived from the Tamil *kurandam*,²⁰ and must have denoted originally the opaque crystallised oxide of aluminium (Al_2O_3). Today, however, the word corundum has two connotations. In mineralogy, it is the collective name for the ruby and sapphire, both having the same chemical composition and crystal structure. In commerce the word is applied to the opaque crystals used as abrasives.²¹ Therefore, in the present context, *kuruvinda* means corundum in the commercial sense of abrasive, and this seems to be the only instance in Sanskrit where *kuruvinda* is used in this sense.

The first five types of grinding wheels described in the AS are cast with different proportions of shellac and corundum. Crushed corundum is thoroughly mixed with molten shellac, and the mixture is cooled and moulded into the shape of discs.

Let us now discuss these grinding wheels individually. (i) The first variety is called *Kharaśāṇā*, literally, 'rough grinding wheel'. This is cast with coarse grains of corundum mixed with a small quantity of shellac, presumably the minimum amount needed to bind the corundum grains together. (ii) The second variety is *Baddhaśāṇā*, made with three parts corundum and one part shellac. The text prescribes that the corundum should be first pounded

¹⁹ See Rutley's *Elements of Mineralogy*, revised by H. H. Read, 26th edition, fifth impression, London 1976, p. 320: "Corundum is, with the exception of diamond, the hardest mineral known, and is used as an abrasive. Grinding 'wheels' are made by incorporation of binding material, such as shellac, with crushed corundum." Similar wheels are made in Persia also, see Hans E. Wulff, *The Traditional Crafts of Persia, Their Development, Technology, and Influence on Eastern and Western Civilizations*, Cambridge, Mass, etc., 1966, pp. 37-40.

²⁰ Henry Yule and . C. Burnell, *Hobson-Jobson*, Delhi 1968, p. 259, s.v., Corundum.

²¹ Cf. G. F. Herbert Smith, *Gemstones*, op. cit., p. 289.

into fine grains and then strained through a cloth. (iii) The third, designated as *Kiṇaśāṇā*, is fashioned with equal parts of corundum powder and shellac. This wheel is stated to be *kiṇānāṃ sarvaśodhinī*, ‘one that removes all the granules from the surface of the gem. (iv) The fourth variety, styled *Spr̥ṣṭaśāṇā*, is made with three parts shellac and two parts corundum. This is used for making the gem very smooth (*suślakṣṇa*). (v) The fifth variety is *Malaśāṇā*, cast with a mixture where shellac constitutes one-third of the whole, that is to say, two parts corundum and one part shellac. This is described as *malāpahāriṇī*, ‘remover of the impurities’ on the surface of the gem.

This sequence does not quite follow the proportion of corundum in the mixture. The correct sequence in the descending order of the hardness is given below.

| | |
|--------------------|---|
| <i>Kharaśāṇā</i> | corundum + small quantity of shellac (obviously less than ¼ of the mixture) |
| <i>Baddhaśāṇā</i> | corundum : shellac = 3:1 |
| <i>Malaśāṇā</i> | corundum : shellac = 2:1 |
| <i>Kiṇaśāṇā</i> | corundum : shellac = 1:1 |
| <i>Spr̥ṣṭaśāṇā</i> | corundum : shellac = 2:3. |

From this it may be assumed that the *Kharaśāṇā* and *Baddhaśāṇā* were employed in cutting hard and soft gemstones respectively. It is not clear what types of impurities the *Malaśāṇā* is supposed to remove. Perhaps with this wheel one ground away the defective parts of the gemstone. The *Kiṇaśāṇā* was meant for the next stage of the operation, namely removing the pits, scratches and wheel-marks from the surface of the stone. This stage is called ‘sanding’ in modern parlance. The *Spr̥ṣṭaśāṇā* is used for making the stone smooth, i.e., pre-final polish.

The remaining four varieties of wheels are meant for polishing different species of gemstones. (vi) *Kāṣṭhaśāṇā*, made of the timber of the *Salmalia Malabarica* (*śālmālī*), is employed in *ślakṣṇatāvidhi*, in giving the pre-final polish. (vii) The next one, called *Mṛcchāṇā*, is cast by cooking shellac with the ashes of *Schrebera swietenoides* (*mokṣaka*) and of other trees and mixing this with an equal quantity of black earth (*kṛṣṇamṛd*). (viii) *Tāmraśāṇā* is a copper wheel coated with burnt *gāra*.²² This copper wheel is employed for

²² Rajroop Tank, the author of the *Indian Gemmology*, informs me that in the jewellers’ parlance at Jaipur, *gāra* denotes the dust arising from the gems when they are cut and also from the grinding wheel. This dust is collected

polishing harder gems, especially the ruby. (ix) The last one called *Dīptiśāṇā*. It is made with the timber of the *Calatropis gigantea* (*ravikāṣṭha*) and its surface is coated with the ashes of cow dung. As the name implies, this wheel makes the gem shine, i.e., it gives the final polish.

The text is silent on the mechanism for rotating these nine types of grinding and polishing wheels. It is, however, conceivable that they were fixed, as is done today, to a spindle that ran between two upright posts, and were rotated by means of a bow-like contraption. It is also likely that the cutting bench was so constructed that the wheels can be interchanged as the occasion demanded. According to the hardness of the gem, appropriate wheels were used for cutting and polishing. The final polish was given to hard stones on the copper wheel and to the softer stones on the wheel made of the timber of the *Calatropis gigantea*.²³ It is, however, intriguing that lubrication with water is prescribed only in the case of the *Kaṣṭhaśāṇā*, although all types of grinding wheels require this treatment in order to keep them cool and also to wash off the gem-dust from the cutting edge.²⁴

In addition to these wheels, the AS describes one more apparatus for grinding which is called *Droṇikā*. It is a wooden mortar, the inner surface of which is coated with a layer of mud to which corundum powder is applied. Gems can be ground in this mortar and the depression of the mortar is well suited for cutting gems *en cabochon*.

The second set of tools is styled *vajrāṇi*, because here the diamond is used as the abrasive. (i) The first tool with the name *Vajracakra* is manufactured in the following manner. To the end of a lathe some straight pieces of diamond are attached so as to form a wheel. He text says that this tool is employed in the process of joining gems (*māṇi-yojana-karmaṇi*); one would rather expect the opposite, namely in sawing the gemstones (*maṇi-bhedana*^o or *maṇi-chedana-karmaṇi*). (ii) The second tool is styled *Vedhacakra*. Here a solid piece of diamond

and used as polishing powder. In the *Ardhakathanak*, composed by Banārasī Dās in 1641 at Agra, such dust is called *cunī*, cf. *Ardhakathanak: A Half Story*, translated from the Bhaj Bhasha by Rohini Chowdhury, Penguin Books, 2009, stanzas 76, 283 etc.

²³ Cf. Rajroop Tank, *Indian Gemmology*, Jaipur, n.d., p. 130. Mr Tank tells me that copper wheels are used for polishing stones with facets and the wooden wheels for those cut *en cabochon*. The AS, unfortunately, does not throw any light on the types of cut.

²⁴ Today power-driven machinery is fast replacing these grinding wheels. But Mr Rajroop Tank confirms that such series grinding wheels used to be manufactured in Jaipur until recent times. On a visit to Taj Mahal, I noticed artisans using a bow-driven grinding wheel to cut and polish agates for repairing the *pietra dura*.

(*ghana-vajra*) is cemented to the tip of a metal rod (*śalākā*) and this tool is used for boring holes into the gems. Since this is a boring drill with a diamond point and not a wheel or wheel-like contraption, the text should be emended to read *vedha-vajra* instead of *vedha-cakra*. This is the same instrument which Kālidāsa refers to as *vajra* in his famous line *maṇau vajrasamutkīrṇe sūtraisyaiiva me gatiḥ*.²⁵ (iii) The third variety is designated as *Sūcivajra*. Here a diamond of a large volume with a needle-sharp tip is attached to the drill. This is meant for carving different shapes. (iv) The next tool is called *Lekhavajra*. In this tool a diamond is affixed to the tip of the drill in a such way that the sharp point of the diamond is at right angles to the rod of the drill. This tool is employed in engraving. (v) The fifth is called merely *Chedana*, ‘cutting’. Here a diamond with a notched cutting edge is attached to the drill; presumably this one is employed in sawing gemstones. (vi) The text is corrupt and obscure as regards the last tool named *Upamāṛjana*^o or *Māṛjana-vajra*. Apparently a diamond with a smooth surface is affixed to the drill and this is used for polishing diamonds. Like the grinding wheel, these drills also must have been rotated by the bow-like contraptions, but it is not known whether these drills were operated vertically or horizontally.²⁶

The AS does not specify the functions of these different types of grinding wheels and drills or gems for which these types are to be used, but merely states *yo yatra yujyate yuktyā taṃ tatra viniyojat*, ‘whichever [tool] is suitable for a certain task, it should be used there’ (33.15)

In the forty-seventh chapter entitled *Nānā-bhāṇḍa-parigraha* (33.18-24), there is an enumeration of the entire range of tools and materials required by the lapidary: lathes (*bhrama*), grinding wheels (*śāṇā*), drills (*vajrāṇi*), shellac (*lakṣā*), beeswax (*sikthaka*), water-tub (*jaladroṇī*), bowl (*kuṇḍa*); burnt *gāra*, [a plate ?] with depressions (*sakūpaka*), timber from *Euphorbia antiqourum* (*snuhi*), *Capatropis gigantea* (*arka*) and *Crataeva Roxburghii* (*varuṇa*), coarse stones, corundum powder (*kuruvinda*), pastes of polishing powder (*vaṭikā*), wedges (*kaṇṭka*), pincers (*saṃdamśa*), blades (*chedinī*) different shapes, steel saws, saws impregnated with corundum powder, a flat copper pan (*tāmrapaṭṭakataḥī*); alkalis (*kṣāra*), acids (*āmla*) and

²⁵ *Raghuvamśa* 1.4; commenting on this verse, Mallinātha explains the term *vajra* as *maṇi-vedhaka-sūci-viśeṣa*.

²⁶ A horizontal drill is illustrated in in a Mughal miniature, reproduced in Ahsan Jan Qaiser, *The Indian Response to European Technology and Culture (A. D. 1498-1707)*, Delhi 1982, plate 3cb.

salts (*lavāna*); primary and secondary minerals (*rasoparasa*) and metals (*metals*); red, yellow, blue and mixed vegetable colours; and diverse apparatuses (*yantra*).

From the time coloured stones were used as ornaments (*ratna*) or magical amulets (*maṇi*), attempts must have been made to give some shape and polish to them by grinding them against harder substances. However, casting a series of grinding wheels with a mixture of corundum and shellac marks a great progress in technology. At the present state of knowledge, we do not know when these innovations were made. The earliest reference to this technique can be seen here in the AS. Unfortunately, it is difficult to determine the date or the provenance of this text. With the exception of Buddhabhaṭṭa's *Ratnaparīkṣā*, the gemmological section of Varāhamihira's *Bṛhatsaṃhitā* and the *Agastimata*, the later texts do not lay stress on originality and frequently borrow passages verbatim from other texts.²⁷ In the course of a cursory examination, I have not been able to detect any passage in the AS that may have been borrowed from the other known sources, nor have I seen any passage of the AS incorporated in other texts of this genre. Therefore, all that is certain at the moment is that the *terminus ante quem* for our text is AD 1334-35 when the only extant manuscript was copied by Dāmodara or at best some decades earlier when the manuscript of the merchant Jayasīha Bhāroka may have been written — in other words, the end of the thirteenth century. Even so, the variety of tools described in this text is remarkable in that it testifies to a well-developed gem industry. We should hope that more manuscripts copies of this unique text may be found so that a reasonably correct edition can be prepared.

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²⁷ Thus, for instance, the *Garuḍapurāṇa* incorporates the entire *Ratnaparīkṣā* of Buddhabhaṭṭa, after removing the all the Buddhist traces from the text. A certain Nārāyaṇa Paṇḍita adds 35 verses (of his own ?) to *Mānasollāsa* II.4.402-536 and incorporates these under the title *Navaratnaparīkṣā* in his *Smṛtisāroddhāra*. The *Ratnayukti* section of the *Yuktikalpataru* borrows generously from the *Agnipurāṇa*, *Garuḍapurāṇa*, *Navaratnaparīkṣā* and a fourth unidentified source which is closer to the *Agastimata*; cf. Sreeramula Rajeswara Sarma, 'The Sources and Authorship of the Yuktikalpataru,' *Aligarh Journal of Oriental Studies*, 3.1 (1986) 39-54.

Buddhabhaṭṭa's *Ratnaparīkṣā*), ed. Buddhisāgaraśarmā, Vīra Pustakālaya, Kathmandu, vs 2020. During a visit to Jaipur 1982, I had an opportunity to discuss the tools mentioned in the *Agastyaśaṃhitā* with Mr Rajroopp Tank, the well-known gem trader and the author of the *Indian Gemmology*; this discussion was helpful in improving the paper.