Drāviḍa Temples in the *Samarāṅgaṇasūtradhāra*

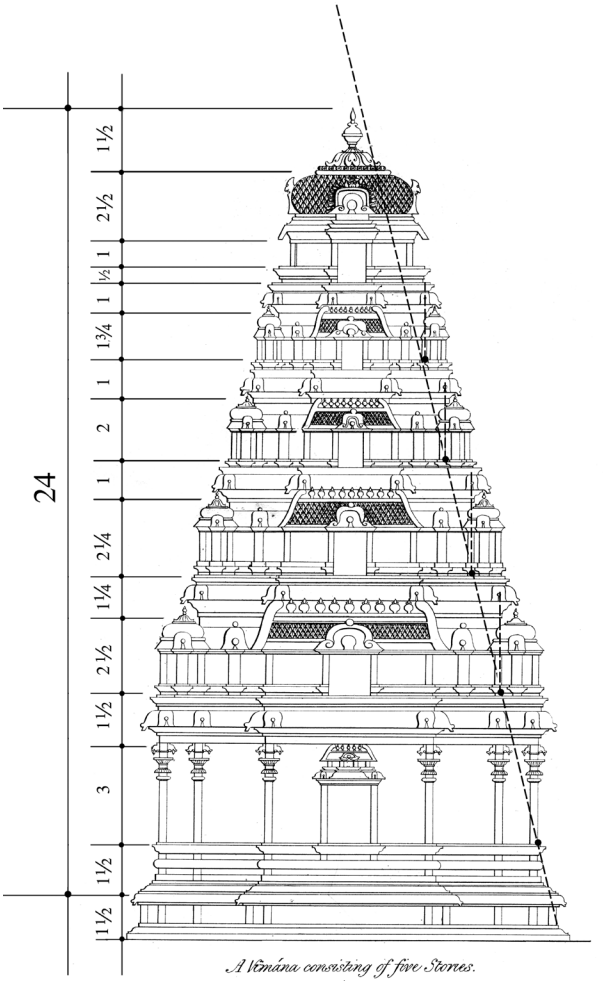
Adam Hardy

The relationship to actual practice of the *vastuśāstra*s (or *vāstuśāstra*s) and *śilpaśāstra*s, the canonical Indian texts on architecture and sculpture, is a complex one. Scholarly attitudes to these texts range between an uncritical assumption that, traditionally, these texts set the rules for making buildings and sculptures, thereby holding the key to understanding them, and complete denial of their utility, on the basis that they were probably composed by Brahmans who were cut off from practical experience. The truth must lie somewhere in between. To establish the extent to which any particular text may have been useful for creating architecture, it must be shown whether it *can* be used for this purpose – if not by actually building, at least by drawing. This, surely, should be a prerequisite for any sensible discussion of the nature of these texts.

Surprisingly, the one sustained attempt to illustrate a *vastuśāstra* is that of Ram Raz, whose 1834 essay is the first work of modern scholarship on Hindu temples.[1] On the basis of a fragment of the south Indian *Mānasāra*, Ram Raz was assisted by a contemporary practitioner in interpreting its prescriptions through lucid drawings, done in a florid latter-day Drāviḍa style (Figure 1). Successors to this enterprise are extremely rare.[2]

This article is an attempt to interpret one *vastu* text through drawing, and in so doing to reach some conclusions about its usability. It is a first fruit of a collaborative study of the *Samarāṅgaṇasūtradhāra* by Mattia Salvini and me. Salvini has transliterated the chapters on temple architecture and translated them from the Sanskrit,[3] and we have begun to refine the translation through discussion. Our eventual aim is to produce a critical, annotated, and illustrated translation of these chapters.

A large proportion of the text consists of technical terms, which must always have rendered it meaningless to anyone unable to visualise what is being conveyed. Access to this vocabulary would be impossible if scholarship in the past two centuries had not unearthed much of its meaning, especially in the last fifty years, and particularly through the work of M.A. Dhaky encapsulated in the *Encyclopaedia of Indian Temple Architecture* (*EITA*) produced by the American Institute of Indian Studies.[4] While it is widely understood that regional traditions employed different terminologies, a relatively standardised vocabulary has become accessible to students of Indian temple architecture. This provides indispensable points of reference from which



1. 'Vimána consisting of five Stories', from Ram Raz, Essay on the Architecture of the Hindus (1834), Plate XXXII, with alignment and prescribed proportions added.

2. Fragment at Ujjain (Madhya Pradesh), showing a 'Drāviḍa' compostion of the Paramāra period, crowned by a drāviḍakarma kūṭa (photo by Michael Willis).

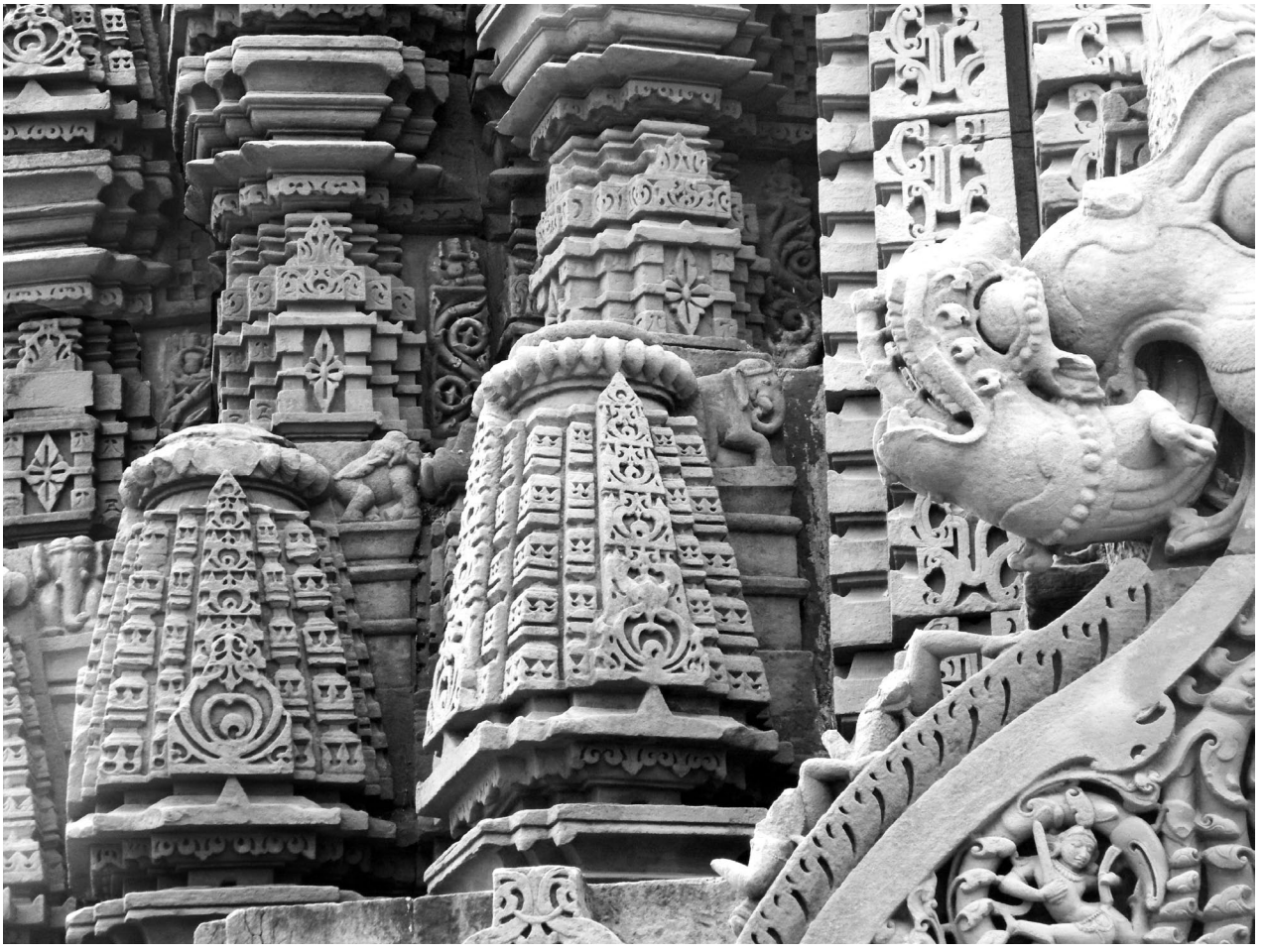
to solve the puzzles posed by the *Samarāṅgaṇa*. But between these footholds, the text wanders widely from the modern academic norms. Moreover, the term for a given element may vary not only from chapter to chapter, but almost from verse to verse, often giving the impression that elegant linguistic variation is more important than precision, that from time to the reader is treated to riddles, and above all that meanings are conveyed as much by the contexts of words as by the actual words used. It is only by grasping the relationships between the architectural elements denoted that a coherent picture of the intended temple can be imagined, and this involves knowing and keeping in mind the possible temple styles and compositions, and recognising when the words fit a particular pattern.

Once the parts and their organisation are identified, the main challenge is to understand the measurements and proportions prescribed. Measurements, when given, are generally in *hasta*s (cubits) and *aṅgula*s (digits or inches). On the whole the text is concerned with relative measure, not absolute measure, and the units concerned are *bhāga*s, *pada*s, and *aṁśa*s. Everything becomes simpler when it is realised that most of the time these terms are interchangeable, and are varied just to avoid verbal monotony. A given width or height is divided into so many *bhāga*s or *pada*s, and a number or fraction of these is then ascribed to its various sections. *Bhāga*, *pada*, and *aṁśa*, therefore generally signify a part or a module. '*Stara*' implies a layer, and this too, where vertical divisions are concerned, is often used synonymously with the other terms.[5]

The Drāviḍa chapters and their source

The *Samarāṅgaṇa* traces its authority to the divine architect Viśvakarman, while proclaiming at the end of every chapter that its author is the King of Great Kings, Supreme Lord, Glorious Bhojadeva. This is taken to be the famous Paramāra king Bhoja of Dhar, who ruled *c.* AD 1010-55, and this period indeed accords with the kinds of temple architecture that are covered. Several chapters (55-57) deal with Nāgara temples, comprising both the basic Latina mode and the now established composite, multi-spired Śekharī or Anekāṇḍaka; although these useful terms, gaining acceptance in modern scholarship, are not used. These Nāgara chapters, which clearly refer to architecture from the broad stylistic zone of central and western India, cover similar ground, each with its own nomenclature for temple types, so that a name such as 'Kailāsa', for example, is assigned to different temple forms in different chapters. One chapter (65) is concerned with Bhūmija temples, another composite mode, which appears in the eleventh century in the Paramāra realm of Malwa and in surrounding regions. On formal grounds Bhūmija temples can be categorised as a variety of Nāgara, though the *Samarāṅgaṇa* treats them as separate. Chapters 61 and 62, devoted to the Drāviḍa temples of south India, are the focus of this article. The two chapters clearly belong together as a coherent section that has been rather artificially split. Although this is not the place to argue the point in detail, the *Samarāṅgaṇasūtradhāra* gives the overwhelming impression that, even if it was for Bhoja that it was compiled, it is a patchwork of architectural texts deriving from different traditions.

The question therefore arises as to the provenance of the Drāviḍa chapters, and what conception of Drāviḍa they have in mind. An obvious surmise would be that they see the Drāviḍa through the eyes of architects from eleventh-century Malwa. The Bhūmija chapter of the *Samarāṅgaṇa* shows an explicit awareness of the Drāviḍa which is entirely borne out by actual Bhūmija temples. The text mentions the *drāviḍakarma kūṭa* (Figure 2), a version of the Drāviḍa domed pavilion (*kūṭa*). The numerous spirelets in a Bhūmija superstructure (Figure 3), at first sight resembling miniature Latina towers, in fact are often composed of these *drāviḍakarma* aedicules, with their curvaceous leafy necklaces that are mutations of the *makara* monsters of the southern floor-with-joist-ends moulding (*prati, vyālamāla*).



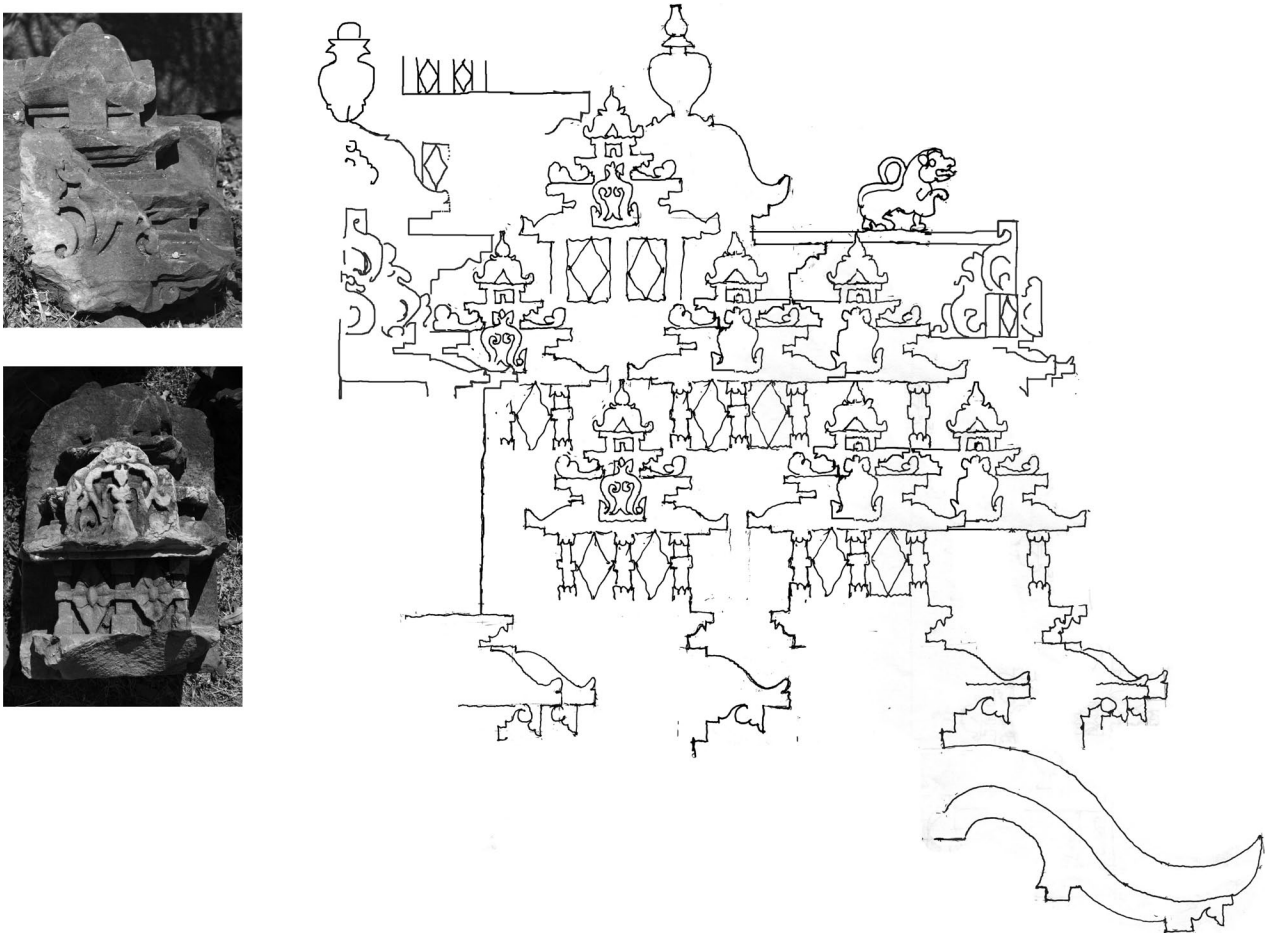
3. Small śikharas in the tower of a Bhūmija temple, composed of miniature drāviḍakarma kūṭas, the Drāviḍa domed pavilion as conceived by the masons of Malwa under the Paramāras. Udayeśvara Temple, Udayapur (Madhya Pradesh), c. 1058-80 (photo by SPA Bhopal).

Temple (no. of storeys)	***Width prescribed*** *in hasta (cubits)*	***Width x √2***	***Height prescribed*** *in hasta (cubits)*	***Sum of ascending stages***
1	5, 2" (5.08)	7.18	7	7
2	7	9.89	(10)	9½
3	11	15.556	15	14,4"+x
4	15	21.21	21¼	21¼
5	21	29.69	29¾	29¼
6	30	42.42	41	41¼
7	35	49.49	(49½)	41½
8	40	56.56	57-3 *aṁśas*	57
9	51	72.12	72	-
10	56	79.196	79¼	79¼
11	65	91.92	92	91½
12	67	94.75	95	95

Table 1: showing how the height of each type of temple is prescribed as the width x √2

	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t 12	Σ=
1	ś1½ rest: 3½ a2												7
2	p1 j2½ a2	ś1½ g(1½) j1											9½
3	p1 j3 a2	p1 j2½	ś2,4” g1+x p1 j2										14,4” +x
4	p1½ j3 a2	p1¼ j2¾	p1 j2½	ś3 g1 p1 j2¼									21¼
5	p1½ j3 a2½	p1½ j3	p1½ j2¾	p1½ j2½	ś4 g2 p1½ j2								29¼
6	p1½ j4½ a2½	p1½ j4	p1½ j4	p1½ j3½	p1½ j3	ś 5 g3 p1½ j2¾							41¼
7	p1½ j4 a3	p1½ j3½ v1½	p1½ j3½ v1¼	p1¼ j2 v1	p1¼ j1¾ v1	ś5½ g3 p1 j1½ v1	-						41½
8	9½	8½	8	7	6	5	4	ś4 g2 t3					57
9	-	-	8	7¾	(7¼)	5¾	5¼	4½	ś5 g2½ t3½				-
10	11	10½	10	8½	7½	7	6	5	4	ś4½ g2¼ t3			79¼
11	14	12½	11	9½	8¼	7	6	5	4	4	ś4½ g2¼ t3½		91½
12	14	11	10½	10	8½	7½	7	6	5	4	3	ś4 g2 t2½	95

Table 2: Left hand column indicates number of storyes (talas, bhūmīs) in the temple, top band indicates the storey concerned (t1 = first *tala*, and so on), right hand column indicates the sum of the storey heights; *ś = śikhara (dome, here termed ghaṇṭā)*, p = *prastāra* (entablature, here termed *kūṭaprastāra*), v = *vedī*, j = *jaṅghā* (‘thigh’, wall, shaft), a = *adhiṣṭhāna* (base, here termed *pīṭha*).



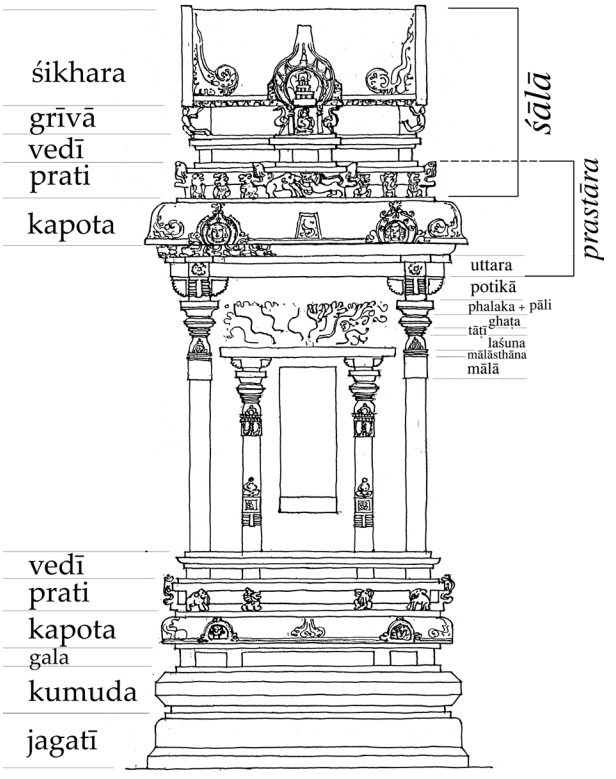
4. Left: fragments of kūṭas at Bhojpur (Madhya Pradesh). Right: nearby line drawing engraved on rocks, depicting a maṇḍapa roof composed of the same kind of kūṭas (author's sketch on site, as the basis for a measured drawing).

Level/storey (*tala*)	Prescribed height	Remaining height (RH) from bottom of level to top of temple	Width of level = RH/√2
5th *tala*	3.50	10.00	7.07
4th *tala*	4.00	14.00	9.89
3th *tala*	4.25	18.25	12.90
2th *tala*	4.50	22.75	16.08
1st *tala*	4.50	27.25	19.26
Base	2.50	29.75	21.03

Table 3: Calculation of widths of upper storeys (courtesy of Bruno Dagens)

At Bhojpur, site of the unfinished Drāviḍa mega-temple attributed to the same Bhoja as supposedly wrote the *Samarāṅgaṇa*, two of the engraved line drawings on the surrounding rocks (which we have been documenting in parallel with the present textual study) depict a form of *maṇḍapa* found nowhere else (Figure 4, right). The roof is not the tiered Phāṁsanā kind familiar at Khajuraho, for example, and also present among the Bhojpur line drawings, nor the Saṁvāraṇa type with multiple bell-topped pavilions, which arrived in this region from western India during the eleventh century. Instead, this type of *maṇḍapa* roof is composed of a peculiar form of miniature Drāviḍa or *drāviḍakarma* pavilion. That at least one hall of this variety had been started at Bhojpur, if not completed, is attested by the survival of small carved stone *kūṭa*s of exactly the kind shown in the drawings (Figure 4, left).

5. The Siddheśvara temple, Haveri (Karnataka), c. 1060s; a late Karṇāṭa Drāviḍa vimāna (photo by author).

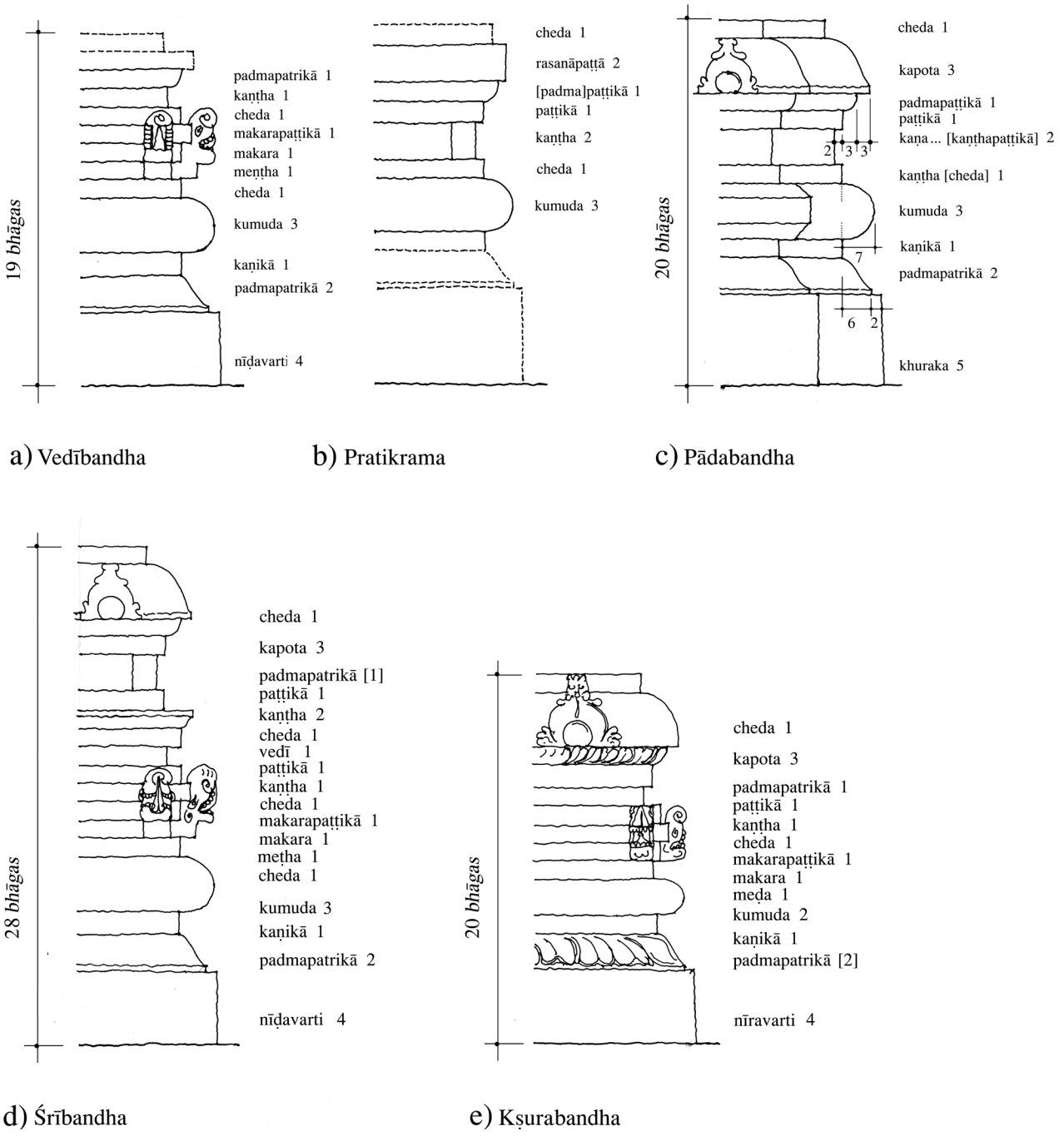


6. A śālā aedicule (shrine image crowned by a barrel-roofed pavilion, or śālā) from the Saṅgameśvara temple, Pattadakal (Karnataka), c. 730. While this element takes up one tier or conceptual storey (tala, bhūmi) of the temple, it contains two conceptual storeys within itself, the upper prati marking the floor of the śālā.

Various aspects of the *Samarāṅgaṇa*'s version of the Drāviḍa corroborate the suggestion that the text is written from a more northern perspective. Plan forms and, seemingly, dome forms are all based on a square, with no mention of the rectangular, apsidal, circular, and elliptical variants usual in the far south. Compared with Tamil proportions, *kūṭas* are generally squat and the *laśuna* section of pilasters is too short to accommodate the elegant, vase-like shape that it follows, for example, in Coḷa temples. Even without detailed linguistic analysis, it is clear that several of its basic terms are northern: a shrine is a *prāsāda* rather than a *vimāna*, a storey a *bhūmi* rather than a *tala*, the shaft of a pilaster a *jaṅghā* not a *pada*, a moulded base a *pīṭha* not an *adhiṣṭhāna*, the dome of a *kūṭa* a *ghaṇṭā* (bell) not a *śikhara*.

Yet nothing in the domains where the Bhūmija held sway can compare with the range and complexity of the Drāviḍa architecture described in the text, at least until one reaches Karnataka and Andhra in the lower Deccan, where both the Drāviḍa and the Bhūmija were well known. So it would seem very plausible that the Drāviḍa of the *Samarāṅgaṇa* should be the later Karṇāṭa Drāviḍa, geographically and stylistically much closer than the Tamil country to the Paramāra orbit. However, the eleventh century Karṇāṭa Drāviḍa (commonly identified as 'Vesara') is unmistakable on account of its staggered plan forms and interpenetrating compositional elements (Figure 5), which find no reflection in the text.

Despite all the northward-pointing clues, the *Samarāṅgaṇa* prescribes a diversity of forms of moulded base found only in the Tamil tradition and its derivatives. Within the range of its plan forms, pride of place is given to unstaggered, five-projection plans, with the option of an internal ambulatory; in the eleventh century this points to the grand monuments of the later Coḷas (Figure 10). So, too, does the range of elevations from one to twelve conceptual storeys. Karṇāṭa Drāviḍa temples are virtually never above four storeys; more than four is rare in Tamilnadu, though there are notable eleventh- to twelfth-century exceptions at Darasuram (five), Tribhuvanam (six), Gangaikondacolapuram (eight), and Tanjavur (fourteen).[6] The theoretical range from one to twelve is also that of the *Mayamata*, a south Indian *vastuśāstra* datable to before the end of the tenth century.[7] These aspects fix the origin of the *Samarāṅgaṇasūtradhāra*'s Drāviḍa temples definitively

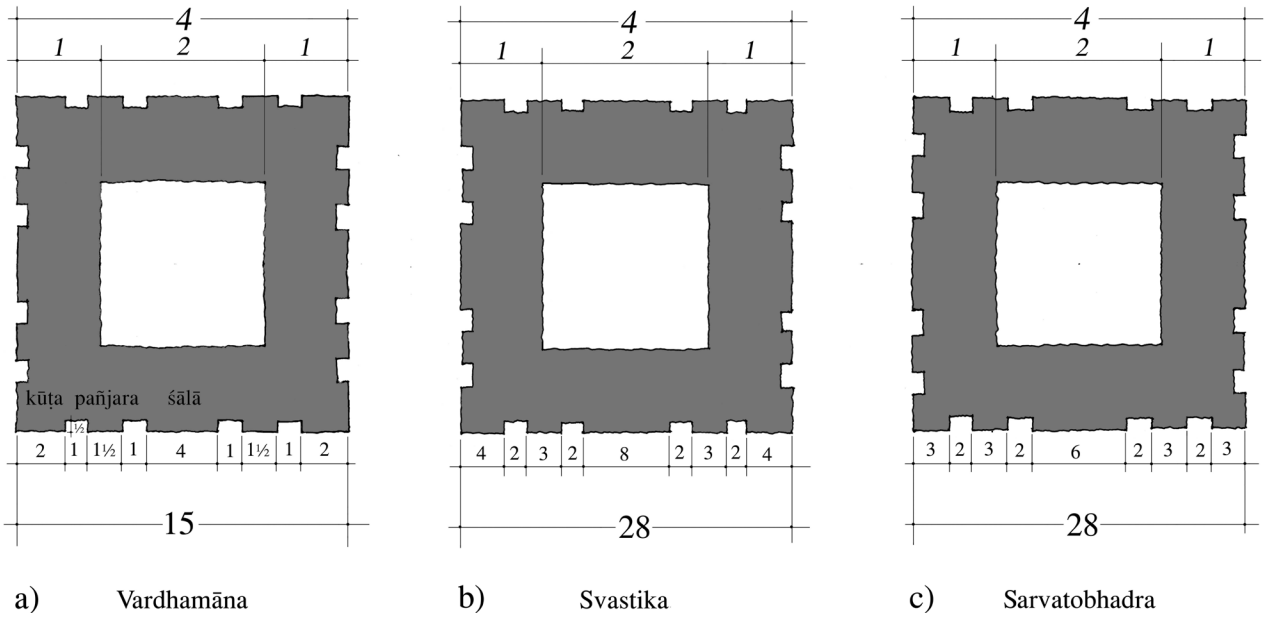


7. The five pīṭhas of the Samarāṅgaṇa

in the far south, even if the text has undergone changes through its northward transmission.

Moulded bases

Chapter 61, entitled 'The Defining Traits of the Five *Pīṭhas*' (*pīṭhapañcakalakṣaṇa*), deals with *pīṭhas* or moulded bases before continuing on to temple plans. If we compare the names for *pīṭhas* in the *Samarāṅgaṇa* with those of the *Mayamata* and with those selected by the *EITA* (which does not name its source), we find names in common, but mostly denoting different types of base. All three follow a procedure typical of southern *vastu* texts, enumerating every little sub-moulding, which makes it more difficult to grasp the principal divisions or mouldings. The latter generally correspond to the courses of masonry. Figure 6 is included



8. Plans

to clarify these divisions, using terms acceptable to modern scholarship but only partly true to the *Samarāṅgaṇa*. On the same basis it also shows the sequence of smaller scale mouldings in the pilasters.

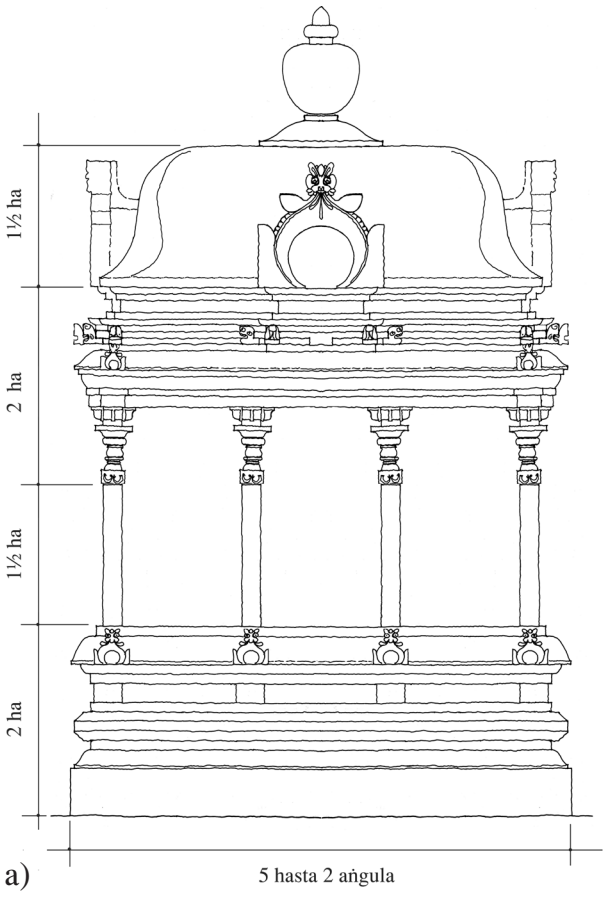
The five *pīṭha*s of the *Samarāṅgaṇa* are the *Pādabandha* (or *Pādabandhana*), *Śrībandha*, *Vedībandha* (or *Vedībandhana*), *Pratikrama,* and *Kṣurabandha* (or *Kṣurakabandhana*). The *Pādabandha* (Chapter 61, verses 5-13) is transcribed in Figure 7a. This is an extremely widespread type wherever Drāviḍa architecture is found, both in the far south and in the Deccan. It consists of foot moulding (*jagatī*), cushion moulding (*kumuda*, most commonly round or faceted), recess or miniature gallery (*gala*), and eave moulding with dormer windows (*kapota*) – equivalent to the basic Nāgara sequence of *kumbha-khura*, *kalaśa*, *antarapaṭṭa*, *kapotālī*. For this first type of base the text specifies, in *aṅgula*s, the *praveśa*, the relative projection and setting back of the mouldings. Here it seems to be laying out the general principles for all the types.

What remains of the discussion of the *Pratikrama* (Chapter 61, verses 22-25) is a fragment, probably belonging to a description of the kind of base shown in Figure 7b (missing parts dotted). Incidentally, this corresponds to the type called *Pādabandha* in the *Mayamata*, followed in this one case by the *EITA*. This is like the *Samarāṅgaṇa*'s *Pādabandha*, but with a wide *paṭṭikā* (fillet) instead of the *kapota*. The passage in the *Samarāṅgaṇa* concerning the *Vedībandha* (Chapter 61, verses 19-22) is cut short by the insertion of the *Pratikrama* fragment, but is complete enough for Figure 7c to be inferred with confidence.

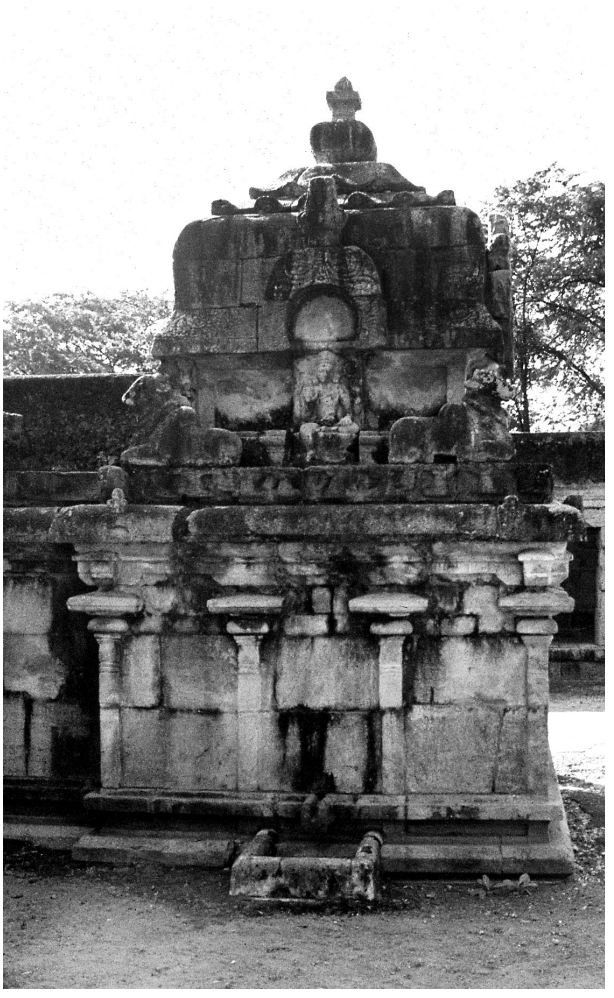
Descriptions of the remaining types, the *Śrībandha* and *Kṣurabandha*, are intact, but they contain a surprising anomaly: the mouldings are in the wrong order. The *Śrībandha* (Figure 7d) has the full complement of standard mouldings, the ones shown in Figure 6, including the floor moulding (*prati*) – the cluster dominated here by the *makara*, and the rail moulding (*vedī*). In the *Kṣurabandha* (Figure 7e), only the *vedī* is absent. The full sequence, as in Figure 6, *and in that order*, is not uncommon in the far south, and in the Deccan, from the eighth century onwards, becomes the norm for all but humble shrines. But never does one find, as one does here, the *kapota* above the *prati* and the *vedī*: the conceptual floor needs to be above the miniature roof of the base, while the railing runs around the edge of the floor platform. Only an inveterate text fetishist would argue that the *Samarāṅgaṇa* must be right and all the temples wrong. Clearly some verses have got out of order. Since the verse runs smoothly, the creases must have been ironed out by a sensitive scribe.[8]

Plans

Following the five *pīṭha*s, the text deals with the five kinds of plan (*talacchanda*, 'plan rhythm' or literally, 'metre'): *Padma*, *Mahāpadma*, *Vardhamāna*, *Svastika*, *Sarvatobhadra*. The first two, which I have not yet worked out fully, seem to be an interpolation from a more northerly tradition: they are different in character and treatment from the others, involving the swinging of chords in their construction. We are given no simple square plan, which is needed for the one-storey temple described later: the *Padma* is square with three projections, the *Mahāpadma* apparently a star with eight points and sharp reentrant projections 'like a pig's face' (Chapter 61, verse 43).

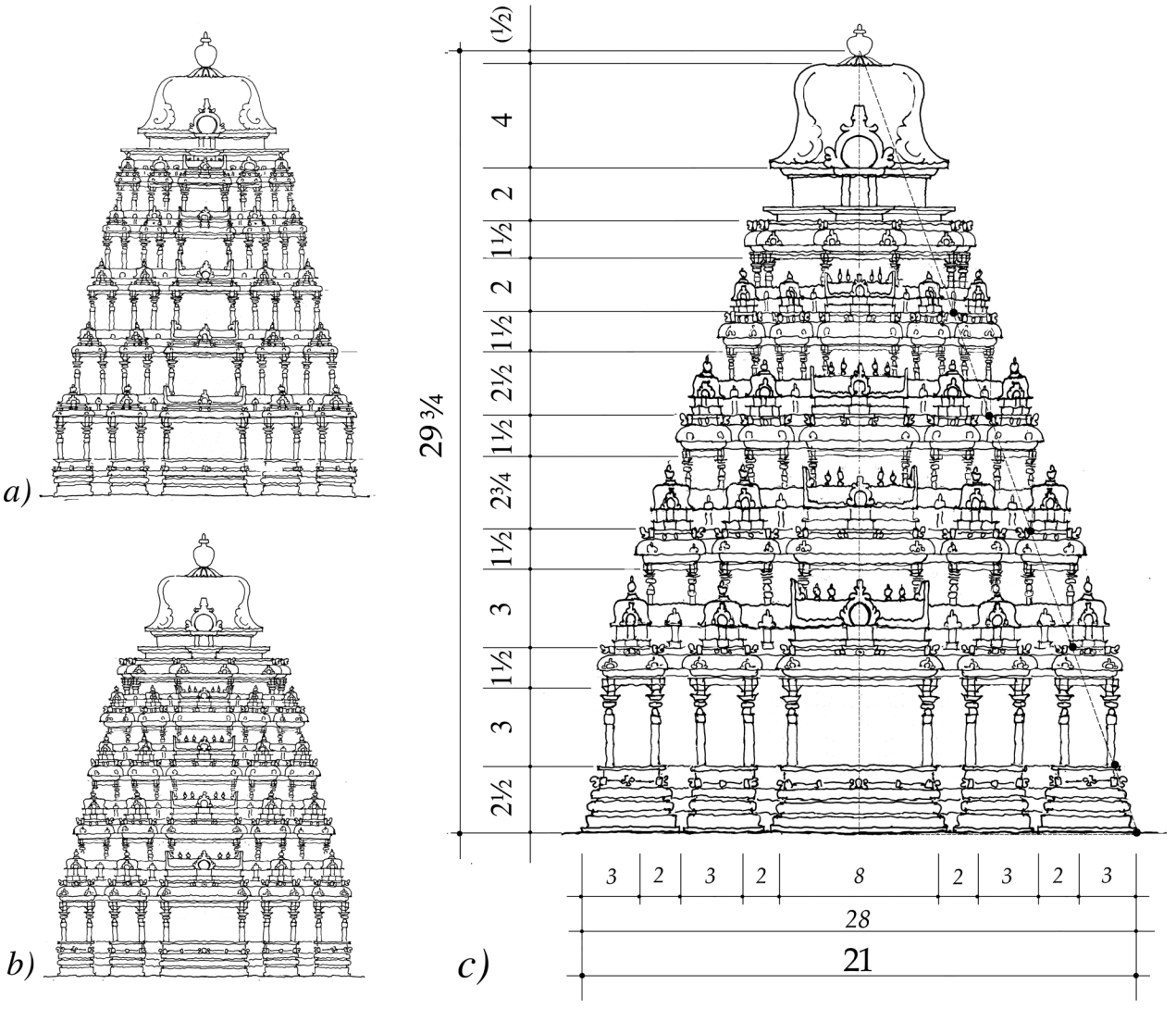


9. The one-storey temple (ekabhūmika-prāsāsda).



10. Mārgasahāyeśvara Temple, Visalur (Tamil Nadu), c. mid-ninth century; a one-storey (ekatala) minor shrine (alpa-vimāna) (photo by Gerard Foekema).

Then three slightly varying five-projection plans are given, as shown in Figure 8. A given number of *bhāga*s is specified for each, and then subdivided. Two observations are worth making here. Firstly, there is not a single, all-embracing grid, as is sometimes the case and often assumed to be universal. In these examples the sides are divided into fifteen or twenty-eight parts, subdivided for the projections and recesses (*salilāntara, jalāntara, jalamārga*), while the square is re-divided into four parts: one for the wall (*bhitti*), two for the sanctum (*garbha*). The second point to note concerns the names used for the different projections. Rather than *karṇa*, *pratibhadra*, and *bhadra* for corner, intermediate and central projections, here these are called respectively *kūṭa*, *pañjara*, and *śālā*, showing that they are conceived not just in terms of the plan, but as shrine-images or aedicules rising the full height of the first tier, crowned respectively by square, horseshoe-arched and barrel-roofed pavilions.



11. The five-storey temple (pañcabhūmika-prāsāsda) from the general description, three alternative interpretations.

Finally, the principle of the *sāndhāra* plan is explained. This has an internal ambulatory, as opposed to *nirandhāra* which has none. Here the square is divided into twelve, with four parts for the sanctum, one for the inner wall, one for the passageway, and two for the outer wall. This procedure, presumably, is to be applied to the previously described envelopes, in order to make them *sāndhāra*.

Elevations

Chapter 62 is about the elevations (*ūrdhvamāna*, literally 'upper measurement') of temples of one to twelve storeys (*bhūmis*). Its title 'Drāviḍa temples' (*drāviḍaprāsādalakṣaṇaṁ*) would be appropriate for Chapters 61 and 62 together, and there was doubtless no such break in the original text from which they derive. Verse 1 proclaims:

ūrdhvamānam atha brūmo
ghaṇṭāntapurapāditaḥ (?) |

pramāṇaṁ karṇamānena sarveṣām eva
dhārayet ‖ 1 ‖

1. I will now explain the vertical measurement, starting from what is at the foot, up to the very top of the *ghaṇṭā* ('bell').

One should ascertain the size of everything according to the measure of the corner (*karṇa*).

The second line is crucial. *Karṇamāna*, the measurement stated to be the key one, is the diagonal of the square of the plan,[9] and it turns out that in each case this dimension,

i.e. the width x √2, determines the height of the shrine to the top of the crowning *ghaṇṭā* or dome. The arithmetical game of making everything add up to this figure seems to have been more important than making well proportioned temple towers.

The one-storey temple (Figure 9) corresponds to what has come to be known in academic parlance as an *ekatala-alpa-vimāna* (Figure 10). Its width is prescribed as 5 *hasta*s and 2 *aṅgula*s, its height as 7 *hasta*s. Assuming 24 digits to the cubit, the width is 5.08 *hasta*s, giving a diagonal of 7.18, close enough to 7. In Figure 9, I have chosen the *Pādabandha* base (Figure 7a) and divided the 2 cubits prescribed for the base proportionately. All the way up the edge of the shrine, every single element and its size is spelt out. If, simply from prior knowledge of the tradition, one adds horseshoe arches (*nāsī*s) and intermediate pilasters in the wall, the result is a passable *alpa-vimāna*. It is, however, crowned by a very squat *kūṭa*, has an unrealistically monotonous number of parts measuring one *bhāga*. There is also one strange extra component, the *ardhabharaṇa* or *bharaṇārdha*, among the pilaster mouldings.

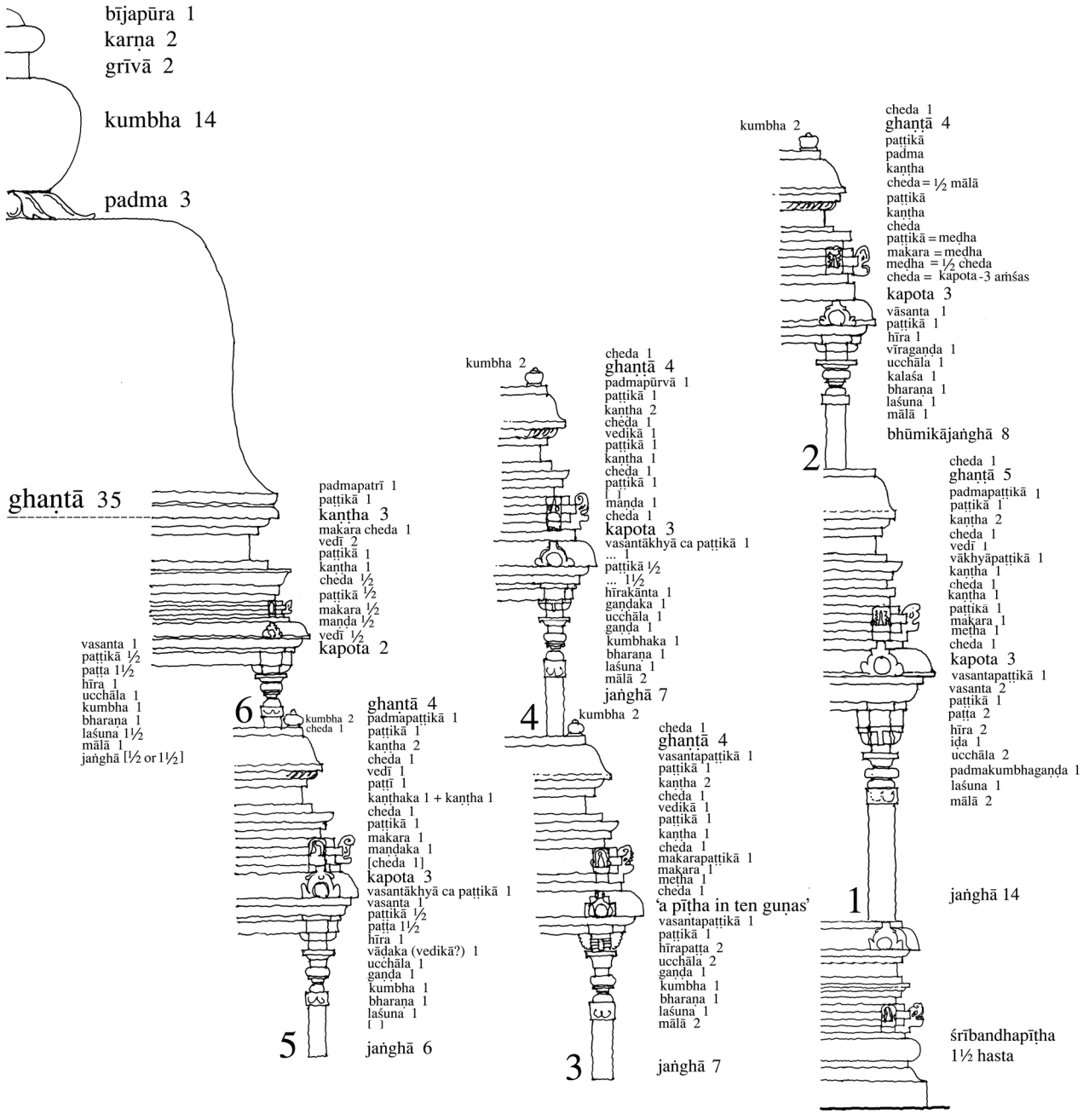
For each type beyond the one-storey temple, the procedure is first to give the overall width and height, and then to list the height of each storey, culminating in the neck (*kaṇṭha*), dome (*ghaṇṭā*), and the sequence of parts constituting the finial. For the shrines up to the one with seven storeys, separate heights are given for the wall and 'entablature' (*kūṭaprastāra*) of each tier; the seven-storey temple, oddly, has a '*vedī*' at the base of each storey, assigned a height separately.

From the eight-storey temple onwards, each tier is assigned a single dimension, without breaking it down. These various dimensions are ostensibly in *hasta* (cubits), but the term *bhāga* (part) is often used synonymously here. Table 1 shows the dimensions for the successive stages, and their sum, for each of the twelve temple types. Table 2 shows how the total height deduced in this way is always equal, at least approximately, to the height of the temple prescribed at the outset, and that this, in turn, is equal or nearly equal to the length of the diagonal of the plan (*karṇamāna*). In the pursuit of this arithmetical goal, the incremental reductions in height seem rather arbitrary, and certainly do not follow regular arithmetical or geometrical progressions.[10] The seven- and nine-storey shrines are anomalous, because the seven-storey shrine as described here has in fact only six storeys, and the description of the first two *bhūmi*s of the nine-storey shrine is missing from the text. Up as far as the five-storey temple, once the general dimensions have been given, the text starts again at the bottom and goes all the way up through every small division, as we have already seen for the one-storey shrine.

The five-storey temple (*pañcabhūmika prāsāda*) may be taken here as an illustration, and as a further demonstration of the extent to which the text can be useful as a guide to design. The relevant passage is

12. Airāvateśvara temple, Darasuram (Tamil Nadu), mid-twelfth century, a five-storey (pañcatala) vimāna. Unlike the equivalent temple in the Samarāṅgaṇa, here the kūṭa, pañjara, and śālā pavilions crowning the first and second tiers are two-storey ones (ṣaḍvarga, 'of six divisions'), i.e. equivalent to the entire śālā aedicule of Figure 6 (photo by Gerard Foekema).

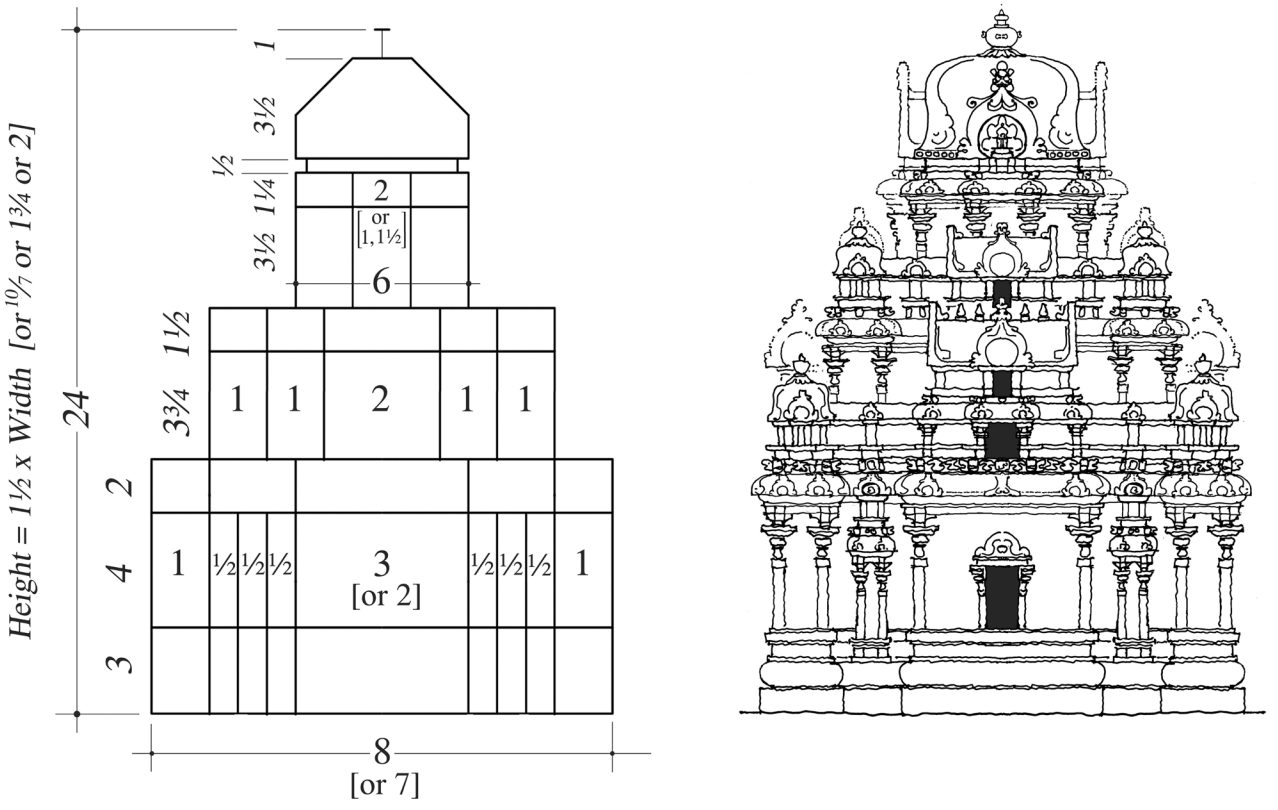
appended to this article. This is the only temple in the series for which the plan type (the *Sarvatobhadra*) and the type of base (the *Śrībandhapīṭha*) are actually specified. For all the others these appear to be open to choice, although the range does not provide a suitable plan for every elevation. In order to give the five-storey temple a *Sarvatobhadra* plan (Figure 7b), its width of twenty-one *hasta*s must be re-divided into twenty-eight parts. The prescribed height is 29¾ *hasta*s, and the stages up to the top of the dome add up to 29¼.[11] The remaining half may be intended for the finial, but it would only allow for a stunted one. *Sarvatobhadra*, incidentally, as well as having the technical sense of a plan with pronounced cardinal projections (and often with four entrances), means 'beautiful on all sides', and the text contains one small and welcome flight into poetry that takes off from this idea (Chapter 62, verses 123-126).[12]



13. The five-storey temple (pañcabhūmika-prāsāsda) from the detailed description, which turns out to have six storeys.

The architectural composition across the elevation is not explained, except inasmuch as it is implied for the first storey by the plan. For the other two five-projection plan types, the pattern of aedicules in the first tier is clearly the classic *kūṭa/pañjara/śālā/pañjara/kūṭa*, whereas for the *Sarvatobhadra* plan the corner and intermediate projections are equal, and the terms '*kūṭa*' and '*rathikā*' are used synonymously. The intended pattern seems therefore to be *kūṭa/kūṭa/śālā/kūṭa/kūṭa*. One can assume that the five projections would be carried up the tower, potentially with minor variations in the types of aedicule, as at the Airāvateśvara temple, Darasuram, illustrated in Figure 12.

Interpreting the elevation depends partly on the meaning of *kūṭaprastāra*, the term used here instead of the more usual *prastāra*. *Prastāra* is generally taken to mean conceptual beam (*uttara*) and the eave moulding (*kapota*), together with the floor moulding (*prati*) above (see Figure 6).[13] *Kūṭaprastāra* could conceivably mean an 'entablature' that includes the entire *kūṭa* or upper pavilion, as well as the *kapota*. This interpretation, followed in Figure 11a,



14. Interpretation of the three-storey Svastika-vimāna described in the Mayamata.

demands that the uppermost tier, below the dome, should mirror the others in having a crowning chain of pavilions (a *hāra*, though the term is not found here) – a feature, incidentally, that became the norm for the top storey in eleventh-century Karnataka, but remained unusual for that position in the far south. Several problems are made apparent by Figure 11a. The first storey is dumpy; there is insufficient upward diminution, as the second storey is identical in size to the first and succeeding 'entablatures' are all of equal height.[14] Moreover, this version gives us uncomfortably compressed pavilions, while, from the second storey upwards, an abnormal expanse of pilaster shaft is visible.

Kūṭaprastāra appears, therefore, to mean an entablature that supports the *kūṭa*, rather than including it – in other words the same as the generally understood sense of *prastāra*. As shown in Figure 11b, this interpretation allows the top storey to take the form, normal in Tamil Nadu, of a crowning *alpa-vimāna*. The interpretation assumes that the *kūṭa*s and *śālā*s of each storey overlap with the storey above, with the advantage that one is free to give them comfortable proportions and make them diminish. Here the fact that the first two *jaṅghā*s are equal is not nearly as disturbing. However, there remains an absence of diminution in the *prastāra*s, and as drawn here there is one fatal flaw: the pavilions, even if kept rather low, clash with the pilaster mouldings behind them.

In Figures 11a and 11b the shrinking of the width of the tower from level to level has been gauged by eye, as the text gives no explicit instructions about how to do this. I am extremely grateful to Bruno Dagens for pointing out the likely implicit method,[15] which overcomes various difficulties and results in a far more convincing elevation. The width of each successive tier can be calculated in proportion to the remaining height, as shown in Table 3 provided by Dagens and as illustrated in Figure 11c. Here there is no clash between pavilions and pilasters. The problem with the equal *prastāra* heights remains, however, still attesting to the dominance of the numbers game. The corollary of the method for calculating storey widths, that the foot of the corner of the first storey lines up with the equivalent points all the way up the tapering tower, is what makes the first storey rather short.

Interestingly, this very form of all-the-way-down alignment is present to a large degree in the interpretations of the *Mānasāra* drawn by Ram Raz's collaborator. In his 'Vimána consisting of five Stories' (Figure 1), a steeper profile (height = twice the width) allows the first *tala* to be rather taller than its equivalent in the *Samarāṅgaṇa*. And one need only look at Darasuram (Figure 12) to

realise that certain actual temples may well follow this principle and that the effect of a short first storey may be mitigated by a sub-base or pedestal. Could it be that the intellectual formulations of texts have begun to feed back into practice? It is worth reflecting on how, in practice, this kind of alignment of corners can be achieved. In a drawing it can be arrived at simply by tracing a line. For building an actual temple, the widths of the storeys could be calculated as in Table 3. However, the starting point of a storey, if conceived as standing on a *prastāra*, is theoretical rather than tangible, especially where the profile of the superstructure necessitates false or applied (*arpita*) rather than freestanding (*anarpita*) parapets. Since it is of dubious use to calculate the positions of hidden points, the more practical method would be to scale off a drawing.

Figure 13 is drawn, from toe to tip, from the concluding detailed description of the five-storey Drāviḍa temple of the *Samarāṅgaṇa*. I have dutifully drawn the *Śrībandhapīṭha* with its erroneous sequence, scaled to the prescribed 2½ *bhāga*s. Above this the sequences of mouldings are largely true to life, though once again the unlikely and monotonous proportion of 1:1:1:1:1 appears everywhere. Between the different storeys there are a few slight and improbable variations in the sequences and in their relative proportions, and many variations in the terms used. As one nears the summit an inconsistency looms into view: the description is actually of a six-storey temple – five fully-aedicular *bhūmi*s plus a top tier in the form of an *alpa-vimāna*. Is this, therefore, a misplaced description of the *ṣaḍbhūmika-prāsāda*?

The detailed descriptions of elevations are introduced by such phrases as 'The number of *hasta*s (cubits) has been indicated: now the subdivision will be explained' (verse 74). This suggests that the proportions of part to part lain down in the detailed descriptions are relative to the dimensions given for the respective *bhūmi*s in the general descriptions. That would account for the fact that, in the detailed description being examined here, each tier above the first (52 parts) is virtually the same height (36-37 parts), i.e. without diminution. However, even if the anomaly of the sixth storey is ignored, the fit between the detailed description and the general one is weak. If we work out, from the detailed description, the ratio in each storey of the *kūṭaprastāra* to the wall, it does not correspond closely to the ratio implied by the general description. And if the first storey in the design deduced from the detailed description is ascribed a width based on the ratio of width to height implied by the general description, then its aedicular components become ridiculously broad and squat.

Conclusion

A *sthapati* wishing to follow the *Samarāṅgaṇasūtradhāra* faithfully in the design of Drāviḍa temples would find his aim complicated by ungainly proportions, contradictions, and occasional solecisms. Many of the perversities in the text are casualties of its transmission through space and time. Yet an underlying logic comes across, and this is based on an ingenious arithmetical game that is partly at odds with Drāviḍa temples as known from the architectural tradition itself. The person or people who originally wrote Chapters 61 and 62 of the *Samarāṅgaṇasūtradhāra* knew Drāviḍa temple architecture intimately, but expounded it a way that was not always helpful for practice. Perhaps, then, it was written by and for south Indian connoisseurs. And if, as seems certain, the text came from the distant south, it is unlikely that, once these chapters had been sewn into Bhoja's compendium, the south Indian temple architecture depicted in them could be imagined by aesthetes at court in Dhar. Compendiousness must then have been an end in itself, as this would have been a text that the literate could not understand and the practical could not use.

But before it is concluded that the function of *vastuśāstra*s was therefore not to be understood or used for design, it should be pointed out that some texts are more usable. A case in point is the *Svastika* form of three-storeyed temple explained by the *Mayamata*,[16] which I have interpreted in Figure 14. Here the width of each storey is specified together with its horizontal subdivision; hence the whole profile can be worked out, as can the aedicular composition within it. Some options are given, so decisions need to be made. There are options for the temple height in proportion to its width, and I have chosen the ratio of 1:1½, so that a vertical part or *bhāga* is one and a half times a horizontal one. The *prastāra* height is given, but judgment must be exercised in deciding the heights of the *kūṭa*s and *śālā*s and of their constituent mouldings. As the text says that the *śālā*s of the first storey are taller than the *kūṭa*s, I have chosen to use a two-tier or *ṣaḍvarga-śālā* (cf. Figure 12). I have balked only at burdening the upper storey with 'sixteen small niches as well as ninety-six small false dormer windows'.[17] This top tier is set back to a surprising degree, yet altogether the result, to my eyes, is a pleasant Coḻa period *vimāna*. There has been room for interpretation and invention, and at the same time the satisfaction of being true to the *śāstra*.

Vastuśāstra texts, then, vary in their degree of utility as guides to design. This is true when different chapters within the *Samarāṅgaṇasūtradhāra* are compared, and I hope to demonstrate in future studies that some of the *Samarāṅgaṇa*'s instructions for Nāgara and Bhūmija temples yield coherent designs. Each text must be taken on its own terms, and perhaps there can be no general conclusions as to authorship and audience. Before such questions can be broached for a given text, a necessary first step is to try to draw the architecture that it describes.

APPENDIX

The Five-storey Temple (*pañcabhūmika-prāsāda*),
from the *Samarāṅgaṇasūtradhāra*, Chapter 62
[This translation by Mattia Salvini is included here to show how the interpretations put forward in the article have been arrived at. Technical terms have not been given English equivalents, as it is felt that a better understanding can be gained by reading the text in close conjunction with Figures 11 and 13. This is work in progress; comments and suggestion will be welcomed by the author of this article and by the translator. The passage begins with the overall description illustrated in Figure 11.]

pañcabhaumam atha brūmaḥ prāsādaṁ rājapūjitam ‖ 106 ‖

We will now explain the five-storeyed temple, worshipped by kings.

vistāreṇa vidhātavyaḥ sa hastra(stā)n ekaviṁśatim |
vibhājayet tathotsedhaṁ pādonatriśataṁ karān ‖ 107 ‖

107. It should be built with a width of twenty-one cubits.[18]
One should then divide its elevation into thirty cubits minus a quarter.

pīṭhaṁ bhāgadvayaṁ sārdhaṁ jaṅghā(sārāmrā)[19] tribhāgikī |
kurvīta kūṭaprastāraṁ sārdhahastaṁ ca buddhimān ‖ 108 ‖

108. The pīṭha (base) is two bhāgas and a half, the jaṅghā (wall zone) is three bhāgas.
The intelligent should construct a kūṭaprastāra of one and half cubits.

jaṅghā dvitīyā kartavyā hastatritayam ucchritā |
bhūyo'pi kūṭaprastāraṁ sārdhahastaṁ prakalpayet ‖ 109 ‖

109. A second jaṅghā should be constructed, with a height of three cubits.
Once again one should construct a kūṭaprastāra of one and half cubits.

jaṅghā tṛtīyā kartavyā pādahīnaṁ karatrayam |
sārdhahastasamutsedhaḥ kūṭaprastāra iṣyate ‖ 110 ‖

110. The third jaṅghā should be constructed, three cubits minus a quarter.
The kūṭaprastāra is accepted as one and a half cubits in elevation.

caturthabhūmijaṅghā ca sārdhahastadvayocchritā |
kūṭaprastārakaṁ kuryāt pūrvamānena buddhimān ‖ 111 ‖

111. The jaṅghā of the fourth storey should be two cubits and half high.
The intelligent should construct a kūṭaprastāra of the same size as the previous ones.

pañcamyāṁ bhuvi kurvīta (jaṅghā sā?) hi karadvayam |
kurvīta kūṭaprastāraṁ tathā prāgā(gu)dito yathā ‖ 112 ‖

112. On the fifth level one should construct a jaṅghā of two cubits.
One should build the kūṭaprastāra as explained earlier.[20]

kuryādd hastadvayotsedhaṁ kapotam api buddhimān |
caturbhāgasamutsedhā mahāghaṇṭā vidhīyate ‖ 113 ‖

113. The intelligent should also construct a kapota with an elevation of two cubits.
A great ghaṇṭā is to be built, with an elevation of four bhāgas.

upariṣṭād bhavet tatra prāsāde pañcabhūmike |
kumbhaṁ tadūrdhvaṁ kurvīta starān ekonaviṁśatim ‖ 114 ‖

114. On the upper portion of that five-storeyed temple,
one should construct a kumbha above (the ghaṇṭā), divided into nineteen staras.

saṁsthānam etat kartavyaṁ sarvatobhadrasaṁjñakau(ke) |
vibhājayed viśeṣeṇa tataḥ staravibhājanāt ‖ 115 ‖

115. This type of arrangement is to be constructed for the one called Sarvatobhadra.[21]

[The overall description ends here, and the text continues with the detailed description illustrated in Figure 13]

One should then specifically subdivide according to a division into staras.

śrībandhapīṭhaṁ kartavyaṁ sārdhahastadvayocchritam |
caturdaśastaraṁ jaṅghā kartavyā stambhasaṁyutā ‖ 116 ‖

116. A śrībandhapīṭha should be constructed, with a height of one cubit and a half.
The jaṅghā should be built in fourteen staras, endowed with a stambha (pilaster).

kartavyā dvistarā mālā laśunaṁ starasammitam |
vidadhīta staraṁ padmakumbhagaṇḍasamanvitam (?) ‖ 117 ‖

117. The mālā should be built in two staras, while the laśuna measures one stara.
One should construct one stara of padmakumbhagaṇḍa(?).

ucchālaṁ dvistaraṁ kuryā(diḍo?)bhāgaṁ vidhīyate |
dvistaraṁ hīrakaṁ kāryaṁ paṭṭāś caiva tathāvidhāḥ ‖ 118 ‖

118. One should construct the ucchāla in two staras, while the iḍa is built as one bhāga.
The hīra should be built as two staras, and the paṭṭa should be the same as that.

paṭṭikā staram ekaṁ ca vasantaṁ dvistaraṁ tataḥ |
vasantapaṭṭikā bhāgaṁ kapotaṁ tristaraṁ tataḥ ‖ 119 ‖

119. The paṭṭikā is one stara, then the vasanta is two staras;
the vasantapaṭṭikā is one bhāga and then the kapota is three staras.

chedam ekastaraṁ kuryāt staramātraṁ ca meṭhakam |
makaraṁ bhāgam ekaṁ ca bhāgaṁ (carāla?)[22] paṭṭikā(m) ‖ 120 ‖

120. One should construct the cheda in one stara and the meṭha measuring one stara.
The makara is one bhāga, and the paṭṭikā is one bhāga as well.

kurvīta bhāgikaṁ chedaṁ tataḥ kaṇṭhaṁ ca bhāgikam |
kaṇṭhaṁ chedaṁ tataḥ kaṇṭhaṁ ca ++++ bhāgikam ‖ 121 ‖

121. One should build the cheda in one bhāga and then the kaṇṭha in one bhāga.
There is a kaṇṭha, a cheda, then again a kaṇṭha (...), one bhāga in size.[23]

(vākhyāpaṭṭikāṁ?) bhāgaṁ vedīṁ vicakṣaṇaḥ |
kurvīta bhāgikaṁ chedaṁ tataḥ kaṇṭhaṁ staradvayam ‖ 122 ‖

122. The expert should make the vākhyāpaṭṭikā (?) and the vedī one bhāga in size,
the cheda in one bhāga, and then a kaṇṭha of two staras.

staraṁ staraṁ prakurvīta paṭṭikā padmapaṭṭikā |
kūṭaprastārake kuryān makarānanapañcakam ‖ 123 ‖

123. One should construct the paṭṭikā and padmapaṭṭikā, each being one stara in size.
In the kūṭaprastāra one should make five makara faces,

vicitrarūpaṁ sarvāsu dikṣu sarvaguṇānvitam |
ūrdhvataḥ paṭṭikāyās tu ghaṇṭā pañcastarā bhavet ‖ 124 ‖

124. with a striking appearance, endowed with all good qualities, in all directions.
Above, the ghaṇṭā of the paṭṭikā should be of five staras,

nāsikābhir vicitrābhir atyudārābhir anvitā |
bhadrāṇi yasya dṛśyante kūṭe kūṭe samantataḥ ‖ 125 ‖

125. endowed with beautiful, and extremely large nāsikās (false dormer windows).

Where, in each kūṭa, on every side, bhadras (or, good things) are to be seen,

sa sarvatobhadra iti prāsādaḥ śilpināṁ mataḥ |
avalambena tadanu stambhacchedaṁ prakalpayet ‖ 126 ‖

126. that temple is considered to be the Sarvatobhadra by the craftsmen.
As a support for that, one should construct a stambhaccheda.

[Verses 127-133a have been omitted here. These discuss the relative degrees of projection of various mouldings. The ascent then continues with the second tier.]

mālādyair laśunaṁ caikaṁ bharaṇaṁ kalaśas tathā |
yathā mālā tathocchālaṁ vīragaṇḍaṁ staraṁ bhavet ‖ 134 ‖

134, There should be one laśuna with mālā and so forth, a bharaṇa, and a kalaśa.
Just like the mālā, so also the ucchāla and the vīragaṇḍa should be of one stara.

ucchālahīrake paṭṭasame kuryād vicakṣaṇaḥ |
paṭṭikā bhāgikotsedhā vāsantaṁ + + kā tathā ‖ 135 ‖

135. The expert should construct the ucchāla and hīra of the same size as the paṭṭa.
The paṭṭikā should be one bhāga high, and the vāsanta in the same way (one bhāga?[24]).

kapotaṁ tristarotsedhaṁ (chedo?) satryaṁśavarjitam |
chedasyārdhe bhaven meḍho makaraḥ paṭṭikā tathā ‖ 136 ‖

136. The kapota should be three staras high, and the cheda should be that minus three aṁśas.
The meḍha should be half of the cheda, the makara and the paṭṭikā should be the same as that.

tataś chedaṁ (ca) kaṇṭhaṁ ca +++ paṭṭikāṁ tathā |
mālārdhena prakurvīta cchedam eva tato budhaḥ ‖ 137 ‖

137. Then there should be a cheda, a kaṇṭha and a paṭṭikā.[25]
After that, the intelligent should construct a cheda half the size of the garland.

punaḥ kaṇṭhaṁ prakurvīta hīrakego(ṇa) samanvitam |
paṭṭi(kā) padmapūrvā ca tribhāgo(ge) na kapotake ‖ 138 ‖

138. Once again one should construct a kaṇṭha, endowed with a hīra.
There should be a paṭṭikā, preceded by a padma, in the kapota.[26]

kuryāc catuḥ starāṁ ghaṇṭāṁ dvābhyāṁ kumbhaṁ tathopari |
punaś chedo bhaved bhāgaṁ jaṅghāṁ kurvīta saptabhiḥ ‖ 139 ‖

139. One should construct a ghaṇṭā of four staras, and on top of that a kumbha in two staras.

[The third tier begins here, on top of the cheda]

Again, there should be a cheda of one bhāga, and one should construct a jaṅghā of seven staras.

(sītamāṭhā?) vidhātavyā māloccu(cco) dvistaro bhavet |
laśunaṁ bharaṇaṁ kumbho gaṇḍaś ceti staraṁ staram ‖ 140 ‖

140. A sītamāṭhā (sītamālā?) should be constructed: the height[27] of the mālā should be two staras.
The laśuna, bharaṇa, kumbha, and gaṇḍa should be one stara each.

gaṇḍadviguṇam ucchālaṁ hīrapaṭṭas tathaiva ca |
paṭṭikā staram ekaṁ syād vasantapaṭṭikāsya ca ‖ 141 ‖

141. The ucchāla should be twice the size of the gaṇḍa, and likewise the hīrapaṭṭa.
The paṭṭikā should be one stara, as also its vasantapaṭṭikā.

pīṭhaṁ da(śa)guṇaṁ kuryāc chedameṇṭhau staraṁ staram |
staraṁ kurvīta (rākara?) (tathā) makarapaṭṭikām ‖ 142 ‖

142. One should construct a pīṭha in ten guṇas, while the cheda and meṇṭha should be one stara each.
One should construct the rākara (makara?) in one stara, and so also the makarapaṭṭikā.[28]

staraṁ chedaṁ ca kaṇṭhaṁ ca paṭṭikāṁ vedikāṁ tathā |
chedaṁ kuryāt punar bhāgaṁ kaṇṭhaṁ taddviguṇaṁ tataḥ ‖ 143 ‖

143. The cheda, kaṇṭha, paṭṭikā and vedikā should be one stara each.
Again, one should construct a cheda of one bhāga and then a kaṇṭha twice that size.

paṭṭikā staram ekaṁ syād vasantapaṭṭikā staram |
catuḥstarā bhaved ghaṇṭā (prāggrācakabhūṣitā ?) ‖ 144 ‖

144. The paṭṭikā should be one stara, and the vasantapaṭṭikā should be one stara.
The ghaṇṭā should be four staras, (ornate with prāggrācaka = prāgrīvaka?)

tasyopari punaḥ kumbhaṁ ghaṇṭārdhenaiva kārayet |
chedaṁ bhāgaṁ vijānīyāj jaṅghā saptāṁśikā smṛtā ‖ 145 ‖

145. Again one should construct on top of that a kumbha half the size of the ghaṇṭā.

[The fourth tier begins here, on top of the cheda]

One should know the cheda to be one bhāga, while the jaṅghā is known to be seven aṁśas.

mālā dvibhāgikā kāryā bhāgikaṁ laśunaṁ bhavet |
bharaṇaṁ kumbhakaṁ gaṇḍaṁ kuryāl laśunavad budhaḥ ‖ 146 ‖

146. The mālā should be constructed two bhāgas in size, while laśuna should be one bhāga.
The intelligent should construct the bharaṇa, kumbhaka and gaṇḍa the same size as the laśuna.

ucchālaṁ gaṇḍakaṁ caiva hīrakāntaṁ ca bhāgikam |
sārdhaṁ bhāgaṁ bhavet ++ paṭṭikārdhaṁ staraṁ bhavet ‖ 147 ‖

147. The ucchāla, gaṇḍaka and hīrakānta should be one bhāga each.
The (...[29]) should be one and a half bhāgas, while the paṭṭikā should be half a stara.

++ taṁ bhāgam ekaṁ syād vasantākhyā ca paṭṭikā |
kapotaṁ tristaraṁ kuryān nāsāyuktaṁ vicakṣaṇaḥ ‖ 148 ‖

148. The (...[30]) should be one bhāga, and so also the paṭṭikā called vasantā.
The expert should construct a kapota of three staras, endowed with nāsās (false dormer windows).

chedam aṁśena kurvīta (maṇḍam aṁśena ?) kārayet |
makare paṭṭikāṁ chedaṁ vidadhīta staraṁ staram ‖ 149 ‖

149. One should construct a cheda of one aṁśa, and should build a maṇḍa of one aṁśa.
In the makara, one should build a paṭṭikā and a cheda, one stara each.

kurvīta bhāgikaṁ (kaṇṭhaṁ) paṭṭikāṁ vedikām api |
bhāgaṁ kuryāt punaś chedaṁ tataḥ kaṇṭhaṁ dvibhāgikam ‖ 150 ‖

150. One should make a kaṇṭha, paṭṭikā and vedikā of one bhāga each.
Again, one should construct a cheda of one bhāga and then a kaṇṭha of two bhāgas.

paṭṭikā padmapūrvā ca vidhātavyā staraṁ staram |
kurvīta ghaṇṭām upari caturbhāgāṁ vicakṣaṇaḥ ‖ 151 ‖

151. The paṭṭikā and the padmapūrvā[31] should be built one stara each.
The expert should construct on top of that a ghaṇṭā of four bhāgas.

tadardham ūrdhvataḥ kumbhaṁ chedam ardhena tasya ca |
jaṅghā ṣaḍbhāgikā kāryā (māttā gena suna kārayet ?) ‖ 152 ‖

152. Above that, there is a kumbha half that size, and a cheda half the size of the kumbha.

[The fifth tier begins here, on top of the cheda]

A jaṅghā of six bhāgas should be made (...)

laśunaṁ bharaṇaṁ kumbhaṁ gaṇḍam ucchāla(vāḍa?) ke |
hīrakaṁ ceti kurvīta bhāgikāni pṛthak pṛthak || 153 ||

153.One should construct the laśuna, bharaṇa, kumbha, gaṇḍa, the ucchāla and vāḍaka (vedikā?), and the hīra, each being one bhāga in size.

sārdhabhāgaṁ bhavet paṭṭaḥ paṭṭikārdhastarocchritā |
vasantaṁ bhāgam ekaṁ syād vasantākhyā ca paṭṭikā || 154 ||

154. The paṭṭa should be one and a half bhāga, while the paṭṭikā should have a height of half a stara.
The vasanta should be one bhāga, as also the paṭṭikā called vasantā.

kapotaṁ tristaraṁ kuryāc chedaṁ (tryaṁśonaśaṁsakām?) |
maṇḍako makaraś caiva paṭṭikā chedakaṇṭhakau || 155 ||

155. One should make a kapota in three staras, and the cheda (...).
The maṇḍaka, makara, paṭṭikā, cheda, kaṇṭhaka,

kaṇṭhaṁ paṭṭī ca vedī ca cchedaś ca syāt staraṁ staram |
dvitīyo dvistaraḥ kaṇṭho bhāgikī paṭṭikā bhavet || 156 ||

156. kaṇṭha, paṭṭī, vedī and cheda should be one stara each.
The second kaṇṭha should be two staras, and the paṭṭikā should be one bhāga.

tathaiva padmasaṁjñā ca syād ucchrāyeṇa paṭṭikā |
ghaṇṭāṁ kuryāc caturbhāgāṁ kumbham ardhena tasya ca || 157 ||

157. The paṭṭikā called padma should have the same height.
One should construct a ghaṇṭā of four bhāgas, and a kumbha half that size,

chedam ekena bhāgena jaṅghāma+rdhabhāgikīm |
mālā(m e)kena bhāgena laśunaṁ sārdhabhāgikam || 158 ||

[The anomalous sixth tier begins here, on top of the cheda]

158. a cheda of one bhāga, a jaṅghā of (half or one and a half[32]) bhāgas,
a mālā of one bhāga,[33] and a laśuna of one and a half bhāgas.

tathaiva bharaṇaṁ kuryāt kumbhocchāle staraṁ staram |
hīrakaṁ bhāgikaṁ kuryāt paṭṭaṁ sārdhastaraṁ tataḥ || 159 ||

159. In the same way one should construct a bharaṇa, and the kumbha and ucchāla in one stara each.
One should create the hīra in one bhāga and then the paṭṭa in one and a half stara.

paṭṭikārdhastaraṁ kāryā vasantaṁ ca staraṁ tataḥ |
kapotaṁ dvistaraṁ kuryād vedīm ardhastaraṁ tathā || 160 ||

160. The paṭṭikā should be made half a stara in size, and then the vasanta in one stara.
One should construct a kapota of two staras, and a vedī of half stara.

yathā chedas tathā maṇḍo makaraś ca vidhīyate |
paṭṭikārdhastaraṁ kāryā chedo'py ardhastaraṁ bhavet || 161 ||

161. The maṇḍa and makara are to be built just the same size as the cheda.
The paṭṭikā should be built in half a stara, and the cheda also should be half a stara.

bhāgaṁ kaṇṭhaḥ paṭṭikā ca vedī kāryā dvibhāgikī |
chedo bhāgena kartavyaḥ kaṇṭhaś cānyas tribhāgikaḥ || 162 ||

162. The kaṇṭha and paṭṭikā should be one bhāga, while the vedī should be constructed as two bhāgas.

The cheda is to be made as one bhāga, and one more kaṇṭha should be built as three bhāgas.

paṭṭikāṁ padmapatrīṁ ca vidadhīta staraṁ staram |
tuṅgasya calanaṁ kāryaṁ dvibhāgikam anantaram ‖ 163 ‖

163. One should build the paṭṭikā and the padmapatrī in one stara each.
The calana of the tuṅga should be constructed contiguously to that, and of two bhāgas.

ghaṇṭā kāryā samutsedhā(t) trayastriṁśadvibhāgikī |
sarvatobhadrasaṁyuktā candraśālāvibhūṣitā ‖ 164 ‖

164.The ghaṇṭā should be constructed with a height of thirty bhāgas,
endowed with a Sarvatobhadra and ornate with candraśālās.

kurvīta tristaraṁ padmaṁ citrapatrasamanvitam |
tasyopari (bhavet) kumbhaś caturdaśavibhāgikaḥ ‖ 165 ‖

165. One should construct a padma of three staras, endowed with beautiful petals.
Above that, there should be a kumbha of fourteen bhāgas.

grīvā dvibhāgikā kāryā karṇaś caiva tathāvidhaḥ |
bījapūraṁ tataḥ kāryaṁ sā(śo)bhāsaṁyuktam ardhataḥ ‖ 166 ‖

166. The grīvā should be constructed in two bhāgas, and the karṇa should be of that same size.
Then a bījapūra should be constructed, beautiful[34] and half that size.

padmacakraṁ triśūlaṁ vā vidhātavyaṁ yathocitam |
prottuṅgagrāsasaṁyuktaṁ ++ makarameḍhakaiḥ ‖ 167 ‖

167. A padmacakra or a triśūla should be made, as appropriate,
endowed with prottuṅga and grāsa, (…) and having makaras and meḍhakas.

sottuṅgakūṭake kuryād evaṁ dikṣu vidikṣu ca |
bhūmau bhūmau vidhātavyā śālā sādhyalatoraṇam (?)[35] ‖ 168 ‖

168. One should construct a sottuṅga and kūṭaka in this way, both in the main and intermediate directions.
On each storey, a śālā should be built, with sādhyalatoraṇas.

koṇe koṇe ca (+ karā) bhadre karikya(ka)rān api |
++ kūṭais tribhir yuktaṁ caturbhiś ca jalāntaraiḥ ‖ 169 ‖

169. On each of the good corners (one should create[36]) karikara[37] ('elephant's trunks') as well.
Endowed with three (…) kūṭas and four jalāntaras (recesses),

kurvīta sarvatobhadram evaṁlakṣaṇalakṣitam | 170ab |

170ab. one should construct the Sarvatobhara according to these specific features […]

Note: As the author is serving as Editor of *South Asian Studies* it needs to be noted here that this article has been peer reviewed, by Professor M. A. Dhaky and Professor Bruno Dagens.

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NOTES

1 Ram Raz, *Essay on the Architecture of the Hindus* (London: Royal Asiatic Society 1834).

2 Exceptions are the reconstructions of three plans from the *Samarāṅgaṇasūtradhāra* by Stella Kramrisch in *The Hindu Temple* (Calcutta: University of Calcutta, 1946), pp. 247, 250, 251; and the two elevational diagrams by Bruno Dagens in *Mayamata: an Indian Treatise on Housing, Architecture and Iconography*, ed. by Bruno Dagens (Delhi: Sitaram Bharatia Institute, 1985), pp. 144, 139. Mention should also be made of the drawings in P. K. Acharya's works on the

Mānasāra, in a strange, hybrid style that, as far as I know, has never been seen in a real building, even from the 1920s.

3 The Sanskrit text was published as *Samarangana Sutradhara of Maharajadhiraja Bhoja*, ed. by T. Ganapathi Sastry (Baroda: Gaekwad Oriental Series Vols. 25 and 32, 1924 and 1925). It was drawn on extensively by Kramrisch, and by D.N. Shukla in *Vāstu-Śāstra: Hindu Science of Architecture* (Delhi: Munshiram, 1993). The text has recently been translated into English by Sudarshan Kumar Sharma, as *Samarāṅgaṇa Sūtradhāra of Bhojadeva: An Ancient Treatise on Architecture* (Delhi: Parimal Publications, 2007). To me the architectural parts of this translation are totally opaque. An excellent translation and critical commentary by Felix Otter on the parts of the text concerning domestic architecture has just been published: *Residential Architecture in Bhoja's Samaranganasutradhara* (Delhi: Motilal Banarasidass, 2009).

4 Especially, in this context, Michael W Meister (ed.), *Encyclopaedia of Indian Temple Architecture Vol.I, Part 1, South India: Lower Drāviḍadēśa, 200 BC-AD 1324* (Delhi: American Institute of Indian Studies and Manohar, 1983)

5 Otter takes *bhāga* as a term to form fractions; it may work in other contexts, but in this chapter, stara and bhāga are clearly used as synonyms. See also14.24, where *bhāga* and *pada* are used interchangeably: *paścimottarabhāgasthāṁ vāpīm api ca kārayet |vā(yau?yu)sugrīvapadayor gandharvasya ca bāhyataḥ ||* (MS)

6 In fact the Bṛhadīśvara at Tanjavur (*c.* AD 1000) set the trend for many-storeyed temples. For my argument that this temple, strictly speaking, has fourteen storeys, rather than fifteen, see Adam Hardy, *The Temple Architecture of India* (Chichester: Wiley, 2007), pp. 220-21.

7 Dagens argues that a brief mention in the *Mayamata* of temples with sixteen storeys is a later interpolation taking account of the large Coḻa temples: see *Mayamata*, p. v.

8 As suggested to me by Michael Willis.

9 See Kramrisch, p. 268.

10 Pierre Pichard has shown that the storeys of the temple at Gangaicondacholapuram do diminish according to a geometrical progression: *Thanjavur Bṛhadīśvara, An Architectural Study* (Delhi: IGNCA and École Française de l'Extrême Orient, 1995), pp. 84-93.

11 See note 19, which allows for the possibility that the stages may indeed add up to 29¾.

12 Mattia Salvini supports this interpretation, and has provided the following note: 'Puns are such a common feature of Sanskrit literature that indeed it is unlikely that the name *Sarvatobhadra* would not have been felt to indicate its most literal sense as well as its technical one. Besides, the name is explicitly interpreted in this manner in another place too (Chapter 55, verse 31): *karoti sarvato bhadraṁ sarvatobhadrakaḥ kṛtaḥ Once constructed, the Sarvatobhadra causes good on all sides (sarvato bhadram).* To be precise, it is likely that *bhadra* is used here in a sense akin to 'meritorious' or 'auspicious'. The more technical sense of *Sarvatobhadra* as [a temple] 'with bhadras on all sides' is given in the etymology offered in chapter 62, verses 125-126, translated in the Appendix.'

13 *Prastāras* are shown in this way in Ram Raz, Plate XIX. For the same understanding in a treatise by a contemporary practitioner of Drāviḍa architecture, see V. Ganapati Sthapati, *Sthapātya Veda* (Chennai: Dakshinaa Publishing House, 2005), drawing on p. 392.

14 Note 19 has arrived too late for revisions to be made, but the first storey may in fact be half a *bhāga* taller than the second. Table 3 would have to be recalculated, and Figure 11a-c redrawn slightly differently. Such are the hazards of working with texts, but the reader must decide whether or not this *bhāga*s up my entire argument.

15 'J'ai été surpris quand vous écriviez que "no instructions are given for how to diminish the width of the tower from level to level", car ce sont des indications qui sont très systématiquement fournies d'une manière ou d'une autre. Enfin il me semble que le problème est réglé en utilisant votre hypothèse sur le sens de karnamanena, car si elle permet d'obtenir la hauteur à partir de la largeur elle permet aussi le contraire: cela nous donne donc le tableau que vous trouverez en pièce jointe et apporte une preuve de plus que votre hypothèse tient la route' (Bruno Dagens, personal communication).

16 *Mayamata* 21.2b-10, Dagens, pp. 128-9.

17 Ibid. 21.9.

18 Following the suggestion of *hastān* instead of *hastrān* (MS).

19 *Sārāmrā* could be possibly split as *sāra+āmra*, giving a sense akin to 'pithy mango', which fits neither context nor metre. I would propose that it may be a corruption of *sārdha-*, which would then mean that the *jaṅghā* should be made as three *bhāga*s <u>*and a half*</u> (MS).

20 Accepting the suggestion of *prāg udito* (MS).

21 Accepting *-saṁjñake* (MS).

22 I would propose that *carāla* may actually have been *ca* + a two-syllable term qualifying *paṭṭikā* (MS).

23 'One *bhāga'* is tentative. Since four syllables are missing, it is impossible to exclude other possibilities, like 'two and a half *bhāga*s' (*sārdhadvibhāgikam*) or 'three and a half *bhāga*s' (*sārdhatribhāgikam*), or 'one and a half *bhāga*' (*kuryāt sārdhabhāgikam*) (MS).

24 I would propose that ++*kā* may have been *bhāgikā* (MS).

25 Here *vasanta-paṭṭikām* would fit the metre (and perhaps the context) well (MS).

26 Here I translate accepting the suggestions of *hīrakeṇa, paṭṭikā* and *tribhāgena*. (MS).

27 Accepting *mālocco* (MS).

28 Accepting *daśa-* and *tathā* (MS).

29 Considering metre and context, I wonder whether the missing part could be *kaṇṭham* (MS).

30 Could the missing bit be ***vasan****taṁ* ? Compare verse 154 (MS).

31 This could also mean 'The paṭṭikā, preceded by a padma' (MS).

32 The measurement of the *jaṅghā* is here tentative. Another available reading is *jaṁghāṁ marddho tribhāgikīṁ*. Perhaps it could have been *jaṅghāṁ sārdhatribhāgikīm*, in which case the *jaṅghā* would be three and a half *bhāgas* (MS).

33 Accepting *mālam ekena* (MS).

34 Reading *śobha-* (MS).

35 *Sādhyalatoraṇa* probably a corruption (MS).

36 Perhaps *+karā* could have been *kurvīta* ? (MS).

37 Accepting the suggestion of *karikarān* (MS).