

land enjoys happiness." The prohibition of foreign travel<sup>1</sup> to Sudra females, except in the company of the husband, similarly points to this. The comfort of living in the home and the discomfort of life and work abroad have been mentioned as factors which influence the soldiery also. Thus alienation of soldiers<sup>2</sup> is brought about by constant life and work in foreign lands." The rule about 'travelling allowances' is another proof of experiences beyond the little 'platoon.'

These references, however, do not furnish any geographical information worthy of note. Nor do they point to anything like an all-India sentiment or knowledge or any extra-Indian experience. These are but vague and indefinite hints about things that are not purely local.

(c) *Definite Names.*

It has been mentioned above that as sources of positive geographical information, *Nitisāstras* are not very valuable. This is sufficiently borne out by the fact that only the following five names occur in *Sukraniti*, a work of 4966 lines: (1) Simhala or Ceylon, (2) Gandaka, (3) Dakṣiṇātya, (4) Madhyadeśa, (5) Khaṣa.

i. *Simhala*

Ceylon<sup>3</sup> has been mentioned as an island, and its people are described as expert in making artificial pearls which should be carefully examined by customers before purchase. The connexion of Ceylon with general Indian history is immense and has been commercial, political, as well as cultural. Prof. Rādhā Kumud Mookerji<sup>4</sup> has, on the authority of Buddhist texts belonging to a period of a thousand years from 600 B. C., given evidences "which point to a complete navigation of the Bay of Bengal and the Indian Ocean and the flow of a steady and ceaseless traffic between Bengal and Ceylon, Madras and Burma." Mr. S. Krishnaswami Aiyangar of the Mysore Education Service in his *Ancient India*, a scholarly work on the early history of South India, has used old Tamil literature to prove the connexion of the Ceylonese with the Cholas, Cheras and Pandyas in particular, and Indian culture in general. Mr. Cunningham's account of Ceylon in the *Ancient Geography of India* also throws fresh light on the subject:

"The famous island of Ceylon is not reckoned amongst the kingdoms of India, and it was not visited by the pilgrim (Houen Tsang) on account of political disturbances. \* \* \* In the seventh century of our era Ceylon was known by the name of *Seng-kia-lo*, or *Simhala*, which was said to be derived from the lion-descended *Sinhala*, whose son *Vijāya* is fabled to have conquered the island on the very day of Buddha's death in B. C. 543. Its original name was *Paochu*, or "Isle of Gems," in Sanskrit *Ratnadwipa*."

ii. *Gandaka.*

The Gandaka<sup>5</sup> has been mentioned as a source of gems which may be regarded as natural images. The neighbourhood of the Gandaka is famous in

<sup>1</sup> Sukra IV, 9-10.

<sup>2</sup> Sukra IV, vii, 366-367.

<sup>3</sup> Sukra IV, ii, 124.

<sup>4</sup> A History of Indian Shipping and Maritime Activity of the Indians (Longmans, 1912), pp. 29, 39, 34, 42, 44, 67, 70, 103, 113, 133, 140, 142, &c.

<sup>5</sup> Sukra IV. iv. 507-508.

Buddhist history as it contains the environs of Kusinagara, the scene of Buddha's death. At the time of Houden Tsang's visit the walls of Kusinagara were in ruins. According to Cunningham the spot where Buddha obtained *Nirvāṇa* "lies to the north-west of Anrudhwa, and to the west of the old channel of the Chota Gandaka<sup>1</sup> or *Hiranyavati* (golden) river;" and "the spot where his body was burned" lies to the north-east of Anrudhwa and to the east of the old channel of the *Hirana* or Chota Gandaka." We must look for *Vaisāli* to the East of the Gandaka." The position of the Gandaka may be inferred from the following description:<sup>2</sup> "The utmost limit that can be assigned to the joint districts (Vaisāli) is not more than 750 or 800 miles in circuit from the foot of the mountains to the Ganges on the south, and from the Gandaka on the west to the Mahanadi<sup>3</sup> on the east." "According to Houden Tsang the country of the Vrijis was long from east to west and narrow from north to south. This description corresponds exactly with the tract of the country lying between the Gandaka and Mahanadi rivers, which is 300 miles in length and 100 miles in breadth."

It is possible to trace the tradition of gems being found in the bed of the Gandaka to literary<sup>4</sup> sources. Perhaps the name of the river as *Hiran* and *Hiranyavati*, which means golden, may have something to do with it. Small pieces of stone which are worshipped as Viṣṇu are still found in the bed of the Gandaka, and they are highly appreciated.

The following is taken from the note on page 3 of *Ethnographic Notes in Southern India* by Edgar Thurston, Superintendent, Madras Government Museum: "The Śālagrāma stone is a fossil ammonite, found in certain rivers, e.g., Gandaka, Son, &c., which is worshipped by Brahmans. The Śālagrāma is often adopted as the representative of some god, and the worship of any god<sup>5</sup> may be performed before it."

The following is taken from Mr. Nandalal Dey's *Geographical Dictionary of Ancient and Medieval India*:<sup>6</sup> "The Gandak rises in the Sapta Gandaki or Dhawalagiri range of the Himalaya which is the southern boundary of Central Tibet, and enters the plains at a spot called Tribeni Ghat. The source of the river is not far from Śālagrāma, which was the hermitage of Bharata and Pulaha. The temple of Muktinātha (an image of Nārāyaṇa) is on the south of Śālagrāma. Hence the river is called also Śālagrāmi and Nārāyaṇi (*Brahmavaivarta Purāṇa*)."

<sup>1</sup> Ancient Geography of India (1871), p. 432. Kushinagara has been recently discovered by Pandit Hirānanda of the Lucknow Museum at the village called Cassia in the district of Gorakhpur, U. P.

<sup>2</sup> Cunningham's *Ancient Geography*, pp. 444, 448.

<sup>3</sup> The Mahānadi is the modern Mahānandā flowing through the district of Malda which contains the sites of ancient Gauda and Pandua, and not the Mahānadi of Orissa.

<sup>4</sup> *Devi Bhāgavata* IX, 17, 30-36, IX, 19, 87-91, IX, 23, 23-38, IX, 24, 56-58.

<sup>5</sup> See the names and forms of the deities on pp. 343-349 of Oppert's *Original Inhabitants*.

<sup>6</sup> Pp. 19-20. (Newman & Co., Calcutta, 1899).

In *The Original Inhabitants of India*<sup>1</sup> by Mr. Gustav Oppert we have a long dissertation on the Śaṅgrāma and the Gandakī—with all the literary and religious traditions associated with them. In the *Varāha Purāṇa* Gandakī expresses a wish to become the mother of Viṣṇu, and the same desire is mentioned in the *Lakṣmī Nārāyaṇa Samvāda*. The *Padma Purāṇa* contains a story according to which Indra sent the nymph Manjuvāc to disturb the penance of the sage Vedasiras, who cursed her that she might become a river, but kindly altered his decision in so far that she would become the holy river Gandakī in which Viṣṇu would be re-born as the Śaṅgrāma stone.

### iii. *Dākṣiṇātya*.

*Dākṣiṇātya*<sup>2</sup> has been mentioned in *Sukranīti* as the land where Brahmans marry maternal uncles' daughters. This has been discussed previously in connexion with the directions and divisions of India. It may be mentioned here that the term does not describe any one portion of India south of the Vindhya, e.g., the Bombay Deccan and the Madras Deccan, but the whole peninsula, and comprises all the nine separate kingdoms, exclusive of Ceylon, included in Hsien Tsang's Southern India, i.e., "the whole of the peninsula to the south of the Tapti and Mahānadi rivers, from Nāsik on the west, to Ganjam on the east." What is now known as the Deccan plateau or at any rate, the Bombay section of the Deccan, had in Hsien Tsang's time, the special name of *Mahārāṣṭra* and could not be described by the term *Dākṣiṇātya*. *Mahārāṣṭra*<sup>3</sup> was only one of the kingdoms of the *Dākṣiṇātya* or Southern India as described by Hsien Tsang, and lay to the south-west of Harṣa-vardhana's empire, as Ganjam to the south-east.

The following lines from the third section of the *Early History of the Deccan* by Sir Rāmkrishna Gopāl Bhandarkār prove the antiquity of the word *Mahārāṣṭra* as a separate name for a particular region of peninsular India :—

"Whether the name Maharattha or Maharashtra had come into use in the time of Asoka does not appear clear from this, but that it was used in the early centuries of the Christian era admits of little doubt. In some inscriptions in the cave-temples at Bhājā, Bedsā and Kārli which are to be referred to the second century, the male donors are called Maharathi and the female Maharathini.....Of the old Prakṛits the principal one was called Maharashtri because we are told it was the language of Mahārāṣṭra. Varahamihira also, who lived in the beginning of the sixth century, speaks of Mahārāṣṭra as a southern country."

In explaining the etymology of the word "Dekkan" and its denotation, the same authority says :

"The word Dekkan represents the vernacular pronunciation of the Sanskrit word *Dakṣiṇa* meaning 'Southern' used to designate the portion of the Indian peninsula lying to the south of the Narmadā. The name more usually met with in Sanskrit works and elsewhere is *Dakṣiṇāpatha* or "the southern region." That this name was in

<sup>1</sup> Pp. 237-56 (Archibald Constable and Co., London, 1898).

<sup>2</sup> Sakra IV, v, 34.

<sup>3</sup> Cunningham's *Ancient Geography*, p. 14.

ordinary use in ancient times is shown by the fact that the author of the *Periplus* calls that portion of the country Dakshinabades. \* \* \* Dakshinapatha or Dakshina was the name of the whole peninsula south of the Narmada. Among the countries enumerated in the Mārkaṇḍeya, Vāyu, and Matsya Purāṇas as comprised in Dakshināpatha are those of the Cholas, Pāṇḍyas and Keralas, which were situated in the extreme south of the peninsula and correspond to the modern provinces of Tanjor, Madura and Malabar."

Dakṣiṇātya is therefore not identical with Mahārāṣṭra, as the popular notion seems to be, in which sense Sir Bhandarkar has taken it for his celebrated *Early History*. A historical account of peninsular India or the Dakṣiṇātya has been written from original sources by Mr. Aiyangar in *Ancient India*,<sup>1</sup> from which the following is quoted :

"When Yuwan Chwang (Hsien Tsang) travelled through the country in A.D. 640 we find India marked out into three clearly defined political divisions. Harshavar-dhana.....ruling over Hindusthan to the frontiers of Assam; Pulikesin II of the Māhārāṣṭra at Badami with his younger brother at Rajamahendri; and Narasimhavarman Pallava at Kanchi." "These two dynasties (Chālukya and Pallava) with their capitals respectively at Kanchi and Badami (near Bijapur) continued the struggle for empire and were seen fighting constantly on the Tungabhadra-Krishna frontier."

#### iv. *Madhyadeśa*.

The probable site of *Madhyadeśa* also has been discussed in connection with the directions and divisions of India. I have taken it in the technical sense of the term as understood in Hsien Tsang's time. "It extended from the Sutlej to the head of the Gangetic Delta and from the Himalaya mountains to the Nerbada and Mahānadi rivers. It comprised all the richest and most populous districts of India with the single exception of the Gangetic Delta or Bengal proper. Of the seventy<sup>2</sup> separate states of India that existed in the seventh century, no less than thirty-seven, or more than one-half, belonged to central India." Manu Samhitā, however, defines Madhyadesa to be the land between the Saraswati (that loses itself in the sands) on the west and Allahabad on the east, and between the Himalayas on the north and the Vindhya on the south. The tract is thus smaller in extent than Hsien Tsang's area. But, as previously explained, it is difficult at present to specify the region meant by the authors of the Sukra cycle. It is clear, at any rate, that it cannot denote the land of aboriginal hill-tribes in the Central India of modern times, simply because beef-eating, fish-eating and unchastity have been mentioned as some of the characteristics of its people.

#### v. *Khaṣa*.

Khaṣa denotes both country and race in the *Sukranīti*. Khaṣa<sup>3</sup> has been mentioned as the country of an abnormal social custom where "people marry the widows of their brothers." Khaṣa is an old term in Hindu literature

<sup>1</sup> P. 224, 48.

<sup>2</sup> Cunningham's *Ancient Geography*, p. 328. The text has "seventy"; but, the number actually described is eighty-two, from which, deducting Persia and Ceylon, the true number of kingdoms is eighty.

<sup>3</sup> Sukra IV, v, 96.



mentioned in *Viṣṇu Purāṇa*, *Manu Samhitā*, &c. The following extract from Stein's *Rāj Tarangīnī* throws considerable light on this people: "In the South and West (of Kashmir) the adjacent hill-regions were occupied by Khaṣas. Their settlements extended as shown by numerous passages in the Chronicle in a wide semicircle from Kastvar in the south-east to the Vitasta valley in the west. The hill states of Rajapuri and Lohara were held by Khaṣa<sup>1</sup> families; the dynasty of the latter territory succeeded to the rule of Kashmir in the eleventh century. I have shown elsewhere that the Khaṣas are identical with the Khakha tribe, to which most of the petty chiefs in the Vitasta valley below Kashmir and in the neighbouring hills belong. We have already seen that the Khakhas have until very recent times worthily maintained the reputation which their forefathers enjoyed as marauders and turbulent hill-men." "Owing to its position on the most direct route to the Punjab, Rajapuri was necessarily often brought into political relations with Kashmir. When Houen Tsang passed through it, the kingdom of Rajapuri was subject to Kashmir. From the tenth century onwards we find the chiefs of Rajapuri as practically independent rulers." Houen Tsang does not give any account of the hill-tribes he passed through.

It is, however, not possible to make out the antiquity of the word Khaṣa. It may be mentioned in passing that the word occurs in the copper-plate of Nārāyaṇa-Palā<sup>2</sup> discovered at Bhiṣālpur recording a gift for the "dispensation of medicines to the sick, and food and shelter to the indigent."

### SECTION 3.

#### *General Aspect of the Country.*

The physical features or relief of the country described in *Sukranīti* can be understood but vaguely from the incidental references to hills and rivers, seas and islands.

#### (a) Hills.

That hills and mountains were some of the familiar sights to the poets of the Sukra cycle would be evident from the simile which compares the stature of an elephant with the peak of a mountain<sup>3</sup> as well as the mention of the fact that when people became miserable through abject poverty they used to leave this world out of despair and have resort to hills.<sup>4</sup>

The strategic importance of hills and mountains was also understood. Thus the site of the capital city is to be not very far from the hills.<sup>5</sup> These are perhaps to be regarded as the store-house of mineral and other resources in normal times, as well as strong defences against foreign aggression in times of danger. That the hills should be made to serve the purpose of ramparts for the capital situated in the plains is clear from the following suggestion of

<sup>1</sup> Stein's *Rāj Tarangīnī*, Vol. II, pp. 480, 488.

<sup>2</sup> Mitra's *Indo-Aryans*, Vol. II, pp. 267-74. Also *Manu* 10.44. The Khaṣas have been mentioned by Varāhamihira in *Brhat Samhitā* (6th Cent. A.D.)

<sup>3</sup> *Sukra* I, 205-6.

<sup>4</sup> *Sukra* III, 572-74.

*Sukra* I, 425-26

**Sukrāchāryya** :—"The wall (of the Capital city) should have many strong shrubs and have a system of well-built windows, and if a hill is not hard by,<sup>1</sup> should have a *pratīprākāra* or a second wall but less than itself in height."

Among the various fortresses mentioned in Section vi of Chapter IV there are *giridurgas*<sup>2</sup> or hill-forts which are described as being on high level and well-supplied with water. These forts<sup>3</sup> are known to be the best of all in point of military efficiency as presenting the greatest amount of difficulties to enemies. Thus "the fort that is protected by ditches only is the lowest of all, and the hill-fort is the best."

It is not probable that the regions for which this *Nilisāstra* is intended are mountainous or rocky in any special degree. The hills do not seem to have been the characteristic features of the lands, though they have been mentioned as some of the objects with which people become familiar through travel. "Through travel the numerous religious customs, materials, animals, races of men, hills,<sup>4</sup> etc. come within the cognisance of man."

(b) *Rivers.*

The country of the poets of the Sukra cycle is not only a land of hills but it is also a land of rivers. The suggestion that the capital should be built at a place that is bestirred by the movements of boats<sup>5</sup> indicates the importance given to rivers by Sukra in his description of an ideal economico-political organisation. That the authors were very familiar with rivers would be evident from the political application that naturally suggested itself to them in the matter of diplomatic relations. Thus in advising rulers to bow down to powerful enemies Sukrāchāryya illustrates his point by the mention of the fact that the 'cloud never moves against the current of the wind' and that 'the rivers<sup>6</sup> never leave the downward course.' A common natural phenomenon has been here pressed into service to explain what in terms of modern statesmanship would be called 'moving along the line of least resistance.' So also in advising the king to restrain passions and try cases or administer *Vyavahāras* according to *Dharma*, the author mentions that the subjects follow the king who does this, "as the rivers the ocean." The fact that Sukrāchāryya has to lay down the humane rule that if a "bound-down" or *āsiddha* person<sup>7</sup> violates the limitations imposed upon him when swimming a river, &c., he is not guilty (and should not be punished) is also an evidence in point." The rule that "anybody who can save somebody's wealth from absolute destruction owing to the ravages of water or deluge<sup>8</sup>, (from rivers, &c.) has right to one-tenth" points to the same adaptation of juristic ideas to the physical features of the country.

Rivers are no negligible features in the topography of the country for which Sukrāchāryya's code has been designed. The fact that rivers<sup>9</sup> are very

<sup>1</sup> Sukra I, 478-9.

<sup>2</sup> Sukra IV, vi, 8-9.

<sup>3</sup> Sukra IV, vi, 11-12.

<sup>4</sup> Sukra III, 262-63.

<sup>5</sup> Sukra IV, v, 601-2.

<sup>6</sup> Sukra I, 425-28.

<sup>7</sup> Sukra IV, vii, 492.

<sup>8</sup> Sukra IV, v, 210-211.

<sup>9</sup> Sukra IV, v, 564-64.

<sup>10</sup> Sukra III, 283-284, "one should not trust the abodes (beds or channels) of rivers."

changeable and constantly shift their beds was well-known. And the advice<sup>1</sup> that one should not cross the rivers by arms or get into a boat that is likely to give way, indicates the familiarity of the authors with rivers. These are to be wisely used in the interests of the state's commerce. Means must be adopted to make them highways of water-traffic, as also the impediments presented by them to land-communication must be removed. That rivers should not be allowed to remain barriers to intercourse, as naturally they are, is sufficiently suggested in the following advice: "Bridges should be constructed over rivers.\* There should also be boats and water-conveyances for crossing the rivers." "Roads are to be provided with bridges."

But rivers have been mentioned in *Sukranīti* specially in connexion with agriculture and land-revenue, and the inferences that can be made from accounts of the natural resources of the state do also point to the importance of rivers as sources of the country's national wealth. The observation of Herodotus that 'Egypt is the gift of the Nile' is in the Hindu sage's language expressed by saying that the lands are the 'daughters' of rivers, or rivers are the 'mothers' of soils. But rivers are not the sole irrigators of lands, there are other mothers of lands also e.g., rains, tanks, wells, &c. In the assessment of lands the ruler is advised to make a distinction between land and land on the basis of the nature of the source of water-supply. Thus "the king should realise one-third, one-fourth, or one-half from places which are irrigated by tanks; canals and wells, by rains and by rivers respectively." The equity of this diversity of assessment lies in the fact that where rivers are irrigators the cultivation is certain, and hence the Government demand is heaviest. But Sukrāchāryya is also aware of the fact that, though rivers are superior to all other sources of irrigation in point of certainty, the moisture yielded by them, however, is not copious,—and do in fact yield the palm to clouds which, though precarious and uncertain, give abundant water when they do pour down their contents. The difference between rivers and clouds is like that between ordinary well-to-do men and sovereigns in the matter of riches. And the analogy that naturally suggests itself is expressed in the following lines: "Can the nourishment that is due to the rain-water from clouds be derived from the water of rivers<sup>4</sup> &c.? So also the promotion of the people's weal depends on the property of the king. Can this accrue from the wealth of the rich folk?"

From the above account of rivers<sup>5</sup> it would have been sufficiently clear that the authors of the Sukra cycle were well-acquainted with the importance of rivers in Politics, Commerce, Agriculture and Public Finance, and that the general aspect of the country is that of a plain intersected by rivers rather than that of rugged mountainous defiles and precipices.

<sup>1</sup> Sukra III, 52-53.

<sup>2</sup> Sukra IV, iv, 125-129.

<sup>3</sup> Sukra I, 85.

<sup>4</sup> Sukra IV, ii, 227-229, of. also Chapter III, 552-554. "Agriculture which is said to have rivers for mothers is a good occupation."

<sup>5</sup> Sukra V, 14-16.

## c) Seas.

Coming now to the hydrosphere of Sukrāchāryya's country we find that the sea is a familiar sight with the poets of the Sukra cycle. The connexion between the moon and the sea is too well-known to all Hindu poets. In describing or defining the seven constituent elements of a state Sukrāchāryya characterises the first element, the sovereign, as by nature or by connotation of the term the person who is the cause of the prosperity of this world, is respected by the experienced and old people and gives pleasure to the eyes (of the people) as the moon to the sea.<sup>1</sup>

A phenomenon connected with the sea which appears to have been very familiar with the poets or at least known to them by hearsay, *vis.*, the maritime navigation by boats, is very naturally pressed into service by the poet in describing the evils resulting from the imperfections of the ruler. Thus we read that "if the king is not a perfect guide his subjects will get into trouble as a boat without the helmsman sinks in a sea."<sup>2</sup> The comparison of the king with a *tarṇadhāra*<sup>3</sup> or helmsman piloting the 'ship of the state' is very suggestive. Nor is this all. The importance of sea and maritime commerce is adequately recognised by the statesmen of the Sukra cycle in the plan they have framed for the site and structure of the Capital city. It is to be situated at a place which, like the 'city of the seven hills' in ancient Italy, is to be near, but yet distant from, the sea.

Pliny ascribed much of the importance of Rome to this condition. We find Sukrāchāryya also suggesting that the spot is to be "bestirred by the movements of boats up to the seas." The capital is to enjoy the advantages of both rivers and seas. Communication with the sea has thus been recognised as an integral factor of the state's commercial wealth. It is also an element of the sovereign's political importance and dignity. The ambition of swaying the destiny of an empire from sea to sea or ruling the world encircled by the ocean has always fired the enthusiasm of Hindu kings and statesmen as would be evident from even a superficial study of Sanskrit literature as well as the inscriptions<sup>4</sup> on copper-plates and other materials describing gifts of lands, &c., to worthy persons or to the gods by sovereigns and ministers.<sup>5</sup>

Flatterers and sycophants as well as court-poets when applauding the merits of their protectors never stop short of the reference to the seas as the natural boundaries of their conquered territories. This ideal of having an

<sup>1</sup> Sukra I, 127-28.

<sup>2</sup> Sukra I, 129-30.

<sup>3</sup> The mention of *nāvika*s, boatmen or sailors, in connexion with the various crafts or industries to be maintained by the King (II. 404-5) also points to the importance of rivers and seas in the topography of Sukraniti.

<sup>4</sup> Sukra I, 425-28.

<sup>5</sup> Mr. Aiyangar's *Ancient India* contains various accounts of the maritime importance of the Chola Empire and Kingdoms in South India; and Mr. Akshay Kumar Maitra's *Gaudalekhamidā* or the Manual of the Inscriptions of the Pālas and Senas of Bengal gives numerous evidences of the natural ambition of rulers to be master of the seas.

empire bounded only by the sea is also present in the imagination of Sukrāchāryya, who, in urging the necessity of moral education of princes, sets before them this laudable mission of their lives as a sufficient spur to their self-culture. Thus, "how can the man who is unable to subdue one's mind master the world extending to the sea?"<sup>1</sup> Verily, the sea is the natural limit of one's ambition—the "scientific frontier" of Indian Napoleons.

An indirect knowledge of the sea and its inmates is suggested in the lines which advise people always to be humble and modest. Thus "the wise man should never consider 'I am superior to all, I am more learned than others,' for one should remember that there is the animal which devours the devourer of whales," *Rāghava* is the devourer of that even, and there is the destroyer of *Rāghava*." The whale is certainly a sea-animal, and the mammoth fish *Rāghava* is a monstrous marine creature celebrated in Hindu folk-lore.

Among the islands of the sea we have found that *Sinhala* or Ceylon has been mentioned definitely by name as the place where people can make artificial pearls. References to islands are to be met with only in two other places in this treatise. Thus in describing the grades of rulers in the order of their revenue Sukrāchāryya mentions the highest as the *Sārvabhauma*<sup>2</sup> or the paramount sovereign to be the ruler whose income, calculated according to modern Indian monetary standards, would exceed Rs. 416,666,666, and "to whom the earth with its seven islands is ever bound." The second mention of islands is in connexion with the punishment of offenders. "Persons who are wicked by nature should be expelled from the commonwealth and bound and transported to islands."<sup>3</sup> The use of islands as convict settlements is unmistakably suggested here.

From the foregoing description of general physical features of the country as are suggested by casual references or "internal evidences," it is not at all possible to make any definite inference as to the exact *locale* or surroundings in the midst of which *Sukranīti* might have been composed. The accounts are all of a very general character and cannot be traced to any special sets of geographical influences. It is, however, certain that the country does not present a dull monotony or uniformity of physical aspects, both in lithosphere and hydrosphere.

#### SECTION 4.

##### *Climate and Soils.*

The same diversity and variety of natural facts and phenomena of the land of Sukrāchāryya would also be clear from an analysis of the other aspects of its physiography, *e.g.*, its meteorology, geology and vegetation.

##### *I. Meteorology.*

Though *Sukranīti* is not a text-book of physical geography, the varied atmospherical and climatological conditions of the country familiar to the authors

<sup>1</sup> Sukra I, 197-198.

<sup>2</sup> Sukra I, 263-74.

<sup>3</sup> Sukra III, 446-447.

<sup>4</sup> Sukra IV, 215-216.

can be gathered from various duties prescribed to kings and people as well as from the description of customs and rites during the several periods of the year and from the metaphors or similes occasionally used in elucidating or illustrating the ideas.

### Heavenly Bodies

The sovereign is the lord of both "movable and immovable worlds;"<sup>1</sup> and among the thirty-two *vidyās* or sciences there is the mention of *Jyotiṣa* as one of the six *Vedāṅgas* or branches of learning auxiliary to the study of the Vedas. It is the science which "measures time by studying the movements of *nakṣatras* (stars) and *grahas*" (planets)" and the aid of other sciences. Besides, it is said that the movements, shape and nature of the *nakṣatras*<sup>2</sup> (stars) are one of the factors in the division of time into epochs or periods. In all these instances it is evident that Sukrāchāryya displays a knowledge of the heavenly bodies, both planetary and fixed, and is acquainted with the facts of their movements and their effects on time.

Some of these heavenly bodies have a double character—first, as members of the Solar System governing the conditions of time, season, &c., as noticed above, and, secondly, as apotheosised into divine beings and made rulers of certain directions of the Universe. The sun and the moon are two such gods in Hindu mythology, and Sukrāchāryya mentions that the sovereign, besides being made out of the permanent elements of other gods,<sup>3</sup> e.g., Indra, Vāyu, Yama, Fire, Varuṇa and Kuvera (who are the lords of six specified regions marked out by six points of the compass), has in him the attributes of the sun and the moon also. Thus "just as the moon pleases human beings by its rays, so also the king satisfies everybody by his virtues and activities." Also, "as the sun is the dispeller of darkness (and the creator of light), so the king is the founder of religion and destroyer of irreligion."

Besides the above comparison of the king with the heavenly bodies which is a common device in all *Nītiśāstras*, the poets of the Sukra cycle have displayed another popular fancy about the orbs of the celestial world. The nine *Mahārātnas* or great gems mentioned in *Sukranīti* have each a deity presiding over it. These deities have to be satisfied by people by putting on the gem that is favourite to each. These deities are the *navagraha*<sup>4</sup> or nine planets of the heavenly firmament, viz., the Sun, the Moon, the Mars, the Mercury, the Jupiter, the Venus, the Saturn, the Rāhu and the Ketu. The subject will be treated at length in the chapter on precious stones and metals. It may be mentioned here, in passing, that the colour attributed to these deities apotheosised out of the heavenly bodies, the *navagraha*, in the propitiatory hymns addressed to them exactly corresponds with the colour and lustre of the *Mahārātnas*,—*vajra*, *muktā*, *pravāla*, *gomeda*, *indranila*, *vaiduryya*, *puṣyarāga*, *pāchi* and *mānikya* which are supposed to be the favourites of those beings respectively.

<sup>1</sup> Sukra I, 141-148.

<sup>2</sup> Sukra I, 41-42.

<sup>3</sup> Sukra IV, iii, 88-89.

<sup>4</sup> Sukra I, 14-1151.

<sup>5</sup> Sukra IV, ii, 84.



*The Sun.*

The Sun has been already referred to as having something to do with Time in its capacity as a member of the Solar System. Its second character is that of a deity who gives light, whose attributes the king possesses. Its third character is that of one of the *navagrahas*, in which capacity it is to be propitiated by people by the use of the *māṇikya*<sup>1</sup> or ruby, "which has red colour and the bright lustre of the Indragopa insect."

Besides these super-terrestrial references, the mundane phenomena of the Sun as the "dispeller of darkness"<sup>2</sup> and the source of heat have also been mentioned in *Sukranīti*. Among the general rules of life it is stated that one should not always look to the Sun (III, 61). Sukrāchāryya compares the companionship of wicked characters to the rays of the burning Sun: "One should abandon the company of bad men which is terrible like the desert scorched by the summer Sun,<sup>3</sup> frightening and inhospitable." The Sun's rays, however, are not all terrible, they are of varying degrees. So it is only towards enemies that the king should display his character of the "summer Sun."<sup>4</sup> But towards his own people he should present the milder front of the "Spring Sun."<sup>5</sup>

As to the division of time noted above it is mentioned that there are three systems of temporal measurements. "Time is divided according to three systems—solar movement,<sup>6</sup> lunar movement (period from full moon to full moon, *i.e.*, two fortnights) and according to Savana (period from morning to morning, *i.e.*, 24 hours)." These three<sup>7</sup> systems do not yield equal results, the solar day being longer than the lunar; and so it is suggested that "in making payments of wages one should always take the solar<sup>8</sup> time, in augmenting interest, the lunar time."

*The Moon.*

The Moon, also, like the sun, has three-fold characteristics: (1) those of a member of the solar system governing time, seasons, &c., (2) those of a deity who gives pleasure, whose attributes the king possesses, and (3) those of the apotheosised celestial being who has to be propitiated by people by the use of its favourite gem, *vis.*, *muktā*<sup>9</sup> "which is of red, yellow, white and *śyāma* (greenish blue) colour."

In *Sukranīti*, the sun and the moon have been mentioned very often together:<sup>10</sup> and this not only with reference to the super-mundane affairs as

<sup>1</sup> Sukra IV, ii, 84-92.<sup>2</sup> Sukra II, 566-67.<sup>3</sup> Sukra I, 146.<sup>4</sup> Sukra II, 788-789.<sup>5</sup> Sukra I, 325-26.<sup>6</sup> Sukra II, 789-790.<sup>7</sup> Sukra II, 566-67.<sup>8</sup> Sukra IV, ii 85.

<sup>9</sup> Prof. Yogesha Chandra Ray has treated the subject very elaborately in his scholarly work in Bengali on *The Astronomy and Astronomers of the Hindus*.

<sup>10</sup> In describing feathers and hairy rings called *bhramas* on the horse's body Sukra says that two such marks on the forehead with space between indicate good and are like the Sun and the Moon. (IV, vii, 206-207).

noticed above, but also in the matter of secular references. Thus, if the influence of bad men is like that of the burning sun, that of good people is like that of the moon. "The man who is attended by good men gratifies the heart in the same way as the moon<sup>1</sup> with its cool rays pleases the tank with its newly blossomed lotuses." This parallelism is carried forward to the elucidation of the various attitudes the king should have. Thus, if he should be the summer Sun to enemies, and the spring Sun to his own people, he should bear the attitude of the autumn Moon to the learned people. The autumn is the season after the rains, hence very clear and generally cloudless; and the moon would then shine in all its glory. The king who has this attitude must have the most pleasant bent of mind; and this is what should be his mood towards the learned people. But the sun in spring season is hot enough, though milder than the summer sun; and this blending of mildness with severity should characterise his relations with the subjects, whereas he is to be solely severe and terrible towards the enemies. Again, as mentioned above, not only the sun, but also the moon governs the time. Among the three systems of temporal measurements<sup>2</sup> one is that of the division of time according to lunar movement, and this is to be adopted when the object is to augment the interest.

In Indian literature, generally, the moon plays an exceptionally conspicuous part. The poets of the Sukra cycle also have given indications of this partiality in their composition. We meet with references to the moon alone over and above the parallelism or antithesis between itself and the sun, as detailed above. Thus, it was mentioned in connexion with the sea that "the king is the cause of prosperity of this world, &c., and gives pleasure to the eyes of the people as the moon to the sea." Then again, in enumerating the divine parts or attributes of the sovereign, Sukra asserts that he should possess all the qualities of the eight gods. Otherwise, he is a mediocre. "As the moon<sup>3</sup> does not shine well if deprived of one of its parts, so the king does not flourish unless he has all the parts described above." The moon is thus beautiful and splendid only when it is full. But there are beauties and beauties; so the beauty of the moon, when deprived of some of its parts, say a quarter or a half or even seven-eighths,<sup>4</sup> is not insignificant. The shape of the half moon is a beautiful sight to the poets of the Sukra cycle, who have suggested that "the capital should have the beautiful shape of the half moon<sup>5</sup> or circle or square." The moon in Indian literature is not only a standard of beauty, but is also a common object-lesson of gradual growth. Thus the crown-prince is "to grow slowly like the portion of the moon<sup>6</sup> in the bright fortnight." There is another convention with Hindu poets regarding the parts of the moon. If the waxing of the moon in parts through a whole fortnight supplies the analogy for the development of adolescence in infants, especially

<sup>1</sup> Sukra I, 823-824.

<sup>2</sup> Sukra II, 566-567.

<sup>3</sup> The Astronomical knowledge of the poets of the Sukra cycle will be dealt with in a subsequent chapter.

<sup>4</sup> Sukra I, 429-430.

<sup>5</sup> Sukra I, 127-128.

<sup>6</sup> Sukra II, 101.

<sup>7</sup> Sukra I, 152.

<sup>8</sup> Sukra III, 482-483.

princes and princesses, the waning or the gradual reduction of its parts throughout the dark fortnight supplies the stock-in-trade for comparison with the giving away of wealth and property in charity. In the chapter on general rules of morality for the people, Sukrāchāryya thus describes the effects of gifts: "In this world there is nothing more capable of subduing others than charity and simplicity. The moon<sup>1</sup> that has waned through gifts, when waxing, is beautiful, though in the form of a curve." Here we have both the beauty of the curve and the comparison of giving away with waning in the same line. It has to be noted, moreover, that shape is only one of the elements in the beauty of the moon. The other element is lustre. Sukrāchāryya mentions it when describing a weapon of war, e.g., the "*Kṣuraprāṇa*" which is high to the navel, has a strong fist and the lustre<sup>2</sup> of the moon."

### *The Atmosphere.*

We have seen above that the ambition of paramount sovereigns in India was never restricted to the lithosphere and that in quest of victory they must reach and govern the hydrosphere also. The glory of swaying even the atmosphere is, likewise, another touchstone of monarchical sovereignty. With Hindu poets it is a common device in extolling their heroes to cry them up to the skies, both literally and figuratively. The man or sovereign whose fame does not reach the skies is not a famous person indeed. Kālidāsa in introducing the rulers of the solar dynasty to the readers of his celebrated *Raghuvamsam* mentions their mastery of the three worlds, the land, the water and the aerial regions in one short line, *āsamudra-kṣilīśānām ānākarathavartmanām* (i.e., his heroes were rulers whose sway included the earth and the sea and whose chariots used to traverse the highways of the sky).

Sukrāchāryya, therefore, in order to make his precepts of discipline and self-control palatable to the princes, does not forget to give them a sugar-coating by mentioning the glorious and enviable results of practising them in life. Thus, "of the monarch who has conquered his senses, and who follows the Nitisāstra, prosperity is in the ascendant and fame reaches the skies."<sup>3</sup>

There is another reference to the sky in *Sukranīti*. This is in connexion with the adoption of proper policies and methods of work with regard to friends and foes. "By appropriate means the terrestrial beings can soar into the sky<sup>4</sup> and even the thunder can be pierced." The efficacy of human intelligence is here illustrated by allusion probably to the air-chariots of ancient times, called *Vimānas* or *Puṣpakarathas* which have had a strong hold on Hindu popular tradition. Such an air-chariot piercing the thunder, i.e., going beyond the region of clouds, &c., and traversing the whole distance of India from Ceylon in the South to Ayodhya in Upper India has been immortalised by Kālidāsa in the 13th canto of *Raghuvamsam*.

<sup>1</sup> Sukra III, 432-433.

<sup>2</sup> Sukra IV, vii, 427.

<sup>3</sup> Sukra I, 301-302.

<sup>4</sup> Sukra IV, 50.

The Air or Vayu has been mentioned as one of the eight gods whose attributes the king possesses. Its function is propagation or diffusion. Thus "as Vayu<sup>1</sup> is the spreader (and diffuser) of scents, so is the king the generator (and cause) of good and evil actions." The current of the air has been suggested in the line which advises the king to move along the line of least resistance, just as "clouds do not move against the wind." The poets of the Sukra cycle have also mentioned the air as the friend of fire in order to draw the moral that Right always should follow Might and that morality does not flourish where there is no strength. The precept is given in the following lines: "One should follow *niti* or the moral rules so long as one is powerful. People remain friends till then; just as the wind<sup>2</sup> is the friend of the burning fire." A common phenomenon regarding the air has also been recorded: "It is possible to protect the lamp with its wick and oil from the wind<sup>3</sup> with great care."

#### *The Clouds.*

Clouds and rains have been often referred to in *Sukraniti*, as we have seen above in connexion with rivers. Rains<sup>4</sup> are some of the physical factors in the division of time into periods or epochs. The analogy by which the poets of the Sukra cycle illustrate the advantages of punctuality, regularity and keeping to time generally, indicates the very important place rains occupy in the physical and economic conditions of the people among whom they lived. The work done at the time appointed for it is certain to produce good results. Thus rains<sup>5</sup> in time give rise to plenty, but otherwise are highly injurious. In India, the land of monsoons, where people depend on the rains for cultivation, uncertainty and precariousness of the rainy season mean famine and ruin. This observation of the author, therefore, is certainly to be attributed to one of the predominant features of the physical environment. The same idea has been repeated in section 1 of Chapter IV: "Where the clouds do not pour rain<sup>6</sup> in season, there the lands are not productive and the commonwealth deteriorates, &c."

The lands that are irrigated by clouds pouring their contents upon them are said to be *devamātrika*, i.e., to have the gods or natural agencies, e.g., Indra the cloud-god, for their parent; just as lands watered by rivers are known to be *nadimātrika*, i.e., to have them as their mothers.

We have noticed previously that Sukrachāryya's Land-Revenue-Policy is equitable and elastic. Thus, where rain is the source of moisture, agriculture is precarious and uncertain, since the monsoons do often fail. Hence, the demand of the Government is to be very small compared with that from lands irrigated otherwise. "The king should realise one-third, one-fourth or one-half from places which are irrigated by tanks, canals and wells, by rains<sup>7</sup> and

<sup>1</sup> Sukra I, 145.

<sup>2</sup> Sukra IV, vii, 376-377.

<sup>3</sup> Sukra I, 41-42.

<sup>4</sup> Sukra IV, ii, 227-229.

<sup>5</sup> Sukra I, 573-574.

<sup>6</sup> Sukra I, 106.

<sup>7</sup> Sukra IV, i, 122-123.

by rivers respectively." It has also been noticed above in connexion with rivers that, though rivers are certain when compared with rains, they cannot however yield the plenty that nature does. Thus "can the nourishment that is due to rain-water from clouds<sup>1</sup> be derived from the water of rivers?"

There are two other references to clouds in *Sukranīti*, one is about their colour. The *Mahārāṭna Indranila* which is Satūrh's favourite, has the "colour of black clouds."<sup>2</sup> The other reference mentions them as the source or mother of pearls.<sup>3</sup> This will be discussed in a subsequent chapter.

#### *The Seasons.\**

The foregoing accounts of the country of the poets of the Sukra cycle leave no doubt that, generally speaking, it is (1) a land of the powerful sun and (2) a land of rains. It is thus both hot and moist.

It is a noteworthy fact that there is no reference to extreme cold throughout the whole treatise, though there often occurs the idea of extreme heat. All the six Indian seasons of two months each have been mentioned in the treatise; and their explanation has been given to be the influence of temperature (*i.e.*, hot and cold) and moisture (*i.e.*, dry and wet). Sukrāchāryya divides Time in two ways: (1) Social or human, *i.e.*, historical, according to the events and movements in man's social life, *e.g.*, the age of Asoka, the epoch of the Reformation, &c., and (2) Physical, according to (a) the seasons and (b) the rotations and revolutions in the solar system which bring in days, nights, months, years. We have already alluded to the influence of the "movements, shape and nature of the planets" in connexion with the heavenly bodies. Here we shall point out the references in *Sukranīti* to the weather and seasons affecting the country's climate as determined by heat<sup>4</sup> and cold as well as drought and moisture.

The summer<sup>5</sup> which presents the sun scorching the desert has been already noticed; and we have also found that the king should present the front of the summer sun<sup>6</sup> towards the enemies. The summer being a terribly hot season, Sukra's advice to horsemen and jockeys of the Cavalry Department is that they should ride the horse<sup>7</sup> in the evening during that period, and to gardeners<sup>8</sup> that they should water the plants twice a day in the morning and evening. Again, as for the seasons of warfare, the "summer"<sup>9</sup> is the worst." In India the summer is technically known to be the period of two months from the middle of April to the middle of June.

The rainy season extends from the middle of June, when the monsoon generally sets in to the middle of August. We have already noticed the

<sup>1</sup> Sukra V, 14-15.

<sup>2</sup> Sukra IV, ii, 90.

<sup>3</sup> Sukra IV, ii, 117-118.

<sup>4</sup> See the summary of Kālidāsa's *Ritusamhāra* or 'Cycle of Seasons' in Macdonell's *History of Sans. Literature*, p. 337.

<sup>5</sup> Sukra I, 41-42.

<sup>6</sup> Sukra IV, vii, 266-267.

<sup>7</sup> Sukra I, 325-326.

<sup>8</sup> Sukra IV, iv, 105-106.

<sup>9</sup> Sukra II, 566-567.

<sup>10</sup> Sukra IV, vii, 446-448.

importance given by the poets of the Sukra cycle to the regularity or punctuality of the rains, also the place they occupy in the economy of nature from a calculation of which equitable assessments of Land Revenue are to be made. In the rainy season horses require to be carefully treated, and Sukra's positive advice to horsemen<sup>1</sup> is not to use them during that period. It is not a good season for the use of carriages,<sup>2</sup> cars or chariots. Nor is it a convenient time for warfare. "In the rainy season<sup>3</sup> war is not at all appreciated, peace is desirable then." But it is very convenient for gardeners and agriculturists who are advised never to water the plants<sup>4</sup> during this period.

The Indian Seasons have played a great part in the history of Indian warfares. The monsoons which give rise to tempests and heavy downpours, swollen rivers, and malarial swamps, have decided the issue of many battles and sieges in Eastern India. Relativity of politics to geographical environment is nowhere better illustrated than in the influence of the rains and rivers in Bengal and Assam. Can this, however, point indirectly to the locale or surroundings of the poets of the Sukra cycle?

The autumn is a delightful season in India, generally cloudless, or rather with deceptive invisible clouds, extending from the middle of August to the middle of October. The autumn moon is celebrated in Indian poetry, because its lustre is then gloriously set off against the background of a pure blue sky. We have seen that Sukrachāryya, in advising the sovereign to put on his most agreeable attitude when he has to receive learned men, asks him to be like the autumn moon. As for riders, they are enjoined to use the horse<sup>5</sup> in the morning in this season. The autumn is also one of the best seasons<sup>6</sup> for warfare.

The *Hemanta* is the season which forebodes the advent of winter. It extends from the middle of October to the middle of December. There are only two references to *Hemanta* in *Sukranīti*, both in connexion with military affairs. The *Hemanta*,<sup>7</sup> being a mild season, of decaying heat and increasing cold, horses may be used both in the morning and evening. It is also, like autumn, one of the best seasons for warfare.<sup>8</sup>

The winter is the next two months and has been mentioned in connexion with the riding of horses and also as a season for warfare. As in the preceding season, horses may be used both in the morning and evening in winter. It is likewise the most convenient period of the year for military operations. It is also enjoined that gardeners need not water the plants every day in winter;<sup>9</sup> they should do this every alternate day. As we have said above, the Sukra poets have dilated on the summer and its effects, but about the cold and the effects of winter generally they are very reticent. There is a mention of *huma* as one of the agencies that may injuriously attack the grains of the fields. But it is not clear what the purport seems to be. It may mean both dews and

<sup>1</sup> Sukra IV, vii, 268.

<sup>2</sup> Sukra IV, vii, 352-353.

<sup>3</sup> Sukra IV, vii, 446-448.

<sup>4</sup> Sukra IV, iv, 105-106.

<sup>5</sup> Sukra IV, vii, 266-267.

<sup>6</sup> Sukra IV, vii, 446-448.

<sup>7</sup> Sukra IV, vii, 266-267.

<sup>8</sup> Sukra IV, vii, 446-448.

<sup>9</sup> Sukra IV, iii, 56-57.



snows. The king has been advised to preserve in a store-house against future calamities such "grains as have not been attacked by poisons, fire or snows" (dews?) or eaten by worms and insects, &c."

There may be a presumption that the summer being the principal season of the area within which the poets lived has left its influence upon their work; while the winter there being only one of the six seasons, and of no considerable inclemency, has been but scantily noticed and has had a very subsidiary effect on the poets' thought and life. If anything can be argued from the negative, it may be mentioned, as we have had reasons to state above, that the country of the poets of the Sukra cycle is a land pre-eminently of the summer and the rainy seasons.

The last Indian season is the Spring extending from the middle of February to the middle of April. It is the season *par excellence* of Hindu poets, the period of the hegemony of Madana, the Cupid of Hindu mythology.<sup>2</sup> But the poets of the Sukra cycle are too prosaic statesmen and diplomats to be swayed by the conventions of orthodox poetical style. In fact, the whole work of Sukrachāryya bears throughout the character of a serious matter-of-fact treatise on the most momentous problems of human life; and the authors have systematically and consistently maintained their dignity by not indulging in a single superfluous epithet or unnecessary descriptions and digressions in the interest of rhetoric, word-painting or the like; though no doubt the arrangement is occasionally diffuse and inconsequential, as in the works of Adam Smith and Montesquieu. *Sukranīti* is the last work to be handled for specimens of literary grace or embellishments. This is unfortunately one of the many reasons which prevent it from being characterised as the work of a certain epoch of literary history. Its style is that of solid scientific Sanskrit and cannot be easily put into one of the classes of ordinary poetry in Sanskrit literature. This will be elaborately discussed in a subsequent chapter.

There are four references to the spring in *Sukranīti*. The first is that in which the king is advised to be like the spring-sun, *i.e.*, neither too mild nor too severe, in the treatment of his own people. The second is in connexion with the use of horses. As in the Hemanta and winter, one should ride the horse both in the morning and evening in the spring season.<sup>1</sup> The third reference describes it as a good season<sup>3</sup> for warfare, better than the rains and the summer, but worse than the autumn, Hemanta and winter. The fourth mention of the spring is in connexion with the watering of plants during this period. This is advised to be done in the fifth part of the day, *i.e.*, in the afternoon.

## II. GEOLOGY.

As could be inferred from the accounts given above, the country of Sukrachāryya is mainly agricultural. From the diverse references to the occupations of the people it would be apparent that the soil is one which is fit for pasture and agriculture. And from the frequent mention of grasses, woods, forests

<sup>1</sup> Sukra IV, iii, 56-57.

<sup>2</sup> Sukra IV, iv, 185-186.

and other signs of rank luxuriant vegetable growth, also, one could easily infer that the crust of the earth is made up of damp alluvial soil. But the poets of the Sukra Cycle know of other regions besides these fertile plains. They mention deserts scorched by the summer sun, as we have noticed above. Among fortresses<sup>1</sup> there are those in deserts also, and these are superior to the forts which are surrounded on all sides by ditches only. Then there are the "barren and rocky soils"<sup>2</sup> from which, according to the humane legislation of Sukrachāryya, the king should realise only one-sixth as Government Revenue, as opposed to one-half from lands irrigated by rivers. Sukra mentions "uneven"<sup>3</sup> grounds also, and advises the horsemen to take special care in, or rather refrain from, using those regions. It is not clear, however, what is meant by 'uneven' lands. There may be a reference to ordinary undulations as are to be met with often in plains, or even to hilly tracts which are uneven wholesale.

The treatise of Sukrachāryya contains several references to the earth underground. That the earth carries in its womb precious metals is a commonplace idea in Hindu literature. Possession of wealth is, in fact, an attribute of the earth. Sukrachāryya also says: "The man who is powerful, intelligent and valorous enjoys the earth<sup>4</sup> full of its wealth." This is Sukra's version of the idea contained in the adage *Virabhogyā Vasundharā* (the *Vasundharā*, the earth, which bears wealth can be enjoyed by the heroes alone). 'Mines'<sup>5</sup> have been often mentioned as one of the sources of Government Revenue. The section on Treasure gives details about precious stones, metals and other mineral products.<sup>6</sup> This will be treated fully in the next chapter—*The Data of Ancient Indian Mineralogy*.

The mention of sulphur<sup>7</sup> and *Suvarchi* salt (Saltpetre) in connection with the preparation of gunpowder may, however, be noted here.

## SECTION 5.

### *Flora and Fauna.*

We have found the country described in *Sukranīti* to be a land of diverse natural and physical features. Its wealth of mineral resources has also been hinted at in the last section. Nor is the land poor in its vegetable and animal denizens. The poets of the Sukra Cycle have nothing to do directly with plants, trees and shrubs or with birds, fishes and mammals. It is only in a subsidiary or auxiliary capacity, e.g., as bearing on the social, economic and

<sup>1</sup> Sukra IV, vi, 2, 11-12.

<sup>5</sup> Sukra IV, vii, 268.

<sup>2</sup> Sukra IV, ii, 280.

<sup>4</sup> Sukra I, 349-50.

<sup>3</sup> Sukra II, 211-212, 671-672; IV, ii, 213.

These and allied subjects have been dealt with in the Bengali works on Gems by Prof. Yoges Chandra Ray and Dr. Ramdas Sen as well as in that valuable exposition of Hindu Culture in some of its secular aspects, *The History of Hindu Chemistry*, by Dr. P. C. Ray.

<sup>7</sup> Sukra IV, vii, 400-404.

political life of man, that these creatures of the lower living world have any place in the treatise of Sukrāchāryya. But even then the authors have displayed a good deal of knowledge about the habits, habitats, food, diseases and structure or external characteristics of the plants and animals, as well as the uses to which they are put by man for the furtherance of his ends of life. We shall form an estimate of the Botanical and Zoological knowledge of these authors of the Sukra Cycle in subsequent chapters. This, together with an account of the mineral products of the country, would give an Economic Geography (as well as History) of India in ancient and mediæval times. In this section we propose to give only the names of the plants and animals occurring in *Sukranīti*.

#### I. PLANTS.

Grasses and woods have been mentioned several times. Among the functions of the Sudras one is that of carrying wood and grass.<sup>1</sup> The Capital should be situated at a place that abounds in trees and shrubs and plants, is endowed with good supplies of grain and is happily provided with resources in grasses and woods. There is an injunction that the wall of the capital city should have many strong shrubs.<sup>2</sup> Among the persons to be expelled from the commonwealth like "sturdy vagabonds" are people "who live on alms even though they are capable of collecting wood and grasses."<sup>3</sup> Men who collect grasses and woods<sup>4</sup> have to pay revenue to the state to the extent of one-third, one-fifth, one-seventh, one-tenth, or one-twentieth.

Vast forests<sup>5</sup> where elephants run to and fro have been mentioned figuratively in connexion with the moral training of the sovereign. "In a forest" of six *yojanas* (i.e., forty-eight miles) the best *Rājamārga* is to be constructed; in the middle, the average, and between the two the worst." So the Forest-Administration of the State has provision for roads in extensive woody lands. Forests<sup>6</sup> are rich in wild games which are to be killed by kings in their hunting excursions that should be regular features of their lives. The forests are administered by a special officer<sup>7</sup> well up in agri-flori-horti-arboriculture, as we should say in modern times. Solitary forests should not be frequented or even visited by people. This is one of the general rules of morality. The man who has a bad wife or who has to live on alms has been advised to "prefer life in a forest."<sup>8</sup> Forests are the places where wild trees should be planted. Among forest-produce there is the mention of honey.

Creepers have been mentioned only once, "Pandits, females and creepers"<sup>9</sup>, do not flourish without resting grounds." The causes of the development of flowers<sup>10</sup> and fruits are known to the superintendent of parks and forests. Three of the sixty-four *kalds* or arts are the planting, grafting and preservation

<sup>1</sup> Sukra I, 85-86.

<sup>2</sup> Sukra I, 425-428.

<sup>3</sup> Sukra I, 478-479.

<sup>4</sup> Sukra IV, 1, 209-210.

<sup>5</sup> Sukra IV, II, 287-288.

<sup>6</sup> Sukra I, 198-199.

<sup>7</sup> Sukra I, 528-529.

<sup>8</sup> Sukra I, 665-666.

<sup>9</sup> Sukra, II, 817-819.

<sup>10</sup> Sukra III, 576-577.

<sup>11</sup> Sukra I, 707.

<sup>12</sup> Sukra II, 817-819.

of plants, the use of preparations from sugar-canes<sup>1</sup> and the knowledge of the mixtures of metals and medicinal plants. Every root is supposed to have medicinal properties (II, 254-255).

Sukrāchāryya has divided trees into two classes, domestic and wild, and enumerated them in Section iv of Chapter IV. Besides these trees, several plants have been mentioned in *Sukranīti*, by name, which are being enumerated below: bamboos (IV, ii, 117-118; IV, iii, 190), lotus (I, 211-212), mustard (III, 619-620), betels (IV, iii, 198), paddy, fila, māsa, mudga, yava (IV, iv, 107-108), peas, IV, vii, 285-286), cotton (IV, vii, 356-357), arka, snuhi, wheat (IV, vii, 432-33) and garlic (IV, vii, 400-404).

A careful study of the "habitats" or "Distribution" of these trees, plants and shrubs is likely to be of considerable help in determining the geography of the locality which produced the *Sukranīti*. This will be done in a subsequent chapter. The study of Plant-Geography with this object is more important than that of the distribution of minerals. For minerals, as commercial merchandise, may be transported easily from the localities which produce them, whereas plants are more or less stationary commodities which tell their own tale as to the soils, surroundings, etc.

## 2. ANIMALS.

Facts of Zoo-Geography also, like those of Botanical Geography, can be gleaned from passages in *Sukranīti*. But the enumeration of the animals referred to in it, though no doubt it may point, to a certain extent, to the physical environment of the authors' lives, is less important in this respect than that of plants, since common domestic animals, e.g., birds, etc., as well as those used in the Army may be brought from a distance as marketable commodities. This aspect of the question, together with the knowledge of Zoology displayed in the work, will be treated at some length in a forthcoming chapter. Here we shall simply enumerate the various animals mentioned in the work to give an idea of the diversity of the lower creatures that has left its impress on the work of the authors of the Sukra Cycle.

Snakes and tigers have been often mentioned, and in various connexions. Among the wild animals or "big games" of the forest we find lions<sup>2</sup> and bears.<sup>3</sup> The domestic animals are many, e.g., cows, buffaloes, goats, cats, dogs, sheep, deer. The aquatic animals are the fishes, cowries (II, 712-713), conches (II, 402-403), whales,<sup>4</sup> Rāghava,<sup>5</sup> crocodiles, tortoise (I, 531), oyster shells.<sup>6</sup> The Animal-corps consists of the horse, the elephant, bulls and camels. Among birds we have the cuckoo (I, 337-338), the peacock,<sup>7</sup> the drake (I, 337-338), the cock (I, 654-657), the parrot (II, 300-2), the crane (I, 654-657), the pigeon or dove, the partridge, the hawk (II, 300-21) and the *chāsha* (IV, ii, 87). Besides these, there are monkeys (I, 654-657), boars,<sup>8</sup> ants (III, 20-22), worms (III, 20-22), flies (III, 33-34), bees (III, 33-34) and rats (I, 654-657).

<sup>1</sup> Sukra IV, vii, 144-147.

<sup>2</sup> Sukra IV, i, 48-49; IV, iv, 381-384; II, 85-87.

<sup>3</sup> Sukra IV, vii, 380.

<sup>4</sup> Sukra III, 446-447.

<sup>5</sup> Sukra IV, ii, 117-118.

<sup>6</sup> Sukra I, 335-38; I, 665-666.

<sup>7</sup> Sukra III, 262-263.

## CHAPTER III.

### THE DATA OF ANCIENT INDIAN ETHNOLOGY.

#### SECTION I.

##### *Sukranīti as a source of Ethnological Information.*

Having briefly surveyed the plants and lower animals in the preceding sections it now remains to point out the races or tribes of men mentioned in *Sukranīti* to complete the picture of Bio-geography that may be deduced from it. But the poets of the Sukra Cycle are very chary of any positive information regarding the various nationalities that lived in their time. *Sukranīti* is the last work in which one should search for ethnographical details about ancient India. We have seen also how poor the work is as a manual of ancient and mediæval Indian geographical names. This is all the more striking, since the work being purely socio-economic and socio-political is expected to be rich specially in the names of kingdoms, peoples, princes and cities. But as the matter stands, the authors fight shy of individual names and deal only with generalities. That the country was a land of diverse races, creeds and tongues as well as of diverse plants, animals, minerals and natural features is evident from the references to "other lands and peoples," "strange countries," "countries and languages," we have already discussed, as well as from the mention of the writing of the characters of the various languages as one of the sixty-four *kālās* or arts. We have already noticed also that among the benefits of travel has been mentioned the pleasure of knowing the numerous religious customs, materials, *races of men*,<sup>1</sup> hills, etc. The caste divisions with their intermixtures and customs (both domestic and social) which the Sukra authors have described in detail will form the subject of a separate chapter. The intermixtures,<sup>2</sup> and *antyajās* that have been mentioned in the section on the *arts and sciences* refer to the castes and will be treated along with them. Here we propose to survey the few details about the races of men mentioned in the treatise.

#### SECTION 2.

##### *The Races.*

The following are the tribes mentioned in *Sukranīti*: (1) Yavanas, (2) Khadas, (3) Mlecchas, (4) Purvadevas or Asuras, (5) Rakṣasas, (6) Pisāchas, (7) Kirātas, (8) Āryas.

##### *Yavanas.*

We have seen in a previous chapter that Yavanas, according to *Sukranīti*, "have all the four castes mixed" together. They recognise authority other than that of the Vedas and live in the north and west, their *sāstras* have been

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<sup>1</sup> Sukra III, 262-263.

<sup>2</sup> Sukra IV, iii, 22-23.

<sup>3</sup> Sukra IV, iv, 74-77.

framed for their welfare by their own masters. But the rules that are followed for ordinary purposes are the same in the two cases." The purport is, that Yavanas differ from the children of the soil only in religion, but in matters of business, politics and the like there is no difference. The poets of the Sukra Cycle have mentioned *Yavanamata* or Yavanism as one of the thirty-two *vidyās* or branches of learning. It is that philosophy which "recognises God as the invisible Creator of the Universe and recognises virtue and vice without reference to *Sruti* and *Smṛiti*, and which believes<sup>1</sup> that *Sruti* contains a separate religious system." It is thus the non-Vedic creed, or speaking generally, an alien or non-national faith.

#### *Khaṣas.*

We have seen that the Khaṣas have been mentioned only once. They are a people living in mountainous tracts to the south and west of the vale of Kāshmir. They are a people "who marry the widows of their brothers."<sup>2</sup>

#### *Mlechhas.*

Sukrachāryya refers to Mlechhas five times. "Those who have deserted practising their own duties, who are unkind and troublesome to others, and who are very excitable, envious and foolish are Mlechhas."<sup>3</sup> The term has been used here metaphorically to connote certain undesirable, barbarous or alien characteristics rather than denote a race or tribe of men ethnologically or politically or even socially distinct from the ruling or predominant people. We find the term used in its literal sense as the name of a distinct race, caste or class of men in the following lines which describe the qualifications of persons from among whom recruits are to be drawn for the army as "officers" and "men." "Those who are well up in *Nītisāstras*, the use of arms and ammunition, manipulations of battle array and the art of management and discipline, who are not too young but of middle age, who are brave, self-controlled, able-bodied, always mindful of their own duties, devoted to their masters, and haters of enemies should be made commanders and soldiers whether they are Sudras, or Kṣatriyas, Vaisyas or descended from Mlechhas."<sup>4</sup> These lines exclude only the Brahmanas of the predominant or the Aryan race recognising the system of castes and stages, and allow all the other three castes to be enlisted in the army. They, however, mention a fourth class of men who may be likewise enrolled. They are evidently beyond the pale of Aryaism or Caste-and-stagism and certainly form a social polity by themselves.

This literal sense, however, is not observed, in the following lines. "The king who does not punish the false-speaking spy becomes the destroyer of the people's persons and properties and is called Mlechcha."<sup>5</sup> Here it is equivalent to an abuse or condemnation. The fourth reference in *Sukranīti* to the Mlechhas is in the literal sense of a race. This is in connexion with the Laws of Property.

<sup>1</sup> Sukra IV, iii, 124-126.

<sup>2</sup> Sukra IV, v, 98.

<sup>3</sup> Sukra I, 87-88.

<sup>4</sup> Sukra II, 276-280.

<sup>5</sup> Sukra I, 875-878.



"In the Śāstras sources of income as well as the castes are known to be various, and that Dharma of the Śāstras always binds even the Mlechchas."<sup>1</sup> According to the injunctions of Sukrāchāryya the Mlechchas also must abide by the regulations regarding title to property which are obeyed by the Brahmanas, Kṣatriyas, Vaiśyas and Sudras, i.e., the four castes of the Arya race. If the Mlechchas or whom the Greeks would have called "Barbarians," do not respect these laws, the community would be jeopardised, as is implied in the next line. "For the preservation of the community these have been fixed by previous sages." This is exactly what has been said about Yavanas<sup>2</sup> who, following their own apostles in matters of faith, must respect the civic laws of the state in which they live. The poets of the Sukra Cycle have displayed a pre-eminently modern conception by thus allowing freedom of religious convictions and practices but compelling obedience to one and the same system of non-religious laws throughout the realm. On the one hand, religious neutrality or toleration which implies a diversity of creeds, and on the other, uniformity or unity in economic, political and other secular interests,—these are the notions of the statesmen of the Sukra Cycle in the passages regarding the Yavanas as well as Mlechchas.

The literal sense of the term is to be noticed in the following lines where Mlechchas have been taken almost as a fifth caste or, at any rate, representing a class of men who do not fall within the fold of the four castes: "Not by birth are the Brahmana, Kṣatriya, Vaiśya, Sudra and Mlechcha<sup>3</sup> separated, but by virtues and works." Here, again, we have a very rationalistic interpretation of the Caste System, and this leads in the following lines to the use of the words, Brāhmaṇa, Kṣatriya, &c., almost in the metaphorical sense.

#### *The Demi-gods.*

Purvadevas<sup>4</sup> or Asuras are the disciples of the sage Sukrāchāryya. It is in the lectures of this Professor to his pupils that the present manual of socio-political science is said to have had its birth. The works of Plato and Aristotle in ancient Hellas had similar origins in the lectures to their pupils at the schools of the Academy and the Lyceum.

Vatāpi is a king of the Asuras<sup>5</sup> mentioned by Sukrāchāryya to have been ruined through folly. Asuras have been mentioned as wicked beings or demons who attend the divine beings, the gods in the religious rites which are celebrated for them. They are in fact demigods, and their images have to be constructed along with those of the benign gods who destroy them. Sukra enjoins that "the images of Pisāchas and Asuras<sup>6</sup> are to be always sixteen tālas (12 angūlas make 1 tāla). Hiranyakasipu, Vritra, Hiranyākṣa, Ravana, Kumbhakarna, Namūchi, Nisumbha, Sumbha, Mahisāsura, Raktavija—these are to be sixteen tālas in height." These are extraordinary dimensions, considering that the ordinary images of gods are to be not more than seven, eight, nine or ten tālas.

<sup>1</sup> Sukra IV, v, 586-587.

<sup>2</sup> Sukra IV, iv, 74-77.

<sup>3</sup> Sukra I, 75-76, 77-88.

<sup>4</sup> Sukra I, 1-4.

<sup>5</sup> Sukra I, 287-290.

<sup>6</sup> Sukra IV, iv, 179-183.

(or feet), and the normal is always the seven-tāla type for *Kali Yuga*. It is clear that Asuras here do not denote a race of human beings, but a class of demi-gods or supernatural creatures—the Titans of Hindu Mythology.

Rākṣasas are likewise a race of Titans, the enemies or rather rivals of gods, and have been mentioned in *Sukranīti* not so much as human beings as mythical giants. But as in the case of Asuras one of their kings has been mentioned along with other Paurāṇika kings and Rishis as instances of failure through vices. We read that "Rākṣasa<sup>1</sup> Paulastya was ruined through vanity." About the images of these Rākṣasas we are told that "they are to be ten tālas.<sup>2</sup> These images like those of the Asuras, Pisāchas and Rākṣasas, who may be figuratively regarded as their tribesmen, are to have "long thighs and legs, to be ferocious, cruel and vehement,<sup>3</sup> or sometimes very lean and thin."

#### *Forest Tribes.*

Kirātas are a class of Āraṇyaka or forest-tribes. They have been mentioned only once in *Sukranīti*, and that in connexion with the division of the Army into two orders—that of the Standing Army and that of the Militia or National volunteers. To this latter class belong the "Kirātas<sup>4</sup> and people living in the forests who have their own resources and depend on their own strength." These wild tribes are enlisted as soldiers, and they bring their own arms and accoutrements. These are probably independent races<sup>5</sup> who do not ordinarily acknowledge suzerainty of the neighbouring chief.

#### *Aryas.*

The word 'Arya' has been mentioned only once. We are told that the "man who abuses the Āryas<sup>6</sup> and the gods" is one of those who are to be expelled by the King from the Commonwealth.

### SECTION 3.

#### *Identification.*

We have now gone through the accounts of the Sūkra poets about the various races mentioned by them in their work. It is doubtful if we should regard Purvadevas or Aśuras, Rākṣasas, and Pisāchas referred to in the treatise as races of men, for they are really half-men, half-gods, belonging rather to the regions of demons, goblins and giants than to the mundane world of human beings. As for the others, the details are very few indeed. Except the Khasas who can be identified, as they have been in Stein's *Raj Tarangīni*, the Yavanas, Mlechchas and Kirātas are more<sup>7</sup> or less generic names of races very difficult to identify until the date of *Sukranīti* is fixed. This is, as I have suggested previously, *petitio principii* at the present stage of our knowledge regarding the branch of Hindu literature known by the name of *Arthasāstras* or *Nītiśāstras*.

<sup>1</sup> Sūkra I, 227-230.

<sup>2</sup> Sūkra IV, 17, 171-172.

<sup>3</sup> Sūkra IV, 17, 308-309.

<sup>4</sup> Sūkra IV, 17, 28.

<sup>5</sup> Sūkra IV, 1, 105-106.

The terms *Mlechcha* and *Yavana* are very elastic, "chartered words" as they are called, and have been very loosely applied by Indian authors to anybody who is not of their race, religion or country. They correspond to "Barbarians" of the Hellenes, "Pagans" or "Heathens" of the Christians, "Kafirs" of the Musalmans, and "Welsh" of the English people. That these terms had definite 'connotation' as well as "denotation" in the initial stages of their history there is no doubt. But in the course of time, at any rate in *Sukranîti*, they have come to be almost identical or synonymous, and as we have seen, both of them metaphorically used to indicate anything that is ignominious, vile or despicable. What, however, we can definitely gather from the passages in the works of the Sukra Cycle leads us to the idea that perhaps the term *Mlechcha* is the genus and *Yavana* is one of its species. Thus Yavanas are a class of men who belong to the Mlechcha group of human races.

The term *Kirâta*, again, had a special significance when first used. But in *Sukranîti* it seems to be a generic name for all forest tribes without any special race-characteristics.

Though *Sukranîti* is silent about the homes, characteristics, etc., of the races incidentally mentioned in it, it would be interesting to know them from other sources. We, therefore, proceed to throw a sidelight on these races from accounts to be found in Sanskrit Literature.

#### *Yavanas.*

We have already discussed the locality and nationality of the Yavanas and quoted at length Dr. Mitra's conclusions. We may mention here that the word *Yavana* is not to be found in Vedic literature. The newly published "*Vedic Index of Names and Subjects*" (in two volumes) by Messrs. Macdonell and Keith does not notice either Yavanas or Mlechchas among the sixty-six tribes<sup>1</sup> or races enumerated in its index. The following observations of Principal P. T. Srinivas Iyengar,<sup>2</sup> however, are important not only as throwing some light on who may be regarded as the counterpart of the Yavanas and Mlechchas in the age of the *Mantras*, but also as contesting the orthodox theory of the Aryan invasion of India :

"The Vedic Mantras mention the names of about forty tribes who inhabited the regions known to their composers. \* \* \* Scholars have given the name 'Aryas' to those tribes among whom the Mantras were composed and applied the name to a supposed Aryan race which sent successive swarms of invaders to India, Persia, Greece, Italy, Germany, France, Britain, and civilised those lands in pre-historic times. But the progress of anthropology has proved the invasion and civilisation of Europe by the 'Aryans' to be a myth. Scholars yet cling to the theory of an 'Aryan' race so far as India is concerned. \* \* \* The Aryas and Dasyus or Dâsas are referred to not as indicating different races, \* \* \* The words refer not to race but to cult. \* \* \* Arya meant a worshipper of Indra (and Agni), and Dasa or Dasyu meant either demons

<sup>1</sup> See pp. 580-1.

<sup>2</sup> *Life in Ancient India*, vol. II-15.

opposed to Indra or the people that worshipped these demons. \*\*\* The Dasyus are without rites, of different rites, fireless, non-sacrificers, without prayers, without Riks, haters of prayer. \*\*\*\* Thus the difference between the Âryas and Dasyus was not one of race but of cult. Nor was there any difference of culture between the Ârya and Dasyu. The Dasyus lived in cities \*\*\* possessed wealth, \*\* owned many castles. \*\*\* Indeed Dasyu and Arya have been understood respectively as enemies and advocates of the fire-cult \* \* Sayana defines Âryas to be those that sing hymns, practising fire-rites, and Dasyus to be enemies who destroy the observers of fire-rites, riteless."

Leaving aside the controversy as to whether the distinction was one of cult and faith only or of culture and race also, we need not hesitate to look upon the Dasyus or Dâsas, the enemies of the Âryas, as the "Yavanas" of Vedic India according to the definition of Sukrâchâryya.

The following extract from Mr. C. V. Vaidya's *Epic India*\* would throw a fresh light on the topic.

"In the Vedas the Aryans speak of themselves as distinguished from the Dâsas or aborigines and the Asuras or Iranians. Gradually through the epic period they lost sight both of the Iranians by distance and of the Dâsas or aborigines by extinction or assimilation. They now spoke of the Aryans as distinguished from the Mlechhas who surrounded their country. Let us examine who were included in that word. When the cow of Vasistha created the Mlechhas to destroy the army of Visvâmitra who was trying to take her away by force it is stated that the cow created from the several parts of her body the Pallavas, the Drâvidas, the Shakas, the Yavanas, the Shabaras, the Paundras, the Kirâtas, the Sinhalas, the Barbaras, the Khasas, the Chibukas, the Pulindas, the Chînas, the Hunas, the Keralas, and many other Mlechhas." \*\*\* It appears plain that the Dravidian peoples of the south were looked upon as Mlechhas equally with the Yavanas and Shakas. It seems also probable that the Aryans of India knew these Yavanas and Shakas and Hunas and Chînas long before they actually invaded India."

In *A Peep into the Early History of India*<sup>4</sup> Dr. Bhandarkar identifies the Yavanas with the Bactrian Greeks on the strength of a passage from Patanjali and the tradition alluded to by Kâlidâsa in the *Mâlavikâgnimitra* that Pushyâmitra's sacrificial horse was captured on the banks of the Sindhu or Indus by Yavana cavalry. "The instances given by Patanjali \*\*\* are *Arunad Yavano Madhyamikam*. This shows that a certain Yavana

\* Sukrâchâryya's account of Yavanas, who respect authority other than that of the Vedas and who have their own spiritual masters, exactly corresponds to this description of the enemies of the Vedic Aryas.

\* Pp. 25-26 (Edition of 1907).

<sup>4</sup> It would thus appear that Yavanas are a species of Mlechhas, as has been suggested above; not Yavanas only, but also the Khasas and the Kirâtas mentioned in *Sukraniti* are thus two branches of the Mlechhas.

<sup>4</sup> Journal of the Bombay Branch of the Royal Asiatic Society (1900). no. 370-72.

or Greek prince had besieged Saketa or Ayodhya and another place called Madhyamika when Patanjali wrote this. The late Dr. Goldstücker identified this Yavana prince with Menander. \* \* \* In another place Patanjali gives *Saka-Yavanam*, as an instance of an aggregate *Dvandva* which signifies that they were Sudras and lived beyond the confines of Âryavarta." In an analysis of the historical inscriptions in the Cave-Temples of Western India<sup>1</sup> Dr. Bhandarkar says: "Gotamiputra Satakarni quelled the boast and pride of Kṣatriyas and destroyed the Sakas, Yavanas and Pallavas." On the evidence of inscriptions and coins his conclusion is that the Graeko-Indian or Yavana kings<sup>2</sup> were in possession of parts of India from about the beginning of the second century before Christ to the arrival of Sakas.

Dr. Bhandarkar's testimony refers to the Yavanas as rulers or warriors, and as such we find them in Ayodhya in Upper India, and also in the Deccan, the land of the Satavahanas or Andhrabhritas. But as a people with a certain culture, language and faith the Yavanas have been known to the Indians since at least the sixth century B. C. when Paṇini the great grammarian<sup>3</sup> flourished.

#### *Mlechchas.*

About the more generic word Mlechchas we quote the following from Mr. Vaidya's *Epic India*:<sup>4</sup>

"At the end of the Epic Period the word Ârya comprises not only the three castes, but also the Sudra within it and is opposed to Mlechchas." Thus "all peoples who are outside the castes born of the head, the arm, the thigh, and the foot of Brahmā, whether they speak the Aryan or the Mlechcha languages are Dasyus." (Manu X, 46.)

The following is also taken from the same work :

"The Mahābhārata, Bhīṣma Parva, Chapter IX, mentions 157 peoples in Hindustan properly so called, 50 peoples in the south, i.e., to the south of the Nerbudda, and about 14 Mlechcha peoples beyond India in which term we include Afghanistan as well as Kashmir. \* \* \* The countries and peoples to the east<sup>5</sup> were originally looked upon as Mlechchas.<sup>6</sup> They were the Angas, Vangas and the Kalingas. \* \* The Northern<sup>7</sup> Mlechchas comprise almost all those people who were undoubtedly known at the end of the epic period after the conquests of Alexander. But we cannot but believe that many of these peoples must have been known to the Aryans several centuries before."

"The Mlechchas<sup>8</sup> who attempted to speak the Sanskrit language committed mistakes," as would be evident from the following verse in the *Âdi*

<sup>1</sup> Early History of the Dekkan, Section IV.

<sup>2</sup> A Peep into the Early History of India.

<sup>3</sup> Dr. Rajendralala Mitra's *Indo-Aryans*, Vol. II, (Edition of 1881), pp. 177-178

<sup>4</sup> P. 27.

<sup>5</sup> East of the Gandaki, the river mentioned in *Sukraniti* also.

<sup>6</sup> Vaidya's *Epic India*, pp. 280-288.

<sup>7</sup> *Ibid*, p. 271.

<sup>8</sup> *Ibid*, p. 231.

*Parva* of Mahābhārata: "*nāryā mlechchhanibhāshābhik*" or the Aryas do not 'mlechchhise' in speech, i.e., as the commentator explains it, do not commit mistakes in speaking, as has been already alluded to in connexion with Yavanas. The Mahābhārata constantly speaks of the Aryas, i.e., the orthodox population of the country between the Himalayas and the Vindhya range as distinguished from the Mlechchas who inhabited countries beyond these whether to the East, South or the West. In the *Bhīṣma Parva* it is expressly stated in the beginning that the peoples were Aryās, Mlechchas and mixed races."<sup>1</sup>

The metaphorical or non-literal use of the words, *Ārya*, *Yavana* and *Mlechcha* in certain passages of *Sukranīti* has already been hinted at. There are instances of this use in the Mahābhārata also. Mr. Vaidya says: "The Aryans had not only not forgotten their race, but had also not forgotten the superiority of their race in morality, and we find the epics constantly using the word *Arya* to signify what is good and high, conscious of the facts that the word meant originally a race and that high morals were characteristic of that race only. *Anāryajushla*<sup>2</sup> is an expression of frequent occurrence in the epics showing that "not practised by the Aryans" was synonymous with "not good" or "not moral."

For the earliest use of the word *Mlechcha* we have to refer to a passage in the Satapatha Brāhmaṇa, "where it occurs in the sense of a barbarian<sup>3</sup> in speech. The Brahmana is there forbidden to use barbarian speech."

The long extracts from the works of Mr. Iyengar, Dr. Bhandarkar and Mr. Vaidya must have made it clear that the Yavanas and Mlechchas have been names of different peoples in different periods scattered over various parts of India; and until and unless the date of *Sukranīti* is fixed it is impossible to identify the tribes who are meant by the poets of the Sukra Cycle in the passages which describe them as living in the North and West, professing non-Vedic faith and obeying their own spiritual guides. Or perhaps in these lines we have a clue to the date of the work, or at any rate, of certain portions of it. For whatever be the age of other parts of *Sukranīti*, it may be presumed that these lines were the composition of men at the time when Yavanas were definitely known to live in a specified quarter of India, namely *pratyaguttara*, i.e., 'North-Western' or 'Northern and Western.'

#### *Āryas.*

We have incidentally noticed above that the word *Ārya* was often used not for a race but for the qualities of good breeding, etc., that the civilised people or orthodox Indian nations represented. In the passage quoted above from *Sukranīti* regarding the persons who abuse the Aryas as well as gods, it is doubtful if the word has been taken literally or metaphorically. But from the general trend of the whole treatise we may gather that a people "consisting of all the

<sup>1</sup> Vaidya's *Epic India*, pp. 28-29.

<sup>2</sup> Vaidya's *Epic India*, p. 24.

<sup>3</sup> Note on the word *Mlechcha* in the *Vedic Index* by Macdonell and Keith, Vol. II, p. 181.



four castes is here meant as distinguished from the Mlechchhas." Messrs. Macdonell and Keith<sup>1</sup> give the following history of the word in Vedic literature: "Arya is the normal designation in the Vedic literature from the Rig-Veda onwards of an Aryan, a member of the three upper classes, Brahmana, Kshatriya, or Vaisya. \* \* \* The Arya stands in opposition to Dāsa, but also the Sudra. Sometimes the expression is restricted to the Vaisya caste. \* \* \* The word Arya also occurs frequently as an adjective to describe the Aryan classes or names. \* \* \* Aryan foes are referred to beside Dāsa foes, and there are many references to war of Aryan *versus* Aryan. \* \* \* In the later Samhitās and Brāhmanas the wars alluded to seem to be mainly Aryan wars." It is thus clear that the three upper castes were called Āryas and the lowest the Dāsas. In the course of time, *i.e.*, during the post-Vedic ages, the lowest classes, the Dāsas or Sudras, constituted the fourth caste of the Āryas. And the name Arya became opposed to Mlechchha, as we have seen above in the extracts from Mr. Vaidya's *Epic India*.

#### *Kirātas.*

The Kirātas have been mentioned in the Mahābhārata as a species of Mlechchhas born out of Vasistha's cow. Kālidasa's hero, Raghu, in his *digvijaya* or 'conquest of the quarters of the globe' overpowers the Kirātas and other hill-tribes, somewhere near the Kailāsa mountain in the Himalayan ranges. The word is found in Vedic literature also. The following is taken from the note on the word in the *Vedic Index of Names and Subjects*:<sup>1</sup> "Kirāta is a name applied to a people living in the caves of the mountains. \* \* Later, the people were located in Eastern Nepal, but the name seems to have been applied to any hill-folk, no doubt aborigines, though the *Mānava Dharma Śāstra* regards them as degraded Kṣatriyas.

#### *Rākṣasas and Pisāchas.*

It has already been remarked that Rākṣasas and Pisāchas, as used in *Sukranīti*, seem to be half-men, half-gods, and not full human beings. "In the early Vedic literature" Rākṣas refers to demons, and is only metaphorically applied to human foes. No definite tribe is meant." This is the verdict of Messrs. Macdonell and Keith, who also assert that "similarly Pisāchas are not a tribe in Vedic literature, whatever they may have been later." The following is their note to the word *Pisācha*: "Pisācha<sup>2</sup> is the name of a class of demons mentioned in Atharvaveda and later. In the *Taittirīya Samhitā* they are associated with Rākṣasas and Asuras, while opposed to gods, men and fathers. In the Atharvaveda they are described as eaters of flesh. \* \* It is possible that the Pisāchas were, as suggested by Grierson, really human foes like the north-western tribes. \* \* This is, however, not at all likely."

The following extracts from Mr. Vaidya's *Epic India* give us some idea of the homes of the Rākṣasas, whether regarded merely as 'ghouls' or real

<sup>1</sup> *Vedic Index of Names and Subjects*, Vol. I, pp. 61-5, in the "Indian Text" series.

<sup>2</sup> Vol. I, pp. 157-158.

*Ibid.*, Vol. II, 516.

human beings. The Rakshas and Rakshasas were originally a people who lived on the sea-coast. \* \* \* Even in their conquest of the Punjab and the Upper Gangetic valley the Aryans must have sometimes come in contact with fierce cannibalistic Dravidian races. \* \* \* Aryan adventurers \* \* plant colonies in the Central Provinces only at suitable places, though they were frequently infested by Rakshasas. \* \* \* In the Rakshas form of marriage the bridegroom was allowed to abduct by force the daughter of a Kshatriya whether she was a willing party or not. \* \* \* The modern Deccan was pre-eminently the country of the Rakshasas."

#### *Asuras.*

Asura is a very important word in Sanskrit literature, both Vedic and post-Vedic. We are especially interested in it, as our author Sukra is the *guru* or preceptor of the Asuras.

Rev. K. M. Banerjea is one of the first scholars to have studied the etymology of the word 'Asura' and the nationality of the race denoted by it. The following is taken from the Preface to his *Arian Witness*:<sup>1</sup> "No term in the Rig-Veda seems to have puzzled students, translators and commentators more than the word Asura. The modern idea denoted by the term is that of an ogre and a demon. The idea is annually embodied in the person of the Mahisāsura among the figures worshipped at the Durga Puja. He appears there as the fiercest of the goddess's enemies receiving his death wounds at her hands. In the Rig-Veda, however, the gods themselves are, all of them termed and accosted as Asuras, and one of them, introduced at the moment as the Creator of the Universe, is called the *all-knowing and wise Asura*. And yet the same Veda elsewhere gives an opposite picture of the character indicated by the term, corresponding to the modern ideal of a demon and an ogre, and the very same individuals are sometimes represented as Asuras, and again lauded as destroyers of Asuras. \* \* The Rig-Veda continues a witness of both senses, but the later Vedas and all subsequent *Sāstras* give exclusively the odious sense of evil spirits, hostile to gods and Brahmanas and inimical to their long-cherished institution of sacrificial ceremonies."

This double character of the Asuras as (1) gods as well as the people who worship the gods, and (2) devils as well as the people who worship the devils has been explained by the evidences of Comparative Philology. The two branches of the Primitive Aryans, *vis.*, the Iranians (Persians) who have developed the *Zend Avesta* with the theogony of the Asuras, and the Indo-Aryans (Hindus) who have developed the Rig-Veda with the theogony of the Devas were once living on the same soil in a common home. Various causes of differentiation led at last to their separation as enemies and vilification of each other. The two stages of their relations, *vis.*, friendly as well as inimical, have been portrayed in the sacred literature of both the peoples. It is in the second stage

<sup>1</sup> Vedic Index by Macdonell and Keith, Vol. I, p. 533.

<sup>2</sup> Vaidya's *Epic India*, pp. 6, 7, 8, 806.

<sup>3</sup> Published by Thacker, Spink & Co. (1875).

of their relations that the Iranian devils are the Indo-Aryan gods, and the Indo-Aryan devils are the Iranian gods. Thus the *Asuras*,<sup>1</sup> who are the beneficent gods of the western branch of the Aryans, have become the worst enemies of the *devas*, the gods of the eastern branch; while the *devas* of the eastern are the devils of the western.

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<sup>1</sup> This interesting topic has been dealt with by Dr. Rājendralala Mitra in his paper on *Primitive Aryans* in *Indo-Aryans*, Vol. II, and also in a short article by Mr. Maheshchandra Ghosh in the *Bengali Monthly*, the *Pravāsi*, Vol. VI, No. 11, pp. 587-593. For some of the characteristics of these eternal enemies of the Indian gods and peoples, see also Mr. Vaidya's *Epic India*, pp. 23, 25, 27, 93, 131, 294, 298, 353, 464, 504., and Fausboll's *Indian Mythology* (Luzac & Co.)

## CHAPTER IV.

### THE DATA OF ANCIENT INDIAN MINERALOGY.

#### SECTION 1.

##### *Sukraniti as the 'Architectonic' Science.*

Writing about Montesquieu, the French Philosophical historian of the eighteenth century, in his *History of French Literature*, Dr. Edward Dowden says: "The scientific researches of his day attracted him; investigating anatomy, botany, natural philosophy, the history of the earth, he came to see man as a portion of nature, or at least as a creature whose life is largely determined by natural laws. With a temper of happy serenity and an admirable balance of faculties he was possessed by an eager intellectual curiosity. 'I spend my life,' he said, 'in examining; everything interests, everything surprises me.' Nothing, however, interested him so much as the phenomena of human society. He had no aptitude for metaphysical speculations; his feeling for literature and art was defective."

Exactly the same character-sketch would apply to the Hindu sociologist, Sukrāchāryya, if we were to construct his biography out of the internal evidences culled from the literary production that is connected with his name. The same non-metaphysical and pre-eminently human outlook, the same positive and scientific standpoint, the same comprehensive and encyclopædic conception, the same aversion to literary and artistic flourish mark the intellectual framework of the authors of the Sukra cycle.

The merits and shortcomings of *Sukraniti* are identical with the merits and defects of the *Esprit des Lois*<sup>1</sup> which has been characterised by Janet in his *Historie de la Politique* as "undoubtedly the greatest work of the eighteenth century" and classed with Rousseau's *Contrat Social* as forming together the literary source<sup>2</sup> and spring of the revolutionary movement. The following are the words of Dowden about *The Spirit of Laws*: "The whole of his mind, almost the whole of his existence—is embodied in the *Esprit des Lois*. It lacks the unity of a ruling idea; it is deficient in construction, in continuity and cohesion. \* \* \* It lacks unity because its author's mind was many-sided. \* \* \* He would warn and he would exhort; he would help, if possible, to create intelligent and patriotic citizens. \* \* \* Its ideas often succeed each other without logical sequence. \* \* \* But he brought the study of jurisprudence and politics, in the widest sense, into literature, laicizing and popularising the whole subject; he led men to feel the greatness of the social institution."

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<sup>1</sup> Published in 1748.

<sup>2</sup> Bidgwick's *Development of European Polity* (1908) Lect. XXV.

The same may be said of *Sukraniti*, also, which has proposed for itself the function of prescribing rules for the promotion of human<sup>1</sup> welfare, and the furtherance of the interests of both peoples and kings. One finds in it the same copiousness of illustrations and multiplicity of details, the same occasional defects in arrangement and incoherency of treatment.

The explanation of this strength as well as weakness of the work is to be sought in its very scope and province, which are those of the 'science of all sciences,' the "architectonic" or the dominant science, as Aristotle would call it. *Sukraniti*, as such a master-science, in order to fulfil its mission as a guide-philosopher-friend to every class of human beings, must survey the whole universe from the planet to the sea-gull, and the daffodil to the star.

## SECTION 2.

### *The Synthetic Philosophy of Sukrâchâryya.*

All the facts and phenomena of the mineral, vegetable and animal worlds have bearings on human life and social progress. Professors of the "architectonic" science, therefore, have need of them. According to Comte,<sup>2</sup> social science is subordinate to Biology and is "related to the whole system of Inorganic Philosophy, because Biology is so." "The whole social evolution of the race must proceed in entire accordance with biological laws. \* \* \* It is only by the inorganic philosophy that we can duly analyse the entire system of exterior conditions—chemical, physical, and astronomical—amidst which the social evolution proceeds, and by which its rate of progress is determined."

John Stuart Mill also believes that the scope of any profitable study of man's action in society must be co-extensive with the whole of social science. According to him, "a person is not likely to be a good economist who is nothing else. Social phenomena,<sup>3</sup> acting and re-acting on one another, cannot rightly be understood apart." Dr. Ingram<sup>4</sup> gives prominence to this encyclopædic character of Social Studies in his article on Political Economy in the *Encyclopædia Britannica* (ninth edition). His conclusion is that Political Economy cannot any longer command attention as a fruitful branch of speculation unless it is subsumed under and absorbed into general sociology." Not only economics, but politics also, "can only be scientifically studied as one part or application of the Philosophy of History." Says Professor Sidgwick: "I agree with Mill in holding that the scientific study of the different kinds of governments that have actually existed in human society ought to be pursued in close connexion with the scientific study of other important elements of the societies in question. \* \* \* The division of intellectual labour ought not to

<sup>1</sup> *Sukra I*, 4—24.

<sup>2</sup> *Carver's Sociology and Social Progress* (1906), pp. 65—87.

<sup>3</sup> *Marshall's Principles of Economics*.

<sup>4</sup> *Keynes's Scope and Method of Political Economy*, Third Edition (1904), pp. 112—141.

be carried so far as to make us forget the influence exercised on government by other social changes,<sup>1</sup> for instance, by the development of thought, of knowledge, of morals, of industry." The science of Public Finance, also, which is closely related to Economics, Politics and History, is, as such, a study of man's social activities, and hence only one of the branches of the Architectonic science—Sociology.

The differentiation and specialisation of the sciences according to the principles of the division of labour have undoubtedly rendered immense service to the world of speculation. The physical sciences have been rendered more and more precise, mathematical and exact. The human sciences also have tended in the same direction. But this 'progress' of the sciences in the acquisition of mathematical accuracy has necessarily deprived them of their realistic and concrete character. The growth in 'exactness' and necessary abstraction has militated against the efficacy and utility of each alone as a manual of guidance to human beings. Modern philosophical thought is fully conscious of this 'other side' of specialisation, and recognises the limitations of the specialised sciences in the matter of framing practical rules or duties of life. Thus Dr. Keynes observes: "Few practical problems admit of complete solution on economic grounds alone. \* \* \* More usually when we pass to problems of taxation, or to problems that concern the relations of the state with trade and industry, or to the general discussion of communistic and socialistic schemes—it is far from being the case that economic considerations hold the field exclusively. Account must also be taken of ethical, social, and political considerations that lie outside the sphere of Political Economy regarded as a science \* \* \* If the art attempts a complete solution of practical problems, it must of necessity be to a large extent non-economic in character." This defect is inherent in all specialised sciences. The science, therefore, that would lay down absolute rules for the regulation of human conduct, cannot with advantage be separated from general political and social philosophy.\*

*Sukraniti* is such a science or art of social philosophy and legislation. The authors of the Sukra cycle, without caring to expound their methods of investigation and explain the 'logic' of their science, have unconsciously followed the method of the most synthetic and comprehensive art that would turn to account all the physical and human sciences in order to prescribe the 'whole duty of man.' The countrymen of Sukrāchāryya were not, however, poor in methodology. The ancient scientific machinery of the Hindus has found an able exponent in Dr. Brajendranāth Seal,<sup>2</sup> whose short but erudite monographs have furnished the sound philosophic basis of the modern Indian school of historico-sociological research

<sup>1</sup> Sidgwick's *Elements of Politics* (1891), pp. 5–6.

<sup>2</sup> Keynes's *Scope and Method of Political Economy*, Third Edition (1904), pp. 55–58.

\* For Seal's *Mechanical, Physical and Chemical Theories*, as well as *Scientific Method of the Ancient Hindus*, see Dr. Ray's *Hindu Chemistry*, Vol. II., pp. 59–200.



## SECTION 3.

*The Place of Mineralogy in Sukraniti.*

It is this comprehensive view-point of the Sukra legislators that supplies the *rationale* of their discussion of purely physical and material phenomena in their treatise on morals. Investigations regarding stones, gems, metals, minerals, buildings, roads, gardening, images, forts, arms, weapons, plants and animals—all these are integral parts of the *Nitisāstra*, according to this conception, which otherwise would remain incomplete. Mineralogical, Architectural, Sculptural, Botanical, Zoological, Veterinary and Agricultural ideas have thus a natural and necessary place in the *Sukraniti*, and are not mere appendages calculated to swell its bulk.

Consistently with this, we might expect greater prominence given to climatological and general geographical facts in the work of the Sukra statesmen, as in the work of Montesquieu. But, as we have seen, *Sukraniti* is rather defective in this respect. It treats of the geographical and meteorological phenomena in a very subsidiary capacity. As auxiliary to the main study, Sukra authors might devote greater attention to the Earth which is the theatre of all human activities and one of the principal aspects of the positive background of a people's social life. The authors, however, refer to the hills and rivers, seas and seasons very casually and incidentally, as it were, to illustrate their points or explain their ideas. This is all the more strange, since the observation and tabulation of natural phenomena were regularly instituted in ancient India in order to determine the fortunes of men and princes. Thus the *Bṛihat Samhitā*, an astronomical and astrological work of the 6th century A D., is a comprehensive study<sup>1</sup> of the physical features and aspects of the universe, e.g. clouds, rains, planets, winds, earthquakes, storms, plants, animals, jewels, &c., and of their influences on the course of human affairs—social, economic, and political. This treatise is the "*Physics and Politics*" of the Hindus written about 1500 years ago, and anticipates "*the Spirit of Laws*," the first important European work on the study of physical forces and energies, as affecting human history by, over eleven centuries.

The treatment of mineralogy in *Sukraniti* is threefold :

- (1) As a feeder or contributor to the 'architectonic' science, Sociology, the position of Mineralogy is inevitable like that of the other physical sciences.
- (2) As incidental or stray references which cannot be prevented in any work of considerable proportions, Mineralogical, like Botanical, Engineering,

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<sup>1</sup> The scope and province of this work have been described by the author himself in Chapter II. See Iyer's Translation (printed at the South Indian Press, Madura, 1884), pp. 3-12. See along with this Buckle's *History of Civilisation*, Vol. I, Montesquieu's *Spirit of Laws*, Book XIV (English Edition in the *World's Great Classics Series*), Bagehot's *Physics and Politics*, Dunning's *Political Theories*, Vol. II, pp. 418-428, 112-113 (Macmillan 1906), Bluntschli's *Theory of State* (Third Edition, 228-236). In 1880-1882, a trial was made in the Baroda State to ascertain whether the probable rainfall of the coming monsoon could be predicted from observations of clouds according to principles laid down in *Bṛihat Samhitā*. The result was eminently successful.

Zoological, and other ideas of physical science, furnish valuable clues to the general culture of the epoch or epochs in which portions of *Sukranīti* might have been composed. Our treatment of Geographical Data in a preceding chapter has been mainly directed by this search for 'internal evidences,' as they are called.

(3) As directly bearing on the socio-economic and socio-political interests of man. The authors of the Sukra cycle have a judicious sense of proportion and scientific selection. They are not tempted to long-winded and labyrinthine inquiries involving prolix digressions within digressions that characterise the *Encyclopædia Indica*s, called the *Purāṇas*. Facts of physical science have been laid under contribution only according to their need. These writers have displayed the same rational discrimination that marks the literary activities of modern thinkers. Says Dr. Keynes: 'While Economics has to take account of the operation of physical laws, it is still concerned with them only indirectly. It does not seek to establish or explain the physical laws that are involved in agriculture or mining or manufacture. This is the function of such sciences as mechanics, chemistry, geology and the science of agriculture. \* \* \* The relation of political economy to the physical sciences is then simply this, that it pre-supposes them; it is sometimes concerned with physical laws as premises, but never as conclusions. \* \* \* The science is not directly concerned with the technique of different trades and occupations.'

In treating of the minerals, metals, stones, &c., (as the other facts of physical world), the philosophers of the Sukra cycle have closely followed the method of the moderners. Thus the chemical, crystallographical, medicinal, and metaphysical speculations over the gems and metals have been sedulously avoided by them. *Sukranīti* has referred to the metals and precious stones only as they affect the economic, financial and political life of the people. The Data of ancient Indian Mineralogy that this work on social and moral legislation yields would thus afford a valuable picture of the commercial geography and economic history of the country in by-gone days, as we have hinted at in a preceding chapter. For, though "the distribution of minerals over the surface of the earth is much less obvious phenomenon than that of plants and animals, it has always been of great importance" in determining the distribution of man and his settlements."

Like the geographical data, these would supply some of the evidences by which it may be possible to fix upon the *locale* of certain portions of the treatise as well as their date.

#### SECTION 4.

#### *History of Hindu Mineralogy.*

##### (a) *Literature on Metals.*

The philosophers of the Sukra cycle have drawn upon mineralogical literature very sparingly indeed. One cannot but admire the sobriety and

<sup>1</sup> Keynes's *Scope and Method of Political Economy* (1904), pp. 84-86.

<sup>2</sup> Newbigin's *Modern Geography* in the Home University Library Series.

restraint of these authors when one remembers how easily they might tend to indulge in the mythological, alchemical and metaphysical notions regarding the mineral world which held sway over both the East and the West<sup>1</sup> for centuries. The Sukra authors have very creditably displayed their ratiocinative intellect and scientific spirit by rejecting all other aspects of precious stones and metals known in their literary circles, and using only such facts and figures as are relevant to the socio-political scope of their work.

For the uses of minerals have been known to the Hindus from the earliest times. In 1877 the late Dr. Uday Chand Dutt brought out his *Materia Medica of the Hindus*,<sup>2</sup> in the first part of which he gave on account of the mineral or inorganic medicines used in ancient times under "five heads: (1) mercury, (2) metallic ores and earths, (3) metals, (4) salts, (5) precious stones; of the mode of their preparation, their chemical composition, and the principal combinations in which they were employed in different diseases. About the same time Dr. Rajendralal Mitra's *Indo-Aryans* and *Antiquities of Orissa* revealed to a certain extent the knowledge of the ancient Hindus in the use of metals and gems in arts, industries and handicrafts.

In order to appreciate the value of Hindu mineralogical literature that is implied and indicated by the actual use of minerals for the diverse purposes of human life, it is necessary to estimate the present character and history of the science as it obtains in Europe.

"Mineralogy" is the science which describes and classifies the different kinds of mineral matter constituting the material of the earth's crust and of those extra-terrestrial bodies called meteorites. The study of minerals is thus a branch of natural history, but one in which certain of the exact sciences find an application. The determination of the composition and constitution of minerals is a chemical problem; their optical and other physical properties are determined according to the principles of physics; the study of the crystalline form and structure belongs to crystallography; their modes of occurrence, origins, associations and changes come within the province of geology and petrology; while a consideration of the localities at which they are found requires some acquaintance with geography. Finally, there is the economic side, dealing with the mining and application of useful minerals, the extraction of metals from their ores and the uses of minerals for building, decoration and jewelry."

The above description of the science can apply to Mineralogy in its last and very modern phase since about 1860. Says the Editor of the *Mineralogical Magazine*:<sup>3</sup> "It was not until the end of the 18th and beginning of the 19th century \* \* \* that any advance was made in scientific mineralogy. It was then

<sup>1</sup> For an account of the progress of Alchemy in Europe, see the *Story of Alchemy* by Muir in the *Library of Useful Stories Series*.

<sup>2</sup> The materials supplied by this work have been subsequently laid under contribution in the preparation of *Hindu Chemistry* by Dr. P. C. Ray and in the work of Gondal.

<sup>3</sup> *Encyclopædia Britannica*—11th Edition.

<sup>4</sup> *Encyclopædia Britannica*—11th Edition.

recognised that \* \* \* external characters were more or less accidental. \* \* \* In 1809 exact measurements of crystalline forms of many minerals were made. \* \* \* In 1819 and 1821 \* \* \* impetus to optical examination. \* \* \* Under the microscope \* \* exact determination (1867)."

It would thus appear that in the west the scientific era is essentially modern, to be counted only by generations. All writers on minerals and allied subjects have up to the beginning and the first two decades of the 19th century been interested only in such aspects as would, in modern phraseology, be regarded as mainly 'unscientific.'

Such Hindu writers on minerals in ancient and mediæval times are a legion. It has been a fashion for long to credit very little of original achievements in secular literature and civilisation to the people of Hindustan. But this notion is being falsified by the explorations and researches of Indologists. So far as minerals and jewels are concerned, Sanskrit literature<sup>1</sup> has been very prolific in producing treatises which have varied from epoch to epoch, according to the changes in the culture of the people. We have already referred to Dr. Dutt's survey of the chemico-medical uses of minerals by the ancient Hindus. This work is based on standard Sanskrit medical works and has copious references to the original literature on the subject. Dr. Prafulla Chandra Ray has discussed the historical, chemical, medicinal, metallurgical, and generally the scientific values of some of these treatises or sections of treatises in his celebrated *History of Hindu Chemistry*. The late Dr. Rāmdās Sen of Moorshidabad<sup>2</sup> contributed in Bengali a monograph on the gems from original Sanskrit sources and edited the *Agastī-matam*, *Ratna-Samgraha* and *Maṇi-parikṣā*, three Hindu works on precious stones. The subject of precious stones and jewels has also received an elaborate and comprehensive treatment in Bengali, especially in their crystallographical, economic, and geological character, in the hands of Prof. Yogēś Chandra Roy of Cuttack, who has tried to interpret the knowledge of the ancient Hindus in the light of the modern sciences. The enlightened Doctor of Music, Rājā Śrī Saurindramohan Tagore's work on gems called *Maṇimālā*,<sup>3</sup> published in 1881, covers over one thousand pages. This encyclopædic work compiled in Sanskrit, Hindi, English and Bengali languages has drawn illustrations from over one hundred Sanskrit, English and Persian works. Of these, the number of Sanskrit authorities consulted is sixty-four.

Among the modern exponents of Hindu culture in these branches, Dr. Tagore's monumental work was followed by Dr. Sen's. Neither of them, however, tried to combine the East with the West in their endeavours. That has been

<sup>1</sup> The *Vāstuvidyā*s, *Śilpasastras*, &c., and other branches of Hindu secular literature will be treated of in a subsequent chapter.

<sup>2</sup> With the help of Pandit Kāllava Vedāntavāgisa (1885).

<sup>3</sup> See *Ratna-parikṣā* by Prof. Yogēś Chandra Roy, who has also noticed the work of Śrī Rājā Rādhākānta Dev, the *Sauva Kalpadruma*, a Sanskrit Encyclopædia (1822-1858).

done by Dr. Dutt, Dr. Prafulla Chandra and Prof. Yoges Chandra, who have succeeded them and brought their scientific scholarship to bear on the mineralogical literature of the ancient Hindus. It is from the learned works of these scholars that the following summary of treatises on metals and gems has been compiled.

Mineralogy is not the *forte* of the Sukra philosophers. They are not specialists in this branch of learning. At any rate, their scope does not allow them to display any special knowledge regarding the metals and gems. They have to deal with these things, because they are the 'sinews of war' and form the *koṣa* (or treasure) or one of the seven constituents of the *Rāṣṭra* or the state. Their knowledge of these valuables must, therefore, depend on the literature of the specialists who flourished along with them. But as the geography as well as chronology of the authors of the Sukra cycle are anything but certain, it is all the more necessary that we should have an idea of the progress of the Hindus in mineralogical knowledge. For it is then only that one can assign the historical and geographical value of the section on metals and gems in *Sukraniti*.

The knowledge of the Hindus on the subject of metals has been discovered in all branches of Sanskrit literature from the earliest times to the middle of the sixteenth century A. D. From Dr. P. C. Roy's Survey of Hindu Chemical<sup>1</sup> literature we get *pari passu* the following epochs of mineralogical culture in ancient and mediæval India :

#### I. VEDIC LITERATURE.\*

The following is the list of metals compiled for the *Vedic Index*<sup>2</sup> by Macdonell and Keith : *Ayas* (bronze, iron), *Kārṣṇāyasa* (iron), *Candra* (gold), *Jātarupa* (gold), *Trapu* (tin), *Rajata* (silver), *Loha* (copper), *Lohāyasa*, *Lohitāyasa*, *Syāma* (iron), *Syāmāyasa*, *Sisa* (lead), *Suvarṇa* (gold), *Harita* (gold), *Hiraṇya* (gold).

"Rudra" is described as shining with brilliant golden ornaments. \* \* \* The Aswins are also adorned with golden ornaments. The Asuras had plenty of gold and jewels," "Blacksmiths" made spears, swords, hatchets, needles, awls, iron legs for those who had lost their natural ones, iron-forts \* \* \* Goldsmiths melted gold and fashioned bright jewels."

<sup>1</sup> This survey is necessarily connected with the history of medical knowledge of the Hindus, and is in fact another aspect of the same thing. Dr. Rāy's work therefore closely follows, and is to a certain extent based upon, that of Dr. Dutt. See Dr. Sen's chapter on metals in *Ratnarahasya*, also Prof. Yogesh Chandra's Essay on metals in *Ratnaparikṣā*. See the *History of Aryan Medical Science* by the Thakur Sahib of Gondal (1895), pp. 184-188, 145-147, and *Medicine of Ancient India*, Part I, Osteology (Oxford, 1907) by Dr. Hoernle, pp. 1-18.

<sup>2</sup> See *Atharva-Veda* in the *Harvard Oriental Series* pp. 17 (amulet of lead), 35 (gold amulet), 272 (amulet of three metals).

\* See Vol. II, p. 584.

<sup>3</sup> Rājendralāl Mitra's *Indo-Aryans*, Vol. I, p. 227, which gives several evidences from the Vedas about the knowledge and use of metals.

<sup>4</sup> Śrinivas Iyengar's *Life in Ancient India in the Age of Mantras*, pp. 28-29, p. 41.

Not only as the materials for arts, industries or as 'measures of value,' but also as having healing powers we find the minerals mentioned in the Vedas. "It is of interest to note the alchemical notions which had gathered round gold and lead at the time of the Atharva Veda. \* \* While gold is regarded as the elixir of life, lead is looked upon as the dispeller of sorcery." "According to Roscoe and Schorlemmer, the ancient Hindus were the first to discover gold. All the appellations that have been applied to gold by different peoples of the ancient world bear testimony to this statement. \* \* According to Roscoe and Schorlemmer," the different nations gained their knowledge of extracting iron from its ores from the Hindus."

## II. AYURVEDIC LITERATURE<sup>1</sup> (from the Pre-Buddhistic era to 800 A.D.)

(1) The *Charaka Samhitā*, based on the medical treatise of Agnivesa, mentioned in pre-Buddhistic literature, indicates "the six metals<sup>2</sup> and their calces as drugs appertaining to the earth," discusses the nature of the alkali, treats of the five kinds of salts, mentions sulphates of copper and iron as minerals for external application, and describes iron, gold and silver tonics.

(2) The *Susruta Samhitā*,<sup>3</sup> later than the *Charaka*, par excellence a treatise on surgery, treats of the preparation and use of alkalies and alkaline caustics, recommends the six metals and their calces as drugs in 'only one śloka,' has 'vague references' to mercury, and describes lead and tin as vermifuge.

(3) The *Bower MS.*,<sup>4</sup> a medical work attributed to one Susruta, copied within the period from 400 to 500 A.D., mentions sulphates of copper and iron as ingredients for hair-dye and considers Bitumen as a product from the following four metals : gold, copper, silver, iron.

(4) The *Aṭṅga hridaya* of Vagbhata (probably a Buddhist of Sindh, 8th cent. A.D., but according to Dr. Kunte, of the 1st or 2nd cent. B.C.), 'the heart or kernel of the eight limbs or divisions of Ayurveda,' is mainly an epitome of the *Charaka* and the *Susruta*, mentions mercury only once and treats of the preparations of gold, silver, copper, iron and lead.

<sup>1</sup> *History of Hindu Chemistry*, Vol. I, First Edition, pp. vi, vii.

<sup>2</sup> Quoted from Major B. D. Basu's Prize-Essay on the *Hindu System of Medicine* published in *Guy's Hospital Gazette* (1889).

<sup>3</sup> See the Preface to Dr. Dutt's *Materia Medica of the Hindus* for the medico-chemical (mineralogical) literature of this period, also references to 'original authorities in the body of the book.

<sup>4</sup> Quoted by Dr. Rāy from A. C. Kaviratna's *Translation of Charaka Samhitā*, pp. 6-7.

<sup>5</sup> See the Bengali translation by Kavirāj Devendranāth Sen (1900), p. 268, where seven metals have been mentioned, the additional one being bell-metal, and *ranga* is used for *vanga*, i.e., *trapu* (tin).

<sup>6</sup> Edited by Dr. Hoernle, published by the Superintendent of Government Printing, Calcutta (1898-1909). See Part II, Fasciculus II, pp. 162-164. The drugs recommended are mainly vegetable. For references to metals, gold, copper, &c., and gems, see General English Index.



(5) During this period also must be mentioned the vast mass of Hindu, Jaina and Buddhist literature in Sanskrit and Prakrit, which embodies the original and characteristic products of Indian intellect, and in which are mirrored the brightest epochs in the history of Indian culture. This is the period<sup>1</sup> of Indian history properly so called, as it covers roughly the interval between the age of precursors of Paṇini<sup>2</sup> and Buddha and the epoch of Harṣavardhana and Houen Tsang,—the last prominent landmark of Hindu civilisation,—or if we push this limit further down, the age of the Palas of Bengal and the Cholas of the South in the 8th and 9th centuries A.D.

Dr. Dutt's *Materia Medica* does not, from the nature of the subject, refer to any authorities other than medical. Dr. P. C. Ray's work also is silent about the non-Ayurvedic branches of Indian literature during this period of over 1,600 years regarding the light they throw on alchemy, medicinal preparations, metallurgical operations, technical arts, the use of coins, arms and implements, &c., and the theory and practice of the transmutation of metals.

It is impossible to collect all the information on the subject of metals that this non-medical literature in Sanskrit and Prakrit may yield. Dr. Gustav Oppert's Essay on the weapons and war implements of the Ancient Hindus, and Dr. Rajendralāl Mitra's essay on Architecture, Dress and Ornament in ancient India, Furniture, Domestic Utensils, Musical instruments, Arms, &c., in ancient India in the first volume of his *Indo-Aryans*, as well as the historical works on Indian Art (including Architecture, Sculpture and Painting) by Fergusson, Havell, Coomāraswamy, Vincent Smith, and Manomohan Ganguly casually bring before us stray evidences from the literature and secular achievements of this period. The following evidence of Mr. Schoff, in his edition of the *Periplus*, published with the object of throwing light on ancient Commercial Geography and History, tells its own tale: "Philostratus of Lemnos, about 230 A.D., mentions a shrine in Taxila in which were hung pictures on copper tablets representing the feats of Alexander and Porus. The various figures were portrayed in a mosaic of orichalcum, silver, gold, and oxidized copper, but the weapons in iron. The metals were so ingeniously worked into one another that the pictures which they formed were comparable to the productions of the most famous Greek artists."

<sup>1</sup> This has been subsequently (p. 74) called the *Classical Period*—Pre-Buddhist, Buddhist as well as Post-Buddhist—the age of Darsanas, Purāṇas, Kāvya, &c. For a brief account of the literature of this period, see Sir Bhandarkar's paper in the *Journal of the Bombay Branch of the Royal Asiatic Society*, 1900, pp. 388-408.

<sup>2</sup> The date of Paṇini is still an open question. The nearest limit is that placed by Macdonell at about 350 B.C. Max Müller could not arrive at any decision. About a year before his death, this European savant wrote to Rai Bahadur Sris Chandra Basu, the learned translator of the *Aṣṭādhyāyī* of Paṇini: "Even Paṇini's date is still a riddle to me, both as to his predecessors and his successors. The date now assigned to him in the 4th cent. B.C. is useful as a working hypothesis, but no more. Perhaps you may be able to throw more light on it."

### III. TANTRIC LITERATURE (from 800-1200 A.D.)

This is the period of the Empire<sup>1</sup> of the Palas in East India and Cholas in South India. The characteristic features of this period, so far as Northern India is concerned, are :

(1) in socio-religious life, the further development of Mahāyānic Buddhism, the continuation of the processes of the merging of decadent Buddhism in revived Hinduism, and the completion of the amalgamation<sup>2</sup> of the mythology of Śaiva-cum-Śāktaism with the doctrinal, devotional, and ritualistic machinery of the neo-Buddhistic Theogony, Cosmogony, and Theology ;

and (2) in literature, the continuation of Purāṇas, and the ascendancy of *Tantras*, which, beginning in the early centuries of the Christian era (if not earlier) as hand-books of Hindu socio-religious life, gradually tinged, modified, and swallowed up the literature of the Hinduised Buddhists of the Mahāyānic school, and finally absorbed (during this period) the whole intellectual activity of the people in philosophy, religion, alchemy, and other departments of human thought. The *Tantras*<sup>3</sup> may in a sense be looked upon as the *Purāṇas* or *Encyclopaedia Indica* of India on the eve of Islamisation.

The mineralogical literature of this period includes the following:—

(1) The works of Nāgārjuna (7th-8th cent. A.D.), the founder and embodiment of Mahāyānism, and the author of alchemical *Tantras*.

(a) *Rasārṇava* gives the tests of a pure metal, treats of the extraction of Zinc from Calamine, mentions the six metals, treats of the colouring of metals, and describes an apparatus for killing metals.

(b) *Rasaratnākara*<sup>4</sup> treats of the purification of minerals, the extraction of Zinc from Calamine, dissolution of gems, and mentions several apparatus.

(2) Vrinda's *Siddhayaoga* (900 A.D.) mentions Nāgārjuna as an authority, and closely follows Charaka, Susruta, and Vāgbhata, describes preparations

<sup>1</sup> See Mr. R. D. Banerji's *Memoir on the Palas of Bengal* (L. A. S. B.), and *Gauḍarājāmālā*, a Bengali work, by Mr. Ramāprasād Chanda ; and *Ancient India* by Mr. Krishnaswamy Aiyangar. Dr. Rāy calls this the Transitional Period.

<sup>2</sup> A full survey of this aspect of East Indian civilisation has been given in *Adyer Gambhīrā*, a learned Bengali work by Mr. Haridāsa Pālit. Portions of Mr. Pālit's work are being rendered into English as materials for my forthcoming *Studies in Hindu Literature*.

South Indian life of this period is characterised by the rise of two new cults, Śaivism and Vaiṣṇavism militating against and assimilating decadent Buddhism.

<sup>3</sup> For this second feature of the period between 800 and 1200 A.D., see Dr. Rāy's resumé of authoritative opinions in the first chapter of his Introduction to *Hindu Chemistry* Vol. II: "Alchemy was included in the curricula of studies" "at the colleges in connexion with the monasteries of Pātaliputra, Nālandā, Vikramasīlā, Udandapura, &c.," in East India from 5th to 12th cent. A.D. Tamil literature has yet to be studied in the same light.

<sup>4</sup> The enumeration of these *Tantras* and other alchemical works has been made in this book in an order slightly different from that in the *History of Hindu Chemistry*, as suggested by the new light thrown in Dr. Rāy's Introduction to the 2nd volume.

The division into periods of mineralogical literature has also been modified in this book to suit its requirements. Dr. Rāy's division into Tantric and Iatro-chemical periods in the 1st Edition of the First Volume was certainly a tentative one.

in which Sulphide of Copper and Æthiops mineral figure and also a process of killing iron.

(3) Chakrapani<sup>1</sup> Datta's medical treatise (1050 A.D.), written at Gauda during the period of the ascendancy of the Palas, liberally recommends compounds of metals as medicinal drugs, treats of the black sulphide of mercury, powder of copper compound and a process of killing iron.

(4) Govindabhāgavat's *Rasakridaya* (11th century), written at the request of the king of Kirāta land, i.e., the region adjoining modern Bhutan, mentions the six salts, the noble metals, essential metals, &c., and treats of the properties of metals.

#### IV. MODERN LITERATURE (13th cent.—16th cent.)

This is the period :

(1) in politics, of (a) the gradual establishment of Islam as a power and the foundation of Moghul Imperialism, (b) small independent Hindu kingdoms, especially the kingdom of Vijayanagara, the "Forgotten Empire" of the South, which presented a formidable bulwark against the inroads of the new power, and (c) the advent of the Portuguese ;<sup>2</sup>

(2) in socio-religious life, of (a) aggressive Islam accelerating the further fusion of Hinduism and Buddhism, and calling forth the assimilative and adaptive capabilities of the people of India, and (b) the rise of new cults in all the four quarters of India ;

and (3) in literature, of (a) the continuation of Puraṇas, Tantras and other Sanskrit works, and of (b) the growth and development of new languages and literatures embodying the aspirations of Kavira, Nānaka, Tukārāma, and Chaitanya—the founders of the new age.

The following Sanskrit works mentioned by Dr. Rāy may be placed during this period :<sup>3</sup>

(1) *Rasendra Chuḍāmāṇi* (12th—13th cent. A.D.) of Somadeva gives tests for killed iron, treats of the residues from lead and tin, and describes the apparatuses.

(2) *Rasaprakāśasudhākara* of Yasodhara (13th cent.) describes the extraction of zinc from calamine and a process for the fabrication of gold.

(3) *Rasakalpa* (13th cent.) describes the six metals, minerals and the processes of killing them. The author says, "I have performed the experiments with my own hands, and have seen them with my own eyes. They are not recorded from mere hearsay or from the dictation of a teacher."

(4) *Rasa Sāra* (13th cent.) of Govinda acknowledges its indebtedness

<sup>1</sup> Sanskrit Text edited by Kavirājas Sen (Calcutta).

<sup>2</sup> "The political influence of the Portuguese as early as 1588 A.D. is evident from the fact that Sultan Bahadur, King of Gujrat, entered into a treaty with them."—*Memoirs of Hindustan*.

<sup>3</sup> The sub-divisions of this epoch into Tantric and modern according to the *History of Hindu Chemistry* have not been adopted here. The treatises also have been slightly re-arranged. Vernacular Literature of these four centuries remains yet to be ransacked for a more complete picture of the secular life of the Hindus.

to the Buddhists of Tibet, is a comprehensive, but purely chemical work dealing with 18 operations on Mercury.

(5) *Rasaratna-Samuchchaya*<sup>1</sup> (13th—14th cent.) contains elaborate treatment of mercury, copper, pyrites, extraction of zinc and copper, sulphur, cowries, gems, processes of reducing gems to ashes, the pure metals, the metals which emit a foetid odour, and alloys, the laboratory and the accessories.

(6) *Rasarājālakṣmi* (14th cent.) of Viṣṇudeva, court physician to King Bukka of Vijayanagara, mentions the common mineral salts.

(7) *Rasanakṣatramālikā* (14th cent.) of Mathana Simha, court physician to the king of Malwa, liberally recommends mineral preparations and mentions opium as a drug.

(8) *Rasaratnākara* (14th cent.) of Nityanātha quotes Nāgarjuna, Chakrapāṇi, and *Rasendrachudamani*.

(9) *Sārṅgadhara-Samgraha* (1363 A.D.), written at Chitor under the Chauhans, treats of the purification and incineration of *seven*<sup>2</sup> metals, but does not mention zinc, has been quoted by Bhāva Misra.

(10) *Dhāturathnamūla* (14th cent.), by Devadatta of Gujrat, is "devoted exclusively to short processes of killing metals and minerals. Six metals are recognised at the outset, but later on *Kharpara*,<sup>3</sup> which is the mineral calamine, is taken as synonymous with *jasada* or zinc."

(11) *Nighantu*,<sup>4</sup> by king Madanapāla of Kanauj (1374), mentions the metals as drugs, among which there is zinc or *jasada*.

(12) *Rasapradīpa* (16th cent.) describes a detailed process for the preparation of mineral acids and mentions the remedy for the Portuguese disease called Syphilis (Phiringiroga), is quoted by Bhāva Misra.

(13) *Dhātucrīyā* (16th cent.) mentions the country of the Phiringis as well as Ruma (Constantinople), enumerates the metals, gives their synonyms and localities, mentions zinc, and speaks of 'imitation gold,' by which one can enrich oneself.

(14) *Bhāvaprakāśa*<sup>5</sup> (after 1535, about 1570 according to Dr. Wise) mentions new drugs, and the Phiringiroga, and recommends mineral preparations as drugs, greatly eclipsing the vegetable.

(15) *Rājanighantu*<sup>6</sup> (17th cent.) of Narahari Pandit, has a chapter called *Suvarṇādīvarga*, and mentions the minerals, treating of their medicinal effects.

<sup>1</sup> See the Text published by the Anandāsrama Office, Poona (1901), pp. 22-84, or the Extracts in Dr. Rāy's *Hindu Chemistry*, Vol. I.

<sup>2</sup> "From the time of the *Susruta* to that of the *Rasaratna-Samuchchaya* we find all along six metals. \* \* \* In the medical lexicon ascribed to king Madanapāla and written about 1374 A.D., Zinc is distinctly recognised as a metal under the designation of *Jasada*." *Hindu Chemistry*, Vol. I, First Edition, p. 86. Sukraniti mentions seven metals and two alloys.

<sup>3</sup> "Zinc is not mentioned by the older writers, such as *Susruta*."—Dr. Dutt. See the chapter on Zinc in his *Materia Medica*.

<sup>4</sup> See the Edition of Pandit Jivānanda Vidyāsāgara (1875), pp. 50-56, Chapter IV.

<sup>5</sup> See Dr. Dutt's Preface to his *Materia Medica* (1877).

<sup>6</sup> See the Hindi Edition (1888) published from Benares, pp. 129-142.

## SECTION 5.

*History of Hindu Mineralogy.*(b) *Literature on Gems.*

The preceding survey, though scrappy and inadequate, must have made it clear that the Hindu literature on metals has grown mainly round the practical arts connected with industry, medicine and alchemy. The literature on precious stones also has developed through the same circumstances, and has had a similar history.<sup>1</sup> It is to one or other of the several epochs in the growth of this metallurgical, medicinal, and alchemical literature on gems that the portions of *Sukranīti* dealing with these topics have to be referred. We, therefore, proceed to give a brief history of this literature.

The knowledge of the use of gems has, like that of the metals, been discovered in almost all the branches of Hindu literature, and, therefore, may be conveniently grouped for historical purposes under the same epochs as those for metals. Besides the treatises mentioned above which are common to both metals and gems, there are special treatises which have to be noticed here in connexion with gems. The chief difficulty in the classification into epochs lies, as always in Indian historical problems, in chronology. The dates have been in most cases conjectural.

We have noted above that Dr. Tagore's encyclopædic work on gems has drawn upon sixty-four Sanskrit treatises. Dr. Rāmdāsa Sen's work in collaboration with Pandit Kāliyara Vedāntavāgisa is based on *Bṛihat Samhitā*, *Mānīparikṣā*, *Sukranīti*, *Mānasollāsa*, *Amaraviveka*, *Hemchandra-kosa*, *Muktāvali*, *Rājānighanṭu*, *Agnipurāṇa*, *Garuḍapurāṇa*, *Agastyamāla*, and *Ratna-Samgraha*. Another important work on the subject is *Yukti Kalpataru*<sup>2</sup>, which is in manuscript, but has been used by Prof. Yogesh Chandra Roy in his *Ratnaparikṣā*.

Fully conscious of the chronological defects, we add here a short history of the literature on gems in the Indian world :

## I. VEDIC PERIOD

Precious stones and jewels are mentioned in Vedic literature. "Maṇi is the name in the Rigveda" and later of a jewel used as an amulet against all kinds of evil. That either pearl or diamond is denoted is not clear. \*\* The Maṇi is certainly worn round the neck." "In the Brāhmaṇa of the old recension of

<sup>1</sup> The meagreness of this summary would be evident from the facts that (i) it has not been possible to gather information from even the most important works of non-Ayurvedic Sanskrit literature ; (ii) ancient Tamil literature has been wholly excluded, and (iii) old Prakrit and vernacular works also have not been touched.

<sup>2</sup> Like the *Bṛihat Samhitā* of Varāhamihira (6th cent. A.D.); this work ascribed to Rāja Bhoja (probably 11th cent.) is a valuable repository of information regarding things Indian. One manuscript of this work belonging to Mahāmahopādhyāya Pandit Adityarāma Bhaṭṭāchāryya, M.A. of Allahabad is in the library of the Pānini Office and is being edited with translation and notes for the *Sacred Books of the Hindus Series* by the present author.

<sup>3</sup> Macdonell and Keith's *Vedic Index*, vol. II. pp. 119-120. See also pp. 304, 350.

the *Yajurveda* jewellery<sup>1</sup> is recommended to be strung on gold." The *Atharva-Veda* in Harvard Oriental Series bears the following testimony: "The bit of Hindu folk-lore about the origin of pearls by transformation of rain-drops falling into the sea \* \* \* is at least ten centuries old. Born in the sky, ocean-born, brought hither out of the river, this gold-born shell<sup>2</sup> is for us a life-prolonging amulet."

## II. CLASSICAL PERIOD<sup>3</sup> (800 B.C.—800 A.D.)

1. *Charaka* mentions gems as drugs appertaining to the earth, and gives a formula of 'the powder of pearl' compound.

2. *Susruta*<sup>4</sup> mentions pearls, vidruma, diamond, vaiduryya, sphatika (quartz) and other gems as cool and being antidotes to poison and useful in ocular diseases.

3. The Epics and Purāṇas refer to precious stones as ornaments for buildings, palaces, and images. The court of Yudhisthira, the cities of Dwārakā and Ayodhyā, the chariots, umbrellas, temples, &c., all testify to the use of emeralds, beryls, rubies, &c. We also read of gifts made in diamonds, pearls, corals and rubies, and also of plants, cows and hills made of gems.<sup>5</sup> The *Mahābhārata* has often referred to *vaiduryya*, *vidruma*, *sphatika*, *suryya-kānta*, *chandrakānta*, *indranila*, *padmarāga*, *diamond* and *marakata*.

4. *Bṛihat Samhitā*<sup>6</sup> of Varāhamihira (505-587 A.D.) has four chapters on the examination of gems, refers to many previous *Ratnasāstras*, describes the characteristics of 22 gems, considers five of them only to be principal, begins the section on diamonds thus: "A good gem brings prosperity to the king, and a bad one brings misery. It is, therefore, necessary to examine the properties of gems with the help of persons learned in the science."

<sup>1</sup> Mitra's *Indo-Aryans*, Vol. I, p. 239.

<sup>2</sup> *Atharva-Veda* in Harvard Oriental Series, Vol. I, pp. 161-162.

<sup>3</sup> This would include some of the Upaniṣads, the systems of philosophy, the epics, the literature of the precursors of Charaka and Pāṇini as medical men and grammarians, the literature of Buddhism, both Hīnayāna and Mahāyāna, the Kāvya and other products of Vikramādityan era, the more important Purāṇas, and some of the Tantras. See the volumes on the History of Sanskrit Literature by Max Müller, Macdonell, Weber, and Horowitz. Max Müller's volume was long out of print, but has been recently published by the Panini Office, Allahabad. See also the paper on the Character and Origin of the Puranas by Mr. B. C. Mazumdar in the *Modern Review* (Calcutta), Vol. XI, pp. 72-79, and the *Dynasties of the Kālī Yuga* by Pargiter (Oxford University Press, 1913).

<sup>4</sup> See p. 268 of the Bengali translation of *Susruta* by Kaviraja Devendra Nath Sen.

<sup>5</sup> Prof. Yoges Chandra Roy's Bengali work as well as Tagore's *Manimālā*.

<sup>6</sup> See Chidambaram Iyer's *Bṛihat Samhitā* (1884), pp. 164-174. This work introduces us to the meteorological, agricultural, zoological, architectural, medicinal and astronomical ideas of the Hindus in the 5th and 6th centuries A.D., and "is one huge attempt to interpret the language of nature and ascertain its bearing on the fortunes of men and nations." Those who are interested in the influence of Geography on History will find this ancient Hindu scientist partially anticipating Bodin, Montesquieu, Hegel, Buckle and Bagehot by full one thousand years.



## III. PĀLA-CHOLA OR TANTRIC PERIOD (800-1200 A.D.)

1. *Rasaratnākara*<sup>1</sup> of Nāgārjuna (8th cent.), the Mahāyanist, treats of the extraction of the essence of vaikrānta, dissolution of gems (pearls, &c.), killing of diamond.

2. *Agnipurāṇa* (9th cent.) testifies to Tantric influence, treats of the examination of gems, enumerates 36 precious stones, describes 8 only as Mahāratnas.

3. *Garuḍapurāṇa* (9th cent.) testifies to Tantric influence, also treats of the examination of gems and enumerates them, mentions Turkey, considers 12 gems as principal, discusses the features to be noticed in a gem before estimating value.

4. *Agastyamatam* (later than Garuḍa, but previous to Viṣṇudharmottara) mentions Arab and Turkey, enumerates ten gems, recommends the use of nine gems for the propitiation of nine planets, is quoted in *Yukti Kalpataru*, mentions pushparāga, vaiduryya, gomeda, sphatika (quartz), and pravala as five *uparatnas* or inferior gems, notices the aspects to be noted in a good gem.

5. *Viṣṇudharmottarapurāṇa* (10th cent.), really a part of Garuḍapurāṇa, bases its enumeration of precious stones on the *Agnipurāṇa* and examinations of them on the *Garuḍa*, mentions nine gems<sup>2</sup> as mahāratna.

6. *Jyotiṣaratnamālā* of Śrīpati, the astronomer (10th cent.), enumerates the same nine gems as sacred to the nine planets that are mentioned in Sukranṭi.

7. *Matsyapurāṇa* describes a huge lake with diverse gems, in its 128th chapter.

8. *Yukti Kalpataru* (11th cent.) quotes Garuḍapurāṇa and Viṣṇudharmottarapurāṇa as authorities, is similar to Agastyamatam in certain particulars regarding the examination of gems, gives technical terms used in *Ratna Śāstra*, treats of "horses, elephants, ornaments, flags, umbrellas, seats, ministers, ships," etc., besides jewels, and frequently quotes from an author of the name of Bhoja, mentions māṇikyā, vajra, vidrūma, gomeda, mukta, vaiduryya, indranīla and marakata as the eight principal gems.

9. *Ratnasangraha*<sup>3</sup> of Mahārṣi Śiṃha (12th cent.) consists of only 21 slokas, but gives a brief description of all the gems, refers to the prosperity of Yavanas, does not mention vidrūma.

<sup>1</sup> Dr. Rāy's *Hindu Chemistry*, Vol. II, pp. 8-9.

<sup>2</sup> According to Sukranṭi the Mahāratnas are nine in number. About nine gems as favourites of nine planets, see sloka 21 of Adhyāya 2 of *Jātaku Pārijāta*, translated by Subrahmaṇya Śāstri and printed at Nirṇaya Śāgar Press, Bombay (1908), p. 24.

<sup>3</sup> Edited and published by Dr. Sen together with his Bengali monograph on precious stones.

## IV. MODERN PERIOD (1200-1600 A.D.)

1. *Rasaratnasamuchchaya* (13th-14th cent.?) mentions *vaikrānta*,<sup>1</sup> enumerates 27 sages skilled in alchemy, among whom Vyādi<sup>2</sup> is one, enumerates and describes the gems as agencies which help the fixation or coagulation of mercury, treats of the process of reducing gems to ashes.

2. *Dhāturalanāmālā* (14th cent.) treats of the properties of pearls, coral, diamond, and the modes of their incineration.

3. *Nighantu* of Madanapāla (14th cent.) has a few verses about gems also.

4. *Dhātukriyā* (16th cent.) gives the synonyms of pearls, coral, etc.

5. *Bhāvaprakāśa* (16th cent.) also refers to gems, discusses their effects as drugs, enumerates several new uparatnas or inferior gems.

6. *Rājanighantu* (17th cent.) recommends the use of gems for the propitiation of planetary deities<sup>3</sup>, indicates Tantric influence, and treats of their medicinal effects.

From the foregoing history of mineralogical literature of the Hindus extending over 2,500 years, it would have been evident that there are two features which characterise it:—

(1) that it is a record of continuous growth: Indian mineralogical literature does not present the case of an arrested development but has grown from epoch to epoch, utilising and assimilating the new conditions<sup>4</sup> according to the changes in the cultural environment of the country, and displaying novel features according to the altered circumstances of the times.

(2) that, like every other branch of Hindu culture, it has been built up by the joint and cumulative effort of the people of the whole of India: Punjab, Gujrat, Rājputāna, Madhyadeśa, Bengal, Mahārāstra and Dakṣiṇātya. Each quarter has contributed to the growth and development of Indian mineralogical literature, according to its opportunities, by supplying either 'great masters' or commentators as the need arose. Thus among the heroes of Hindu medicine and mineralogy, Charaka belongs to the Punjab, Susruta is claimed by Punjab as well as Benares, Vāgbhata belongs to Sindhu (Western India), Vrinda to the Deccan, Narahari Pandit is claimed by Kashmir, but belongs probably to Mahārāstra, Chakrapāṇi to Gauḍa (Bengal), Sārangadhara to Rājputāna, Viṣṇudeva to Vijayanagara, Devadatta to Gujrat, Madanapāla to Kanauj, Mathanasinha to Malwa, and Bhāvamisra to some part of Madhyadeśa (i.e. the U. P.).

<sup>1</sup> Prof. Yoges Chandra considers this to be the first mention of *vaikrānta*. But the discovery of Nāgārjuna's *Rasaratnākara* has pointed to it some four or five centuries earlier.

<sup>2</sup> This Vyādi has been mentioned in *Garuḍapurāṇa* as specialist in detecting artificial pearls.

<sup>3</sup> See the Hindi Edition (1888), p. 139-142. Published from Benares.

<sup>4</sup> For the 'original' features in the successive works of the so-called commentators, see the account of Sanskrit medical treatises in Kavirāja Birajācharaṇa Gupta's Bengali work, *Vanaspādhidarpaṇa* (Auddy Co, Calcutta, 1908), pp. 30, 33, 34, 35, 36. In this the author has presented a learned treatment of the History of Hindu medical literature, and has discussed the questions of priority, interpolations, &c., by reference to original texts.

## SECTION 6.

*General remarks on Metallurgy<sup>1</sup> in Hindu life and thought.*

We shall first mention all the references in *Sukranīti* bearing on the subject of metals, whether (1) as indicating metallurgical, alchemical<sup>2</sup>, medicinal or artistic and commercial uses made of them by the ancient Hindus or (2) as indicating their theoretical or scientific knowledge about the diverse properties of metals and their uses in society. A study of these references will give us (1) an estimate of certain aspects of the material civilisation of the Hindus, (2) an idea of the geographical influences in which portions of the work might have been composed, and (3) incidentally enable us to determine the age of certain parts by comparison with the other works on the subject, as described in the preceding section.

It may be remarked here that the "distribution" of the mines, metals, stones and gems mentioned in *Sukranīti* covers practically a chapter of the whole Economic Geology of Ancient and Mediæval India. The Himalayan regions, Burma, Rajputana, the Deccan and the Indian ocean are the principal localities from which the minerals were derived in those days. Some of these regions have been identified, others not. It would appear that commercial intercourse was sufficiently active in promoting the formation of all-India 'markets,' or rather "world-markets" for the valuables. It is therefore very difficult to give a 'local' character to the mining and allied topics referred to in *Sukranīti*.

*Extent and Importance.*

On this subject of mining\* in ancient India, the *Arthashastra* of Kautilya is a fuller and more definite document than the work of Sukrachāryya. The economic and financial condition of the Maurya times (4th-3rd cent. B.C.) is vividly mirrored forth in this treatise. "According to it, there were two classes of mines, viz. (1) ocean-mines and (2) land-mines. \* \* \* The duty of the Superintendent of ocean-mines was to look after the collection of diamonds, and other precious stones, pearls, corals, &c. \* \* \* The Superintendent of land-mines had to perform the difficult work of prospecting and discovering new mines on plains and mountain slopes. \* \* \* Silver ores are those which have the colour of *sankha* and do not emit much foam and smoke. Similarly, we find mentioned the properties of the ores of gold, bitumen, copper, lead, tin, iron, &c. \* \* \* The Brahmana who has committed heinous offence \* \* \* may be condemned to the mines."

The fables and fairy legends<sup>3</sup> in which gold, silver and precious stones play an important part also tell their own tale. In the appendix to his

<sup>1</sup> Birdwood's *Paris Universal Exhibition of 1878*, pp. 20-69 (2nd Edition).

<sup>2</sup> See the paper on *Some Glimpses of India in the age of Chandragupta* by Mr. Narendra Nath Law, M.A., B.L., in the *Modern Review* for April, 1911.

<sup>3</sup> See also Lalbehari Day's *Folk Tales of Bengal* (MacMillan & Co.) and Shaikh Chhill's *Folk Tales of Hindusthan* (Panini Office, Allahabad) for the stories, respectively, regarding the origin of rubies, and of the Seven Goldsmiths.

*Indian Mythology*<sup>1</sup> Mr. Fausboll remarks : "In all cases the greater part of the Folk-Tales, both on the whole and in many separate characteristics, point back to India<sup>2</sup> as the land of their birth. \* \* \* And when the old Greek authors Herodotus, Ktesias, Strabo and Ælian speak of gold-digging ants \* \* \* it is evident that these tales are only a reflection of the imaginative mind of India. Some of the principal elements in the fables are gold, silver and precious stones. \* \* \* In India we read of serpents (nāga, sarpa) in ant hills full of gold (Panchatantra III, 5,10), of golden hamsas (Panchatantra III, 6, Jataka Nr. 136), of the Nāga who makes a present of jewels to the king who saved its life (Jataka Nr. 386), of the princess who will only marry one who has seen the golden city (Kathasarit Sagara V, 24), of the golden lotuses (K. S. S. V, 25), of Śiva's garden, of golden trees with branches of jewels and flowers and with clusters of pearls (K. S. S. IX, 52), and so forth.

How does it happen that precious metals and minerals play so important a part in India's tales (and therefore also in those originating from there)? The simple reason is because India has always been richly endowed with the same.

An early proof of this fact we gather from the records of the ancient Greeks. Thus whilst Megasthenes relates that, whilst the land on its surface bears all kinds of cultivated fruits, it has underneath numerous veins of all sorts of metals, for it is in possession of much gold and silver, and not a little copper and iron, yea, even tin and other metals which are used in the manufacture of useful articles and ornaments, as well as implements of war. He further says that Taprobane (Ceylon) produces more gold and more large pearls than the continent of India, and people's raiment is interwoven with gold and ornamented with gems.<sup>3</sup> \* \* \* Another proof is the numbers of mines still being worked in India. According to Constable's Hand Atlas of India there are about 59 gold mines, 14 silver mines, 34 diamond mines, besides 105 iron, 55 copper and 21 lead-mines. The great conquerors whose desire it was to reach India also give evidence of this. \* \* \*

Considering these things, can we wonder that we in India find a God of Riches (Kuvera), a god for those riches that grow in the mountain and not those that grow in the fields?

Precious stones and metals have also left their indelible marks on the Tamil classics of the Augustan age which, according to Mr. Aiyangar, should be placed in the 2nd century A.D. Two celebrated classics, the *Silappadhi-Kāram* (epic of the Anklet) and *Maṇimekhalai* (Jewel-belt), which incidentally bring before us a vivid picture of the political, religious, educational, economic and social life of the early Cholas, derive their titles, *dramatis personæ*, scenes and incidents from the morals and manners of people dealing in gold, rubies and jewels.

<sup>1</sup> Luzac and Co., London, 1903, pp. 189-98.

<sup>2</sup> Bentley's Translation of Panchatantra.

<sup>3</sup> See footnote on p. 192 of *Indian Mythology*.

The author of the *History of Indian Shipping* quotes the following from "A geologist's contribution to the History of Ancient India" by Prof. Ball in the *Indian Antiquary* for August 1884: "Even in the Mosaic Period (1491-50 B.C.) precious stones which were to a great extent a speciality of India appear to have been well known." Prof. Ball also rejects the view held by Lassen, Heeren and others that gold (and silver) was not indigenous to India but was imported from abroad, e.g., Tibet, Burma, and Africa.

The following evidence given by Mookerji derived from Seal's *The Chemical Theories of the Ancient Hindus* gives a bright picture of the economic mineralogy of Hindu India: "Broadly speaking, there were three great discoveries in applied chemistry to which India owed her capture of the world-markets: (1) the preparation of fast dyes for textile fabrics by the treatment of natural dyes like *manjistha* with alum and other chemicals; (2) the extraction of the principle of indigotin from the indigo plant by a process, which, however crude, is essentially an anticipation of modern chemical methods; and (3) the tempering of steel in a manner worthy of advanced metallurgy, a process to which the mediæval world owed its Damascus Swords."

#### Ornaments.

According to authors of the Sukra cycle, as to all Hindu writers, the Earth is full of wealth,<sup>1</sup> and Kuvera<sup>2</sup> is the deity presiding over it. They appreciate *Kuveratâ*<sup>3</sup> or the possession of wealth more than many other qualifications, though, of course, it is inferior to *Îsatâ* or over-lordship, i.e., sovereignty. They would therefore enjoy the good things of this world and advise others to do it.

According to them ornaments constitute some of the important valuables<sup>4</sup> of the state, and the ruler should appoint females to look after them. These are some of the items among the gifts<sup>5</sup> of the king to his officers, and we are told that the good servant<sup>6</sup> is satisfied with those that he receives and does not hanker after things not given. The love of ornaments among Sukra's countrymen is also indicated by the frequent metaphorical<sup>7</sup> uses of the term in *Sukranîti*. Thus "the ornament, the kingdom, strength, learning, or wealth does not adorn a man so much as courtesy and gentleness. Speed in horses, splendour in jewels, mercy in kings, blandishments in prostitutes, sweet voice in singers, charity in rich men, prowess in soldiers, abundance of milk in cows, restraint in ascetics, eloquence in learned men, impartiality in councillors, truthfulness in witnesses, devotion in servants, good counsels in ministers, silence in fools, faithfulness in wives, are the proper ornaments."

Three uses of ornaments have been mentioned in the treatise:—(1) as valuables of the treasury and as marks of honour conferred on office-bearers; as we have just noted; (2) as decorations for the person of females;—"The woman should put on clothes, ornaments, jewels given" by the father-in-law,

<sup>1</sup> Sukra I, 349-350, 357-358.

<sup>2</sup> Sukra I, 151, 160, 361-362.

<sup>3</sup> Sukra IV, III, 4-5.

<sup>4</sup> Sukra I, 702-704.

<sup>5</sup> Sukra II, 846-848.

<sup>6</sup> Sukra II, 12.

<sup>7</sup> Sukra III, 291-292, 471-472.

<sup>8</sup> Sukra IV, IV, 21-22.

mother-in-law, husband, parents, brothers, uncles and relatives ;" (3) for adorning images of the *rājasika*<sup>1</sup> type. That ornaments are important items in the material life of the people is likewise shown by the distinct recognition of the social offence committed by those who use others' clothes, ornaments<sup>2</sup> gold, &c.

The following is taken from Rājendralal's *Indo-Aryans* :—" In the *Nirukta* of Yaska and the grammar of Pāṇini not only ornaments, but names of various kinds of them are enumerated, and Manu defines the nature and duties of the caste whose special vocation was to manufacture them, and the punishment meet for fraudulent adulteration of gold. The old vocabulary of Amarasinha gives names for crowns, crests, and tiaras for the head, of rings, flowers and bosses for the ears ; of necklaces of one to a hundred rows, and of various shapes and patterns ; of armlets and bracelets ; of signet and other rings for the fingers ; of zones and girdles for the waist of both men and women ; as also of ornaments of bells, bands and chains for the legs and ankle." The sculptures of Bhuvaneswara and the bas-reliefs of Sānci and Amaravati exhibit specimens of a great variety of ornaments which have been described with illustrations by Rājendralal.

The countrymen of Sukrāchāryya are thus neither barbarous people who do not understand the importance of valuable commodities and who have not the æsthetic sense to appreciate them as materials for decorative and utilitarian arts. Nor are they the Utopians who set no store by precious metals, but employ gold and silver for their vessels of baser use. We know that the Utopia or 'Nowhere' of Sir Thomas More is peopled by men among whom the wearing of gold is a reproach and where fetters of bondmen are made out of it. "Gold and silver, whereof money is made they do so use as none of them doth more esteem it than the very nature of the thing deserveth. And then who doth not plainly see how far it is under iron : as without the which man can no better live than without fire and water. Whereas to gold and silver nature<sup>3</sup> hath given no use, that we may not well lack : if that the folly of men had not set it in higher estimation for the rareness' sake. \* \* \* And these metals, if they should altogether at once be taken from the Utopians no man there would think that he had lost the worth of one farthing."

These are the teachings of the socialistic and the political reformer of England in the 16th century. But the authors of the Sukra cycle are not revolutionary idealists running away from the troubles and imperfections of the existing state of things into an Ideal Republic of nowhere. They are sane men dealing with the world as it is, and have to reckon with the human passions as they are. They therefore do not taboo wealth and enjoyments from their scheme of life, but try to regulate them as far as necessary.

<sup>1</sup> Sukra IV, iv, 163-164.

<sup>2</sup> Sukra IV, v, 151-152.

<sup>3</sup> See the chapter on "journeying or travelling abroad with diverse other matters cunningly reasoned" in the *Utopia* of Sir Thomas More (English translation).



*Sukra on Mining and Metallurgy.*

In this pursuit of wealth they do not scruple to disembowel the "unsunned" treasures of the underground universe and search its entrails wide and deep. It is because of this that we have the very old European tradition about the 'wealth of Ind' in the gorgeous east which "with richest hand showers off her kings barbaric pearl and gold." Mining becomes thus one of the occupations of the people, and the rulers have a right to its yield. Among other functions the *Sumantra*<sup>1</sup> or Finance Minister of the state has to study the amount of revenue realised through mines. This income from the mines is known to be *Itara* or other than *pārthiva* (i.e., terrestrial), according to the Public Finance of the Sukra statesmen. "Duties, fines, royalties on mines,<sup>2</sup> prices and contributions, etc., are known to constitute non-terrestrial income according to writers and specialists." The mention of mines<sup>3</sup> among the regions of Sulka or duty which is the king's share from the buyer and the seller points also to the importance of mining as an item that feeds the Income-schedule of the State Budget. So we read: "The king should realise from minerals<sup>4</sup> at the following rates: half of gold, one-third of silver, one-fourth of copper, one-sixth of iron, tin and lead, half of gems, half of alkalies; after the expenses have been met." The ruler is also advised to appoint miners<sup>5</sup> to their proper works and store by minerals<sup>6</sup> carefully for emergency or other purposes.

Not only the miners, but goldsmiths, coppersmiths and other metal-workers as well require patronage and "protection" of the State. "The king should always keep in his kingdom the tools and implements of the metal-workers' after inspecting them" and find occupation for "those who make lighter machines, gunpowder, arrows, cannon-balls, and swords, and construct various tools and implements, arms and weapons, bows and quivers, etc.; those who prepare ornaments of gold, jewels; etc., builders of chariots, stone-carvers, blacksmiths, and those who enamel metals."

This enumeration of the industries connected with metallurgy to be encouraged by the king involves also a good deal of legislation on the subject. Thus among the laws to be promulgated among the people one is that "falsehood must not be practised by anyone with regard to the standard of

<sup>1</sup> Sukra II, 211-212.

<sup>2</sup> Sukra II, 871-872. The *pārthiva* or terrestrial income accrues from the rights of sovereignty over lands, rivers, seas, lakes, tanks, wells, &c.

<sup>3</sup> Sukra IV, ii, 212-218.

<sup>4</sup> Sukra IV, ii, 233-235. Here I beg leave to correct my translation on p. 148 of Vol. XIII, Parts I and II of the Sacred Books of the Hindus Series. *Vanga* is tin and not zinc. The words for zinc in *Sukraniti* are *raṅgaka* and *jaśada*. The reader is requested to understand these three lines as translated in this section.

<sup>5</sup> Sukra II, 404-405.

<sup>6</sup> Sukra IV, ii, 60-63.

<sup>7</sup> Sukra IV, iv, 85-87.

Sukra II. 324-328.

weights and measurements, currency, some kinds of metals<sup>1</sup> etc." So also "the man who adulterates<sup>2</sup> metals deserves double the punishment." State intervention in Industry cannot be one-sided. If it is the duty of the ruler to maintain the artists and artisans and thus "protect" them with work and wages, it is also his lookout to see that the people should be protected from them. Hence guardianship of the state must be exercised against the dangers of false and counterfeit coinage and the passing off of base metals for genuine and high class commodities.

An account of the fabrication of imitation-jewellery in Hindu India has been preserved in the dramatic literature of the 1st cent. B. C. In the *Troy Cart* of Sudrakā a question is raised about the identity of certain ornaments produced in a court of justice. We quote the following from that play published in Wilson's *Hindu Theatre*:<sup>3</sup>

"Judge.—Do you know these ornaments ?

*Mother*.—Have I not said ? They may be different, though like. I cannot say more ; they may be imitations made by some skilful artist.

*Judge*.—It is true. Provost, examine them ; they may be different, though like ; the dexterity of the artists is no doubt very great, and they readily fabricate imitations of ornaments they have once seen, in such a manner that the difference shall scarcely be discernible."

The examination of metals as to their genuineness and worth thus becomes an important function of the state as well as people. The Sukra statesmen know very well that metals<sup>4</sup> may be made to acquire artificial character, and have mentioned the preparation of artificial gold<sup>5</sup> as an art or one of the sixty-four *kalās*. The testing<sup>6</sup> of minerals must therefore be an important branch of learning and is referred to as a *kalā*. And the wise men<sup>7</sup> are those who know how to determine their value by carefully examining them. One test is given in the following lines : " If two pieces<sup>8</sup> of a metal—one pure and the other suspected

<sup>1</sup> Sukra I, 587-592.

<sup>2</sup> Sukra IV, v, 660. So also Manu advises the king to cause a dishonest goldsmith to be cut to pieces with razors. IX, 292.

<sup>3</sup> Wilson's *Hindu Theatre*, II, p. 85.

<sup>4</sup> Sukra IV, ii, 171-172. where we are told that gems also have defects, but they are 'natural.' This preparation of artificial metals, however, does not seem to be the transmutation of "base" metals, e.g., copper or lead into gold or silver, but the manufacture of imitation gold or silver, i.e., of substance having their lustre, or the laying of gold or silver deposits on copper and other metals. Prof. Yoges Chandra Ray proves this in his *Ratna-Parikṣā* by examining the extracts from *Rasaratna-samuchchaya* and *Garuda-purāṇa*.

<sup>5</sup> Sukra IV, iii, 178. This does not refer to the alchemical transmutation of base metals into gold, but the manufacture of imitation gold.

<sup>6</sup> Sukra IV, iii, 180.

<sup>7</sup> Sukra IV, ii, 171-172.

<sup>8</sup> Sukra IV, ii, 178-179. Specialists would do well to examine the accuracy of this test in a laboratory.

as alloy—be successively passed through the same hole, and threads of equal lengths be drawn out of them and weighed, and if the weights of both are equal, the metal<sup>1</sup> is unalloyed, otherwise not."

We have already referred to some of the industries connected with metal-work.<sup>2</sup> The use and manufacture of seals and emblems have been mentioned in several places.<sup>3</sup> Thus, "one should put on the clothes, uniforms and emblems granted by the king;" "they should put down their seals over it at the end of the writing;" "the king should give to each cultivator the deed of rent having his own mark (seal)." These and other manufactures are suggested also in the enumeration of the *kalās*, e.g., (1) melting,<sup>4</sup> powdering, incineration &c., of metals, (2) the knowledge of the mixtures of metals and herbs or medicinal plants, (3) analysis and synthesis of metals, (4) preparation of alloys, (5) alkalies and salts; (6) cleansing, polishing, (7) dyeing of stone and metal vessels, (8) making of ornaments, (9) enamelling, (10) preparation of tools and implements, &c."

Metals thus occupy a very important place in several aspects of the secular life of the people as described in *Sukranīti*. They have a religious bearing also. For the "images of gods<sup>5</sup> are made of sands, pastes, paints, enamels, earth, woods, stones and metals," the strongest being those of metals. This religious branch of the metal-craft carries with it a very severe responsibility. It compels the artist to be very particular about his workmanship and to study the canons of Hindu art, in order to conform to them as closely as possible. For, though defects may be allowed in images of a temporary character, e.g., those made by painting, drawing, or of sand, earth &c., and in the natural images of gems and stones picked up in rills and hills, those which are to be durable must be tested very minutely and must satisfy the condition of good Art. Thus we are told that "one should consider the defects of proportion in images of stones<sup>6</sup> and metals only." If the sculptor bungle with the work entrusted to him and do not construct the image according to the prescribed measurements of the limbs, his wealth and life would be jeopardised and his misery<sup>7</sup> will daily increase.

#### *Metals and stones in minor arts.*

We thus see that, besides the important part played in commercial, social, religious, and literary lives of the people of India, the metals and gems have had their influence on Indian art also. Architecture as well as sculpture of Hindu-  
 sthan bear abundant testimony to the treatment of *dhātus* and *ratnas* by artists.

<sup>1</sup> See also the rule laid down in *Sukranīti* about the relation between weight and volume. IV, ii, 177.

<sup>2</sup> Notice also the references to the manufacturers of badges, sceptres, bridges, coins, &c., *Sukra* II, 853-855; I, 722.

<sup>3</sup> *Sukra* II, 490-491; II, 739-740; IV, ii, 247.

<sup>4</sup> *Sukra* IV, iii, 145-150, 167-168, 179-193.

<sup>5</sup> *Sukra* IV, iv, 147-151.

<sup>6</sup> *Sukra* IV, iv, 865-869.

<sup>7</sup> *Sukra* IV, iv, 157-159.