

ENCOUNTER IN ANATOMICAL KNOWLEDGE: EAST AND WEST

JAYANTA BHATTACHARYA*

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Recent scholarships reveal that divine character of Āyurveda does not belong to its hard core, but has been imposed upon it during a particular stage of development serving as a disciplinary matrix to gain legitimacy from the religious society. But, scholars working within a traditional framework have tended not to engage with the problem, because of the strong belief that Āyurveda is indeed a continuation of medicine from the Vedic *saṃhitās*. The study of medicine (and anatomy) in ancient India was the first momentous step forward from *daiva-byāpāsraya bheṣaja* to *yukti-byāpāsraya bheṣaja*. Suśruta's list of bones can be compared with that of Caraka along five points: (a) The Principle of Position, (b) The Principle of Homology, (c) Alteration of Terms, (d) Alteration of Items, and (e) Alteration respecting Structures. Directly perceptible results (*pratyakṣa-lakṣaṇa-phala*) constituted an important matrix of rational medical approach. Despite this fact, there was schism between rational clinical acumen and anomalies observed, and gap among anatomy, physiology and pathology. Even if the body had assumed an anatomical exploration, physiology and pathology were not linked to and compatible with it. The later two were determined by the philosophical doctrine of Nyāya, Vaiśeṣika, Sāṃkhya, and, to some extent, by Buddhism and Vedāntic Philosophy.

The physical examination, medical imaging and other procedures, as well as the elements of the medical history, all generate clinical data that pertain to modern anatomical entities in the human body. The paper is specifically focussed on: (i) the shaping of transformatory perceptions about the three-dimensional body (emerging out of dissection and experimentation) vis-a-vis textual authority of knowledge of the two-dimensional body-frame in Āyurvedic education, (ii) localization of space (in the form of anatomical pathology as poised against Āyurvedic humoral pathology) and time (in the form of both anatomical physiology against

* Research Associate of Indian National Science Academy, New Delhi.
E-mail: drjayanta@gmail.com

humoral physiology and the production of clinical charts in hospitalized patients), and (iii) creation of medical professional authority out-reaching people through teaching institutions, dispensaries, hospitals, cantonments, asylums, and jails and also through private practices.

Asymmetric exchange between two knowledge systems changed the ways of knowing the body in Āyurveda. The 'Indian' body was the very site of confrontation between the colonizing alien power and 'true' Indian ways of knowing the body wherein lies the centrality of anatomical knowledge and the 'medical' body in medical education before and after arrival of the British. Spatio-temporal understanding of this sort of anatomical body was not individualized and could only be perceived to be co-rhythmic with the greater rhythm of nature and universe - in the light of macrocosm-microcosm. Case history taking of individual patients added a new paradigm to doctor-patient-disease relationship. From the world of verbal testimony and narratives and a sort of organic bondage between physician and the patient a new paradigm of 'clinical detachment' began to emerge. Assimilation of modern Western anatomical ideas to explain internal dynamics of Āyurveda and to judge all ancient works in 'scientific' light (bearing equivalence of being 'civilized') gradually became the call of the day. Philosophical matrix of Āyurveda was dislocated through this 'modernization' of Āyurvedic knowledge of anatomy. Post-Renaissance medical concepts insinuated into the interstices of classical Āyurvedic concepts and reconstituted their meanings. Consequently, the Āyurvedic body as a self-reflexive and active agency began to metamorphose into 'object' of modern medicine.

INTRODUCTION

The present study is from a medical professional's point of view, not from a historian's viewpoint. This particular position of doing research has yielded, to my opinion, a few interesting issues that can be taken up for further investigations by historians of science and medicine. There was descriptive anatomical knowledge in traditional medicine enshrouded by philosophical and religious orthodoxies and interventions which made it 'holy' and 'eternal.' The Western medical knowledge has however provided the knowledge of dissection and delving into the interiors of the body. The body was subjected to experimental verification. Rasmussen identifies one source in the concession of established Christian orthodoxy to permit dissection of the human body some five centuries ago.¹ Such a concession was in keeping with the Christian view of the body as a weak and imperfect

vessel for the transfer of the soul from this world to the next. For in the eyes of the Church these had more to do with religion and the soul, and hence properly remained its domain. This compact may be considered largely responsible for the anatomical and structural base upon which scientific Western medicine eventually was to be built. For at the same time, the basic principle of the science of the day, as enunciated by Galileo, Newton, and Descartes, was analytical, meaning that entities to be investigated be resolved into isolable causal chains or units, from which it was assumed that the whole could be understood, both materially and conceptually, by reconstituting the parts. With mind-body dualism firmly established under the imprimatur of the Church, classical science readily fostered the notion of the body as a machine, of disease as the consequence of breakdown of the machine, and of the doctor's task as repair of the machine. Thus, the scientific approach to disease began by focusing in a fractional-analytic way on biological (somatic) processes.² Contrarily, Kenneth Zysk contends, "Because...dissection required the physician or student to come in contact with extremely impure and defiling substances, it very likely did not originate in the brâhmic social and religious setting in which the tradition claims the early medical treatises, as we now have them, developed."³ He adds, "traditional brâhmic sources recount the origin of Indian medicine through a lineage of divine, semidivine, and venerable transmitters."⁴

With these points in view I hope to specifically focus on: (i) the shaping of transformatory perceptions about the three-dimensional body vis-a-vis the two-dimensional body-frame in Âyurvedic education, (ii) localization of *space* (in the form of anatomical pathology as poised against Âyurvedic humoral pathology) and *time* (in the form of both anatomical physiology against humoral physiology and the production of clinical *charts* in hospitalized patients), and (iii) creation of medical professional authority outreaching people through teaching institutions, dispensaries, hospitals, cantonments, asylums, and jails and also through private practice.

Moreover, in the early years of "Colonizing the Body", it would cost 100 pounds to train a soldier in British India. Hence, this loss had to be averted.⁵ Colonel Hodgson warned, "in Bengal one year encounters as much risk of life as in three such battles in Waterloo."⁶ So it was very much necessary for the British to introduce modern medical education in Bengal

(and India). During the nineteenth century Western medicine enjoyed an intimate association with colonial power. “Its first priority was the protection of the European community and those interests and individuals closely connected with it”⁷ At the same time, the existence of established medical systems and folk practice constituted a major barrier to the penetration of Western medicine before 1900. As a cautionary note, “Once colonial medicine is abridged to its colonial provenance alone, it tends to deny political and social agency to people (‘colonial subjects’ in postcolonial lingo), independent from colonial designs.”⁸

PRELIMINARY DESCRIPTIVE ACCOUNTS: EAST AND WEST

John Fryer was a medical graduate from England. He served as a surgeon in the East India Company for nine years from 1672 to 1681 and traveled extensively on the Coromandel and Malabar coasts. He describes the life and trade of Bombay, Surat, and Madras. His account is valuable for its commentary on natural history and medicine. He found ‘*Bengal Juglers*’ and others to show magic. One magician “by Suction or drawing of his Breath, so contracted his lower Belly...as by the most accurate Dissection could be made apparent...The Aetiology whereof I think to be this; that while all the contents of the Belly are moved upwards, all Respiration is expelled, only the voluntary Motion of the Animal Spirits act upon the Nerves (the Mind or Soul commanding them) while the Vital or Natural are compelled to the contrary.”⁹ Terms like ‘suction’, ‘accurate dissection’ or ‘voluntary motion’ are more specific technical-scientific terms to describe a magic show which the Indian people observe with awe. We should also take into account the idea that “the Nerves”, according to the prevailing 17th century notion, receive command from “the Mind or Soul.”

Fryer finds, “In esteem among them are principally Magick and judicial Astrology...Elocution, Physick, Metaphysicks, are not out of their element: Their Philosophers maintain an *Aristotelian* Vacuity; nor are they quite ignorant of Medicks, though Anatomy is not approved, wherein they lean too much on Tradition, being able to give a very slender account of the Rational Part thereof.”¹⁰ In this observation ‘Anatomy’ has been juxtaposed to ‘Tradition’ and near-absence of ‘Rational Part’ thereof. Anatomical perception of the human body was the basic issue of Fryer’s account, while it was the extra-scientific puzzle that pervaded Indian observation.

Two relevant issues worthy of mention may be noted here. First, throughout the seventeenth and eighteenth century, particularly in the aftermath of the French Revolution, some important changes did occur in the field of medicine, namely – (a) scientific chemistry, (b) the microscope, and (c) the idea that disease might produce specific changes in the bodily organs and blood and which could be detected and would be helpful in the management of the patient. The lesion spoke through the patient, though it only finally yielded its secret in the physical examination. In other words, clinical pathology and pathological anatomy began to make long strides.¹¹ Bedside Medicine changed over into Hospital Medicine, speculative pathology to pathological anatomy. Metaphorically, Boerhaave gave place to Bichat. Second, with the introduction of the use of stethoscope by Laennec in 1816 medical art of healing was greatly transformed into science of physical diagnosis, and led directly to the organ-pathology and Linnaean identification of ‘disease’, the two developments that became major contributions of the nineteenth century to Medicine.¹²

Aided and informed by these technological advancements and an altogether different system of knowledge Europeans came to conquer geographical territories as well as the knowledge world of India. It was in its validation of the colonial civilizing mission and ‘difference’ that colonial medicine informed attitudes and responses within indigenous society. It may be emphasized here that the word *science* is adopted by Āyurvedic doctors (as by many other kinds of doctors) as a sign for a universal knowledge that transcends national and cultural boundaries. For most Ayurvedic doctors today the question seems to be not whether Āyurveda is a science (indeed, the root *veda* is routinely translated as science) but rather how it might differ from other sciences.¹³ With this objective it would be pertinent to know (i) how, with the introduction of anatomical knowledge in India, a new history of medicine and medicalization and surveillance of population was written for ever, and (ii) how different levels of interactions are noted and certainly shaped by an encounter with modernity that takes place on various fronts, from the purely medical to the socio-moral.

At this juncture, we can cite two differing accounts (more than two centuries later than that of Fryer) of a Bengali peasant as well as of an elite. These two accounts reveal multi-layered perception of the body, being and conceptual framework in colonial India. A peasant of Birbhum (of Bengal)

writes to a person (to whom he owed some amount of money), “I went to town wreaking evils against you, so I am contacted with an alien disease. You should know it ... and on getting cured I must repay the whole of debt whatever I owe to you.”¹⁴ On account of the complex referentiality of somaticity in India, the body provides a kind of skeletal structure for an alternative history of disease understanding and the specific site for identity formation (particularly during nationalist period) against colonial backdrop.¹⁵ An opposite contemporaneous ‘elite’ account is provided by Dwijendranath Tagore, “Treatment by any means is a wild goose chase! So better not to say anything about *kavirāji cikitsā* (Āyurvedic treatment) – even the shimmering rays of nineteenth century knowledge has failed to penetrate its windows.” He continues, “modern medicine starts with *dissecting* a cadaver, Āyurveda starts with elaborating on relationship between the body and mind.” Inspired by ‘modernity’ he innovatively uses the categories of Āyurveda like *vāyu*, *pitta*, *ślesmā* (wind, bile, and phlegm) to interpret the superiority of Western intellect. In his analysis persons like Danton belong to the category of *pitta* or bile and represent ‘social dynamics’. Finally, he concludes, “By the raging light and scorching heat of English education orthodoxies began increasingly to be banished from metropolis to the fringe of villages.”¹⁶ It is understandable that while in the first account the role of *karma* appears as the basis of disease causation¹⁷, in the second, dissection (or anatomical spatial localization of organs) constitutes the core of argument. Another interesting point may be noted. Technical terms (*pitta*, *ślesmā* etc.) used in Āyurveda were freely used in every-day life too with quite different connotations. The same Āyurvedic technical terms are used by Dwijendranath to carry over modern meaning and signification. To remember, “The primitive meaning which can be restored does not indicate quite surely the derivative meanings in which the words have been used in the texts.”¹⁸ Another important issue may be mentioned here. One European scholar finds that the vision of the sick-man institutionalized within the tenets of ‘Bedside Medicine’ was that of conscious human totality – a viewpoint that transcended, not merely united, the distinctions of psyche and soma found in modern medicine.¹⁹ There occurred an epistemological break in the sense that there was no “perfect association between appearance and disease.”²⁰ A mechanistic model of the body compounded this in the aftermath of Newtonian revolution in physics, Cartesian philosophy, and Galilean mathematical explanation of physical

bodies. A new paradigm emerged: models—logical deduction—theorem or result. But the Indian approach remained to be: observation—algorithm—validated conclusion.²¹

Colonial medicine arrived in India at a period when it has undergone the paradigmatic shift from ‘Bedside Medicine’ to ‘Hospital Medicine’, and also to ‘Laboratory Medicine’.²² To know and combat diseases in alien environment the British had to depend on knowledge of the native body on the one hand, and to control environment or the space surrounding the body. In *Bengal Gazette*, dated 12 August 1780, a poem “*Calcutta in the Rains*”, was published containing the following lines:

Where insects settle on your meat,
 where scorpions crawl beneath your feet
 and deadly snakes infest;
 mosquitos’ ceaseless teasing sound
 and jackals’ direful howl confound
 destroy your balmy rest.²³

By the early nineteenth century, the ‘native of Bengal’ had come to symbolize all that was despicable in the colonized race. The common illnesses reported were dysentery and various fevers, treated summarily by Company physicians with doses of brandy, mercury or bleeding. In March 1862, Prof. Longmore, of Netley, gave the following evidence before the Royal Commission on the sanitary state of the Indian Army, “As regards the chief part of this extensive city (Calcutta) – that inhabited by the native population – the pestilential condition of the surface-drains and yards, and many of the tanks among – the huts and houses, would not be credited by any one who had not been among them.”²⁴ In 1860 the cholera deaths were 6,553, and in 1866, the figure was 6,823. The notion of geographical pathology was constructed which waited to be properly ordered and ‘improved’ by the Colonizers. In a similar way, the space of Calcutta and the bodies inside this space were fit into this project of ‘improvement’. “Plants, minerals, morbid specimen, skulls, medicinal samples, natural history drawings and letters reached these institutions (like the Asiatic Society) in Calcutta, and from there, they often sailed ship to London, Edinburgh, and other metropolitan centers.”²⁵ There were two faces of Calcutta – a pathological space, and the colonial “centre of calculation” (as Bruno Latour clinches the point).

To control this pathological space and to ‘civilize’ the native bodies there came up the importance of public health emerging out of its ‘enclave’ origin. The focus of the nineteenth-century public health became the zone which separated anatomical space from environmental space, and its regime of hygiene developed as the monitoring matter which crossed between these two great spaces.²⁶ Sanitary science dissected the mass and recognized separable and calculable individuality in the form of anatomical/corporeal space in the crowd – though not the *singularity* of individual difference. Such an idea originating in Europe was made to operate in India. But, ignorance of Indian context and milieu is quite revealed in the 1st census of Indian Empire in 1871. Scholars have argued that “the wisdom of trying to impose on the Indian people a category – in this case, age – that worked well in a Western context but did not easily translate into useful data when exported abroad. In short, they realized that even so putatively ‘universal’ a category might be impossible to determine accurately in a culture that lacked certain assumptions about *time*, and in a state that lacked the resources to record the dates of births and deaths.” Ignorance, sometimes tantamount to stupidity, became even more explicit when after the 1872 census in Bengal, Beverley, the provincial registrar, observed that “[t]he population of Bengal rose in one day from 42 to 67 millions,” and quipped, “[t]he Lieutenant-Governor . . . suddenly found that he had unconsciously been the ruler of an additional population more than equal to that of the whole of England and Wales.”²⁷

Many books were written during this consolidating phase of colonization to guide the White settlers in India. One such was “Medical Hints for Hot Climates and For Those out of Reach of Professional Aid.”²⁸ Some of the suggestions were:

- 1) To get up late in the morning and take breakfast or light food at 11-30 am. “Do not eat too much at a time; i.e., be content with satiety and leave off with an appetite.”²⁹
- 2) To take regular bath.
- 3) To take decoction of *ciratā* (a traditional herb used by Indians to increase appetite) and *bael* (a mild astringent and is used in India for dysentery and diarrhoea; the pulp may be eaten or the decoction administered. It is said to cure without creating any tendency to constipation.)³⁰ It was also observed that “there are certain days on which meat killed quickly turns

putrid, and that such seasons have been noticed as marked by humidity, closeness, or stillness of the atmosphere.”³¹ So, there arose the need to incorporate local Indian medical and herbal knowledge within the therapeutics of Western medicine for everyday purpose while living in an alien environment.

When two culture groups come face to face they are confronted with the barrier of language. It hinders a deep and meaningful process of mutual appreciation and cultural exchange. When the British emerged to be the ruler of India “The British mode of living in India provided cultural blocks to their acquisition of knowledge beyond their problem with language.”³² Hence, there was a deluge of translation of Indian texts. As a consequence, “Seen as a corpus, these texts signal the invasion of an epistemological space occupied by a great number of diverse Indian scholars.”³³

It can be summarized as:

- (1) At the interface of two cultures exchanges occur at various levels with different responses, namely, (a) upper echelons of a given society, (b) middle class, if any, and (c) lower rung of the society.
- (2) More powerful culture (with its political and economic background) pursues the *modus operandi* through (a) *interaction* (or, knowing the object), (b) *experimentation* and *assimilation* (knowing the nature of the object – which turns out to be an ontological question), (c) *transformation* (reconstituting the object in an artificial environment), and (d) *dissemination* (exporting it to its root – original cultural context – which may be regarded as an epistemological question).
- (3) In tandem with the last one (dissemination) dislocation occurs at idioms of expression or understanding in both the cultures. For example, while exploring Tropical medical space (including India) ‘germ theory’ was dislocated by the rise of parasitology, and, finally, giving rise to Tropical Medicine. Simultaneously, there was reconstruction of Âyurvedic knowledge of anatomy and it began to be read and interpreted in the light of modern medical/anatomical knowledge. ‘Philosophical’ or ‘speculative’ anatomy was reconstituted by modern anatomical knowledge.

We shall now proceed to see how all these exchanges and changes occurred at the level of both epistemology and ontology of Indian knowledge

pattern. While talking about the English East India Company Patterson observes, “The early traders faced formidable medical problems, and, at first, they were eager to learn anything they could from the local medical practitioners...Faced with a continuing high mortality the Europeans noticed that Indians were relatively immune to some of the local diseases. This led to the policy of ‘indianisation’: the attempt to make the blood of the Europeans more like that of the Indian, and so make him more resistant to Indian disease.”³⁴ With the success of the first English expeditions the import of drugs into England increased markedly: the portion of drugs imported from outside Europe in 1588 was 14%, in 1621 48% and in 1669 70%, of which the majority had come from India and the East Indies.³⁵ Connected closely with the issue of medicine was the question of botanical identification of plants and herbs in use for pharmacological purposes. Gerard Koenig, a student of Carl Linneaus, realized that a better understanding of Sanskrit would open the world of medical values of these plants. He observed, “Some hundreds of plants, which are yet imperfectly known to European botanists...grow wild on the plains and forests of India.”³⁶ Garcia de Orta’s knowledge of Indian plants opened up a new world of Western botanical taxonomy. “The developing *British Pharmacopoeia* in Britain at the time was then a precursor to these developments.”³⁷ More evidences may be found from the use of *Rauwolfia (sarpagandhā)*,³⁸ and cotton wool (which was originally produced in India) for wound dressing.³⁹

But at a later period during the mid-nineteenth century, things began to change. Western interest was confined not only to taxonomy or morphology of a plant. Plants were scrutinized through chemical tests and to separate its constituents which could be artificially produced in laboratories and, then, in factories. John Stenhouse presented a paper before the Royal Society on December 6, 1855. The paper title was “Examination of select Vegetable Products from India. These Vegetable Products were *Datisca cannabina*, *Ptychotis Ajowan*, and *the Decamalee Gum of Scinde*. His effort for “last twelve months has been chiefly directed to three of these vegetable substances...”⁴⁰ Bala finds that the simultaneous flourishing of indigenous and Western forms of medicine was not only because of state patronage but also because of the similar basis of treatment and diagnosis so that one system did not threaten the other. But, after knowing the extracts of a plant and herb (along with synthetic chemical production of drugs) the chemical

and drug industry in Britain flourished like giants. So, “the rise of the chemical and drug industry and the growing profession of medicine in Britain created a vast gulf between Indian and Western medical sciences which was getting wider day by day...it could not be breached.”⁴¹ As mentioned earlier, the phase of interaction passed over to the phase of assimilation and experimentation and more. We shall come to notice later on what had come out of this interaction. Bruno Latour has described similar processes by which local facts are converted into “**immutable and combinable mobiles**...All these charts, tables and trajectories are conveniently at hand and combinable at will, no matter whether they are twenty centuries old or a day old.”⁴² All these are carried to the ‘centers of calculation’ and every domain enters the ‘sure path of science’ when its spokespersons have so many allies on their side. The tiny number of scientists is more than balanced by the large number of resources they are able to muster.⁴³ Here, in the ‘centers of calculation’ these facts are standardized. *Additional* work is done inside the centres to mop up the inscriptions and reverse the balance of forces once more. Such recurring cycles, according to Latour, give metropolitan science its steadily increasing claims to universal knowledge.

During the first half of the nineteenth century, however, the drive for ‘westernization’, both secular and religious, had been growing. The only course for India was thought to lie in abandoning Indian ways, and arranging for all education to be on western lines. This resulted in a complete reversal of the earlier liberal attitude of Europeans to Indian culture, including medicine.⁴⁴ One recent scholar finds, “Thus, modern European science is ontologically linked to the growth of European colonialism and to intellectual voyages from the sixteenth century.”⁴⁵ This ontological question is also intertwined with centre-periphery epistemological question. Our assumptions about what it is to be human, about what it is to be a person, correlate with deeply held convictions about what constitutes a human and a supposedly ‘normal body.’⁴⁶ Moreover, to add, during the mid-nineteenth century the notion of the norm, of normalcy, and the normal body evolved. A ‘normalizing regime’ or ‘regime of normalcy’ emerged out of the idea that there exists a normal standard to which all bodies must and should conform. “Shifting power relationships in the colonies, together with new intellectual currents emanating from the metropole, wrought a profound change in the way Europeans came to see their *bodies* in relation to their subjects and the tropical environment.”⁴⁷

PLACE OF ANATOMICAL KNOWLEDGE IN ANCIENT INDIAN MEDICAL TEXTS

The study of medicine in ancient India was the first momentous step forward from *daiva-byāpāśraya bheṣaja* to *yukti-byāpāśraya bheṣaja*.⁴⁸ Kenneth Zysk, taking cue from Edelstein, suggests that anatomical knowledge can be obtained in three ways: sacrifice, chance observation and dissection. Regarding anatomical knowledge in ancient Indian medicine he has focused “on the methods by which this specialized knowledge was ascertained.”⁴⁹ The quartered animals at the Vedic sacrifices afforded excellent materials for the framing of a comparative anatomy.⁵⁰ “Suśruta devoted his whole life to the pursuit of surgery proper, to which he brought a mind stored with luminous analogies from the lower animals.”⁵¹ Though Zysk admits, “the most impressive aspect of the earliest phase of anatomical knowledge is precision with which the lists of anatomical terms were recorded”,⁵² he also finds that the correspondence between “the underlying medical philosophies in the teaching of Suśruta and in those of the Greek scientists and anatomists point to a Hellenistic origin of dissection in India.”⁵³ While concluding with a critical translation of chapter five on the “enumeration and distinction of the bodily parts” in the book of anatomy of the *Suśruta Saṃhitā* he comments, “there is a definite lack of knowledge concerning the structure of the body which lies beneath the rib-cage. This has continued to the time of Dalhana (12th cent. AD). The anatomists saw the tubes (trachea and oesophagus) descending into the lungs and assumed that one went to the lungs and the other to the heart.”⁵⁴

Here, I shall argue that (A) Āyurveda does not have any loan word from the Greek, so the question of Hellenistic origin of Āyurveda does not probably arise (“Indian physicians almost certainly had the opportunity to imbibe Greek medical ideas, but apparently no motive.”⁵⁵), (B) in Indian context, sacrificial practices of animal possibly played the key role in the accumulation of anatomical knowledge (not chance observation or dissection as found in Greek practice), and (C) the two humoral theories of the Greek and Indians respectively seem to be distinctly different at their core and perception.⁵⁶

Moreover, *Ūarīrasthānam* in *Suśruta Saṃhitā* may be an insertion (*prakṣipta*) to the original text. This particular chapter does not have much significance over the rest of the text or in diagnosis or treatment of diseases.

It will also be noted that more or less similar anatomical, more particularly osteological, descriptions are found in non-medical texts like *Jâjñavalka Dharma-ûâstra* and *Úatapatha Brâhmaṇa*. Regarding disease diagnosis in ancient Greek medicine Ludwig Edelstein comments, “In general, they explain disease by the humors in the body and by the way these are combined. Such a theory makes it unnecessary to take the internal organs or their form and character into account.”⁵⁷ In their own explanatory model Âyurvedic pathologists recognized two main forms of diseases, namely: congestion and inanition (atony) – the former being held amenable to resolution or elimination, and the latter to local feeding or nourishment.⁵⁸ To quote Zimmermann, “this historical process also follows from a logical division within the classical doctrine itself: the division between pathology and anatomy.”⁵⁹

In his introduction to *Suúruta Saṃhitâ* Bhisagratna comments, “Suúruta recommends dissection on dead human bodies and suggests that it is only required of those who will practice surgery and that students of medicine can do without it.”⁶⁰ He continues, “Suúruta’s *Avagharúana* is now considered by many as the only perfect mode of dissection ever known.”⁶¹ *Avagharúana* is a purely Indian procedure, although it has been sometimes compared with *hydrotomie* practiced by Lacauchie.⁶² Similar examples of preparing a dead body for anatomical dissection may be found in European experience too, “...the running water which cleaned the body as it disintegrated and the small creatures it contained which fed on it, seem to have played an essential part. The whole process is completed within a short time... Immersion in stagnant water, on the other hand, is followed by very gradual change...”⁶³ But, needless to say, such procedures could only produce skeleton, bones, tendons and muscles before a naked eye. It was not possible to get into the interiors of the body and gain knowledge about visceral anatomy. Lester S. King and Marjorie C. Meehan comment in a different context, “ancient study of disease did not stress the solid organs, anatomical structure, nor the changes therein.”⁶⁴ As a result, “The association of clinical data and anatomical findings simply made no special impression... The time was not ripe for such an association.”⁶⁵

It may be added here that throughout the eighteenth century, most physicians thought that diseases arose solely in organs and tissues, the solid parts of the body. By the last quarter of the century, solidism was firmly entrenched in medical theory. Body fluids were not thought capable of causing

or harboring diseases, their possible involvement in pathology was largely ignored, and any changes in them that might be observed were regarded as symptoms, rather than causes of disease.⁶⁶ [But, according to ancient humoral doctrine proper balance or imbalance of humours leads to health and disease respectively.] Localization of an organ inside the body was almost always anomalous in ancient anatomical perception. Bhishagratna too, in his keen observation, does not fail to note anomalies in Suśruta, “The *absence* of any reference to brain and spinal cord, to pancreas and heart, in a book of Anatomy and Physiology is unpardonable and in the *Śarīra-sthāna* we feel this absence almost to *despondency*.”⁶⁷

Illustration of an ‘Indian’ anatomical body may help us to clarify the issue.⁶⁸ We shall find in this illustration a ‘body frame’ (i.e. two-dimensional body) without any depth or volume or accurate localization of the internal organs (i.e. three-dimensional body) of modern anatomical knowledge. Wujastyk observes that the body to which Indian medicine addresses itself is the physical body as understood to the senses and to empirical examination.⁶⁹

Herein probably lies the particular reason why we find such astonishingly accurate account of the bony details in āyurvedic anatomy, but lack of details and anatomical localization of the organs inside the body. *Sāraṅgadharasaṃhitā* (c. 1300) gives a standardized and clearly presented version of anatomical organs. It enumerates: 7 receptacles, 7 body tissues, 7 impurities of the body tissues, 7 membranes, 900 sinews, 210 ligaments, 300 bones (as against 206 bones in actual estimate the number of bones varies between Caraka and Suśruta being 360 and 300 respectively), 107 lethal points, 700 ducts, 24 pipes, 500 muscles (21 extra ones for women), 16 tendons, 10 orifices of the male body, 13 orifices of the female body.⁷⁰ In another study there are 90 tendons.⁷¹ We must note that these are all gross structures which can be observed, accurately or inaccurately, with superficial, yet keen, observation by the unaided eye. In case of a more minute and deeper observation Caraka stressed on the difficulty to correctly count the number of minute parts of the body, “the parts of the body cannot, however be counted because they are divided into tiny atoms (*paramāṇu*), and these are too numerous, too minute, and beyond perception.”⁷² Caraka counts 14 bones in the breast, as Indian anatomists counted cartilages as new bones. While in Suśruta and Vâghbhaṭa I, the same curiously stands to be 8. The

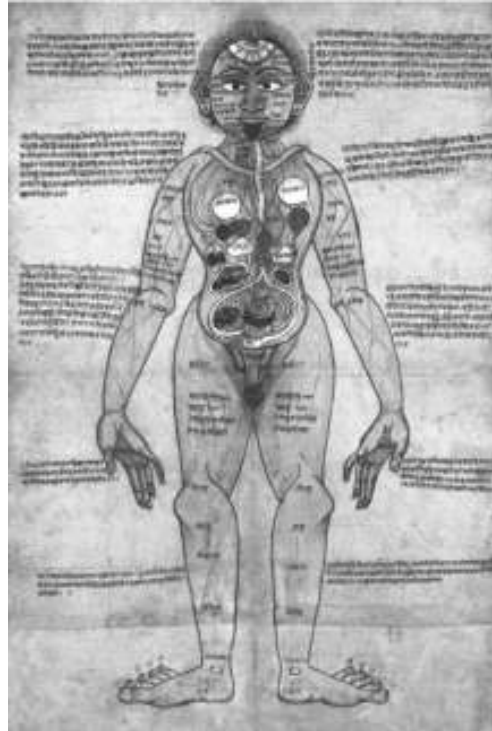


Fig. 1. This image is entirely drawn from the Āyurvedic understanding of the human anatomy, unlike other Indian images of the human body. The channels and organs drawn on the torso are specified as in Ayurvedic literature, with organs named as receptacles for one or other of the organic fluids. However, the organs in Āyurveda, are seen in a much wider context than in the West. They are the seats of the humours (wind, bile and phlegm) and do not generally engage in the kind of processing which modern western biomedicine expects of an “organ”.

Nepalese; c.18th/early 19th century.

Courtesy: Wellcome Library no. 574912i. (Image no.V36133 or L17592)]

windpipe too is regarded as a bone.⁷³ “The Indian anatomists followed a novel method in their count of ribs...the costal cartilages were counted as separate bones”⁷⁴ According to Hoernle, Suśruta’s list of bones can be compared with that of Caraka along five points – (a) The Principle of Position, (b) The Principle of Homology, (c) Alteration of Terms, (d) Alteration of Items, and (e) Alteration respecting Structures.⁷⁵ Occasionally nerves and muscles were confused with ligaments. The standing puzzle of Indian anatomy and physiology is the classification of *śīrās*, *dhamanīs* and *śrotas*.⁷⁶

In Indian medical texts, there are many instances of misinterpretation of the anatomical terms through ages. One example – it is only as late as the sixth or seventh century AD that, owing to a misinterpretation of the anatomical terms *sandhi* and *aṃśā*, the windpipe or *grivāḥ* (in the plural) appeared to mean clavicle.⁷⁷ It strongly points to absence of any standardization as well as non-uniformity of nomenclature and, in consequence, lack of uniform understanding across different time and space. These terms had contextual meanings only. On the contrary, Latin or Greek terms used in Western anatomical descriptions could avoid such basic problems for scientific terms in international usage. Moreover, conscious efforts have been made to ensure uniform usage, particularly, since 1895. Besides, following works of Morgagni and Bichat, the doctrine of diseased organs “replaced the classical concepts of illness enshrined in the corpus of Hippocrates.”⁷⁸ Changing concepts regarding natural world and generation of technical terms went hand in hand in European context. “A philosophy based on particles, action by contact, and denial of purpose could not have the traditional interest in gross anatomy.”⁷⁹

It would not be much imprudent to say that aetiology, pathogenesis, prognosis and therapeutics could be explained with the aid of āyurvedic humoral pathology. Ancient Indian healers were not much in need of this knowledge. It becomes more evident in the practice of surgical learning where no human subject is mentioned of imparting practical surgical knowledge to the apprentices. In *Suśrūta Saṃhitā* we find, “The art of making specific forms of incision should be taught by making *cuts* in the body of *Puṣpathala*, a kind of gourd, alavu, watermelon, cucumber, or eravaruka... The art of making excisions should be practically demonstrated by making openings in the body of full water bag, or in the body of a dead animal, or in the side of a leather pouch full of slime or water.”⁸⁰ Regarding anomalies in anatomical description, Bhishagratna is compelled to take these facts into account. He finds the root of such anomalies partly embedded in the very mode of anatomical dissection. The injunction of Hindu scripture is that corpse of persons more than 2 years old should be buried. He comments, “In ancient India, subjects chosen for the demonstration of practical anatomy were always children, and naturally these bones, which are fused or anastomised into one during adult life, have been separately enumerated – a circumstance which may, to some extent, account for the excess in the number

of bones described in this Saṃhitā... Suśruta might have included the teeth and the cartilages within the list of skeletal bone comes very near to the truth.”⁸¹

Zimmermann makes an insightful and relevant observation, “Though all the saṃhitā-s deal with surgery and midwifery in detail, the former link between texts and practice has been broken... To the high-caste physicians who have access to Sanskrit knowledge, the chapters on surgery and midwifery are a dead letter, even if the learned practitioners do read and recite these Sanskrit texts by heart so that apparently there will be no break.” His argument goes further, “Dating the decline of anatomy in India is an impossible task... The oldest parts of the *Suśruta* and *Caraka saṃhitā*-s, which date back to the VIth cent. BC according to Hoernle, displayed an elaborate and accurate knowledge of bones, that eventually fell into oblivion. Of the decline, or more exactly, of the disqualification of anatomy during the first centuries AD, the major evidence adduced by Hoernle is that of Vāthāṭa’s [sic] *Aṣṭāṅgasangraha* (VIIth cent. AD): it is so replete with inconsistencies as to show that in the time of Vāthāṭa [sic] practical anatomy had already fallen into disuse.”⁸² Hence, it was not an anatomical body in actual practice, rather it was a *bodily frame* through which saps and humours flow. To emphasize, this particular lack of anatomical knowledge should not be viewed as some deficits of Indian medicine. On the contrary, humoral and *tri-doṣa/tri-dhātu* theory could very well explain the regulatory mechanism of the body in health and in disease. For want of such a distinction, the Āyurvedics in India as well as the Hippocratics in Greece only had a physiology of saps and metamorphoses, but no real concept of organ. But, consequently, it turned out to be the unique, distinctive feature of Indian medicine.

Coming to practical surgical operations it demanded some amount of accurate knowledge of regional anatomy rather than elaborate and often tedious descriptions of all the structures of the body. This particular learning of regional anatomy should not be compared by any means with regional anatomy of modern anatomical and surgical practices. “The place of regional anatomy was supplied by the concept of the *marmas*.”⁸³ Interestingly, other important anatomical organs like heart appears to take an “un-anatomical” position. “Caraka holds that the *manas* and the soul reside in the heart... Caraka speaks of the heart as being the supreme place of the inner self (*antar-ātmanah ūreṣṭham āyatanam*).”⁸⁴

Despite all these facts, particular types of surgical and allied branches in the Âyurvedic system of medicine became quite specialized. Over 121 instruments and appliances of various sorts were accurately described. These included knives, scissors, syringes, hooks, forceps, trocars, needles, etc. From a detailed description of the appliances, modern medical research workers have been able to recognize the instruments as such. Medical students were instructed in the use of these. Operations for anal fistula, tonsillectomy, amputations and excisions, couching of cataract, obstetric procedures, venesection, ligation of blood vessels were all described and taught to students. Trephining of the skull and eye operations were also described.⁸⁵ Of particular exception was the practice of plastic surgery. It was fairly developed in ancient India and Europe had most likely followed this line of technique during the initial phase of development of modern plastic surgery. The plastic operations of otoplasty (plastic surgery of the ear) and rhinoplasty (plastic surgery of the nose) are described in the 16th chapter of the first book (*Sūtrasthānam*) of the compendium. First, methods are described for piercing the ear-lobes of an infant which still is a widespread practice in India. Often these ear-lobes, due to the use of heavy ornaments, get considerably expanded and ultimately sunder. Suśruta has described 15 methods of joining these cut-up ear-lobes. For these plastic operations, called *Karṇabandha*, a piece of skin was taken from the cheek, turned back, and suitably stitched on the lobules. Further treatment of the operation, periodic dressing of the wound and the use of various ointments are elaborately described.

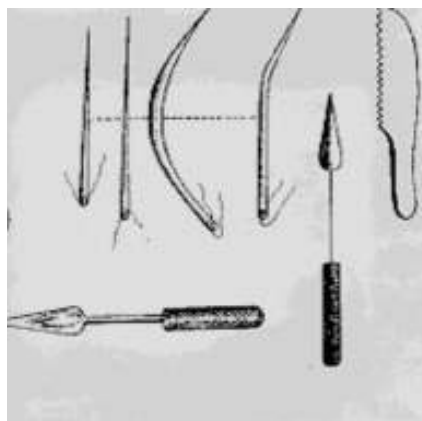


Fig. 2. Some of the surgical instruments used by Suśruta in ancient Indian surgical practices.

An interesting historical evidence can be cited here. Dr. J. Ward, a witness to the act of rhinoplasty in 1815 in Bombay (which was being practiced as a family craft along the lineage of ancient technique), wrote to his superior:

DEAR SIR,

In consequence of the conversation I had with you last night about Cowasjee, who had a nose put on at Poonah, in the presence of Mr Uhthoff and myself, when we belonged to the suite of the late Sir Charles Warre Malet, then ambassador at the above court, I beg to inform you, that the same people who put on the nose said, they were also in the habit of putting on lips; and wanted to perform that operation on the eldest son of our native ambassador at the Paishwah's court, who had lost part of his upper lip: but to this he would not although they told him they agree, had frequently done it with success.

I am,

Dear Sir,

Your obedient humble Servant,

J. WARD.

November 12th, 1815. MR. CARPUE. [Gaspar Taliacozzo, Bologna, 1546–99: pioneer of nose repairs.]⁸⁶

From the ongoing discussions we may now possibly extrapolate a few inferences to proceed further:

First, primarily arising out of (a) *avagharśana* procedure, (b) dissection of the dead bodies of age less than 2 years, and (c) observing large number of bodies of sacrificial animals, ayurvedic anatomical knowledge could not go beyond the surface. Rather it was confined to the knowledge of surface anatomy and osteology. Interiors of anatomical organs remained elusive even to the most judicious, diligent and circumspect physician. It would hardly suffice to enable the ancient anatomist to discover bones lying interiorly; such, for example, as the ethmoid, sphenoid, vomer etc. inside the head. As a matter of fact, we do not find these latter bones mentioned even in the more accurate list of Suśruta.⁸⁷

Second, there was schism between anatomy, physiology and pathology. Even if the body had assumed an anatomical exploration physiology and pathology were not linked to and compatible with it. The later two were determined by the philosophical doctrine of Nyāya, Vaiśeṣika, Sāṃkhya,

and, to some extent, by Buddhism and Vedantic philosophy. “In *Úarīrasthāna* chapter 1, verses 16 and 17, *puruṣa* is defined in two different ways, the first according to the *Vaiúeṣika* philosophical system and the second according to a possibly old form of *Sāṃkhya* philosophical system.”⁸⁸ Caraka explains body as one the constituents of the tripod that sustains a living being. Other two of the tripod are mind and soul.⁸⁹ English and Western medical education was not much different in its core from that of Indian subcontinent.⁹⁰

Third, spatio-temporal understanding of this sort of anatomical body was not individualized and could only be perceived to be co-rhythmic with the greater rhythm of nature and universe – in the light of macrocosm-microcosm.⁹¹ Temporal dimension of the body and disease could be conceptualized within the framework of year, season, month and day (and a smaller unit of time, *prahara*). Clinical charts and physiological swings consistent with anatomical dys-functions of the body were unthinkable in *Āyurvedic* philosophical position and medical practices.

Fourth, there was no description (and no necessity as well) of producing any anatomical atlases or illustrations of anatomical figures. Memorization of texts would fill in the void. There was also absence of focus on muscles.⁹² Sole reliance on *text-as-authority* was the hallmark of the day. An illustration from Vesalius’ *De humani corporis fabrica libri septem* may help us to understand the gap between the two positions – classical anatomical knowledge and its modern form.

Now let us have a look at the Gray’s Anatomy – 1st edition of 1858 – as an exemplary modern anatomical treatise. The book Gray and Carter (illustrator of that historical production) created was simply organized and well designed. The beauty of Carter’s illustrations resides in their diagrammatic clarity, quite atypical for their time. Again, in the tradition of Enlightenment anatomy, the passive voice revels on the page, erasing any agent whose presence (whose body) might corrupt the objective aim of scientific description. The description itself is so detailed and precise that language becomes euphemistic; the human quality of the body is stripped away so that Gray may write, “To demonstrate the various fibres of the tongue, the organ should be subjected to prolonged boiling...” and a reader doesn’t flinch, doesn’t picture a glass specimen jar on a hotplate in which a tongue slowly rises and revolves on bubbles of boiling water. Gray’s rhetoric is representative



Fig. 3. This is from Vesalius, Andreas. *De humani corporis fabrica libri septem*. (Basel: Johannes Oporinus, 1543). Vesalius's *De corporis humani fabrica libri septem* is one of the most influential medical texts ever printed, not only because of the scientific methods used to produce it, but because of the artistic renderings of the anatomist's findings. Although he relied heavily upon Galen, at times translating his words exactly, Vesalius performed his own careful dissections and observed the body in great detail, confirming and refuting many of Galen's anatomical and physiological tenets. His peers reacted strongly to his decision to question Galen, and he received praise and condemnation. Contrast with the previous image with regard to anatomical perfection, precision and detail is too evident to explain.

Courtesy: National Library of Medicine – Historical Anatomies on the Web.



Fig. 4. Another picture from Vesalius' book regarding which he wrote, "The hollow vein laid bare and freed from other parts." Unlike the Indian image of the body, it graphically and unmistakably makes open the interiors of the body

Courtesy: National Library of Medicine – Historical Anatomies on the Web.

of the scientific worldview that sees the body's functions as derived from the body's structure. So, one's voice, for example, is simply due to an arrangement of muscular fibers in the tongue and the action of muscles in the larynx. Gray ignores what else the tongue may do – a lick, a kiss – and further ignores how the voice may be used or silenced.⁹³ Simply put, the *person* of the patient becomes divorced from his/her personhood. It becomes objectified and objectifiable, reducible to any number of anatomical organs. Extended further along this line of argument it has been aptly termed as “A reductionist and contagionist turn in medical knowledge and practice.”⁹⁴

Fifth, case history taking of individual patients added a new paradigm to doctor-patient-disease relationship.⁹⁵ From the world of verbal testimony and narratives and a sort of organic bondage between physician and the patient a new paradigm of ‘clinical detachment’ began to emerge.⁹⁶ Marvels of surgical successes moored on precise and accurate knowledge of anatomical localization of organs made this inevitable.

INDIAN MEDICAL KNOWLEDGE SYSTEM ON THE EVE OF COLONIALISM

“By the seventeenth century, Indian students who chose to specialize in medical studies were being exposed to a tradition of sophisticated medical reasoning and theory almost two thousand years old...and these works brought together not only treatises on anatomy, including embryology, diagnosis, surgery, epidemics, pharmacology, and so forth, but also a philosophy of the origin of the human being, the rules of medical debate, rules on technical terminology and interpretation, and other “meta-medical” materials.”⁹⁷ All this work was synthesised in the early seventh century AD into the great work *Aṣṭāṅgahṛdaya* by the Sindhi author Vâghbhaṭa. This work became the textbook *par excellence* for classical Indian medicine. Though Hoernle comments on this work regarding its detailing of human skeleton and number of bones, “The fact is interesting, because it shows that the text of the Compendium of Suśruta, on which Vâghbhaṭa I based his anatomical theories, was already in his time in a corrupt state...Vâghbhaṭa I possessed no experimental knowledge of the skeleton...from want of anatomical knowledge he was unfitted to use critically.”⁹⁸ Hoernle aptly notes another important phenomenon with its far-reaching consequences. Regarding the use of anatomical terms (which was by no means uniform and standardized) he notes, “Vâghbhaṭa I’s ill-conceived interpretation of the term *aṃśā* led to

another unfortunate result, inasmuch as it appears to have served as the basis of the definition of *aṃśā*, which is given in the *Amarakośā*, the famous Vocabulary of Amarsimha, and which, in its turn, led to the misinterpretation of the term *jatru*...⁹⁹

The later history of Sanskrit medical literature is a “mixture of further works of grand synthesis and the proliferation of works on specialized topics and manuals for the working physician.”¹⁰⁰ Since the period of Vâgbhata I till nineteenth century there was almost no radical change in medical thoughts. Besides additions of some new therapeutic techniques or names of some new diseases or introduction pulse diagnosis no fundamentally new conceptualization and innovative application of knowledge came out of this 2500-year old traditional healing system. Sometimes great and laudable efforts were employed to make old Sanskrit âyurvedic texts popular by rendering them into vernacular readings. There emerged a few dissenting voices like Vireśvara. “Vireśvara has indeed produced an unusual and interesting work. He systematically takes the principal theories of pathology in classical medicine, and refutes them one by one. Thus, he deals with humoral imbalance, diseases caused by bad *karma*, accidents, secondary diseases, hereditary diseases, birth defects, contagion, and corruptions of the humours and the body tissues.”¹⁰¹ For example, Vireśvara points out a fatal contradiction in the classical theory of humoral disease. But, those voices did not pose any formidable threat to the authority of the scriptures as, we may assume, his theory of pathology was not based on any new anatomical correlation. We can remember Cunningham’s observation at this point, “Only with the arrival of Vesalius could the approach to anatomizing change, and the era begin of seeing-for-oneself, questioning of authoritative texts and teachers, and the culture of anatomical research.”¹⁰²

While talking about intellectual milieu in seventeenth-century India Sheldon Pollock comments, “In India, however, this mode of discourse (centered around prosody, rhetoric or grammar) also implied that all intellectual generations, dis-embedded from any spatio-temporal framework, were thought of as coexistent: the past was a very present conversation partner.”¹⁰³

INTRODUCTION OF MODERN ANATOMICAL KNOWLEDGE IN COLONIAL INDIA

It becomes apparent to us that till the introduction modern medical knowledge in India traditional indigenous medical practices (our focus being

Āyurveda here) were composed of teachings of different Indian philosophical thoughts. Indian medicine, while taking directly from Vaiśeṣika and Sāṃkhya *darsānas*, constructs its medical paradigm according to its own perspective, making it conducive to medical application and thought. Using a pragmatic approach to life, it incorporates the philosophical principles from the Vaiśeṣika and Sāṃkhya *darsānas* into its own transformative configurations.¹⁰⁴ Larson argues, “In discussion of “essence” (*sāmānya*) and “particularity” (*viśeṣa*), for example, in the (*Sūtrasthāna*) portion of *Caraka* (1.1.45 and the following pages), these terms are not employed in their correct philosophical usage as categorical notions in ontology and epistemology, but, rather, as organic notions having to do with homeostasis and the disruption of homeostasis in a living body.”¹⁰⁵

This very mode of philosophical and logical learning of Indian medicine was fundamentally reconstituted by new tools of knowledge based primarily on Baconian philosophy of ‘ordered experience’ on the one hand, and utilitarian attitude toward learning on the other. Lord Macaulay and William Bentinck were first of the two utilitarians in India. “The first to declare that India needed a Bacon was Akshay Kumar Datta” Another person was Rajendralal Mitra. The fourth issue of *Vividārtha* edited by him carried a long article on the “Baconian System of Philosophy.”¹⁰⁶ Around 1600, Francis Bacon (1561–1626) distinguished between ‘ordinary experience’, based on chance observations and therefore subjective, and ‘ordered experience’, based on the results of methodological investigation and aspiring to a certain form of objectivity.¹⁰⁷ [We shall discuss later in a more detailed way this issue of Baconian influence on education in Bengal.] Here, we can take some stock-taking of prevailing Indian mode of general education in Bengal of that period, “At the end of the course on credentials passed from teacher to student – the student’s accomplishments were sufficient testimony to his proficiency.”¹⁰⁸ The Rev. William Adam, who found 2632 schools in a population of 5,875,000 persons, or one school to every 3230 inhabitants, carried out a survey in selected areas in Bengal and Bihar.¹⁰⁹

Climatic challenge in India was another formidable factor which the British had to encounter. The time roughly between the middle of eighteenth and nineteenth centuries is crucial in the emergence of cultural construction of disease. “The geography of nations was now rewritten in terms of the language of health, disease, and medical technology.”¹¹⁰ The British lost their

three quarters of troops, most of whom were Indian sepoys, from disease. It is reported, “the muscles and sinews of man could not hold against the perseverance of the boiling kettle...”¹¹¹ In this milieu “The health of people’s bodies would be guaranteed by ensuring the health of their physical environment.”¹¹² It was the native’s body which was of utmost importance to explore – the interiors of the body – to protect the colonial regime from contamination and, also, from unknown diseases. Moreover, “the imperialistic culture which offers the same metaphors to scientists and novelists, shapes both biology and literature by shaping the language through they express themselves.”¹¹³ And these metaphors were very often expressed in terms of *military* metaphors, metaphors of invasion like ‘microbe hunters’, ‘interior resistance’ etc. Such aggressive expressions was non-existent in âyurvedic notions – be it of body, health, disease, pathology or treatment. On the contrary, “as recorded in the *Caraka* ...the counter-demonstration is not a refutative enthymemes, for, nothing is refuted by it.”¹¹⁴ Ontologically it was constituted by man-nature harmony within its conceptual framework.¹¹⁵

MEDICAL COLLEGE AND ANATOMICAL EDUCATION

Against this backdrop Medical College of Calcutta was opened in 1835. Calcutta Medical College was the first institution in India imparting a systematic education in western medicine. The British East India Company established the Indian Medical Service (IMS) as early as 1764 to look after Europeans in British India. IMS officers headed military and civilian hospitals in Bombay, Calcutta and Madras, and also accompanied the Company’s ships and army. A utilitarian approach and the need to provide expert apothecaries, compounders, and dressers in different hospitals prompted the earliest official involvement with medical education in India. These subordinate assistants would help European doctors and surgeons who looked after the health of European civilians and military employees and also reduce the company’s financial burdens by limiting the appointment of European doctors. Even the great scientist C. V. Raman had to trenchantly comment against colonial educational policy, “The influence of powerful British interests which desired that India should be a producer of raw products and a consumer of British manufactures also tended in the same direction, namely, that of restricting engineering and scientific education in India to the minimum necessary for carrying on the British administration.”¹¹⁶

In 1827 John Tyler, an Orientalist and the first superintendent of the NMI started lectures on Mathematics and Anatomy at the Sanskrit College. In general, the medical education provided by the colonial state at this stage involved parallel instructions in western and indigenous medical systems. Translation of western medical texts was encouraged and though dissection was not performed, clinical experience was a must. Trainee medical students had to attend different hospitals and dispensaries. Successful native doctors were absorbed into government jobs. But, “Anatomy was very imperfectly taught from plates and models and it was thought the vernacular medium did not further advance study and assimilation of the great treatises of European Medicine.”¹¹⁷ The committee appointed for this purpose observed that “the entire omission of practical human anatomy in the course of medicine”¹¹⁸ had resulted in a poor quality of medical students who would never be able to work at par with the English doctors required in the battle fields and for the governance of health of the subjugated people to be disciplined. Specifically speaking in Indian context, indigenous and Western systems of medicine had been congruous until the early nineteenth century, but anatomical study, cadaveric dissection, pathological anatomy and other developments in Western medicine had created a gulf that was never to be bridged.¹¹⁹ Surgical practices premised on modern anatomical knowledge was the fundamental distinguishing point between these two medical traditions. Indigenous practitioners were regarded as a danger from which the population had to be protected.¹²⁰

In 1807 Dr. Buchanan – an East India Company doctor – observed, “Medicine is taught by several of Pandits, some of whom also, although they are *grammarians*, practise the art...has always been exclusively *literary* in character...and from *oral* tradition.”¹²¹ Anatomical pathology or the notion of three-dimensional mapping of the body was completely absent. Even Japan’s experience of “introducing the very notion of anatomical approach to the body – the idea of visual inspection in dissection as the primary and most essential way of understanding the nature of the human body” was not found here.¹²² David Arnold notes, “the medical texts of early nineteenth-century India constitute an extended exercise in comparative physiology and pathology in which European and Indian bodies are constantly compared (despite the difficulty of obtaining Indian bodies for dissection).”¹²³ He goes on to add, “colonial India became increasingly active in providing the kinds

of anatomical data required in Europe, even to the extent of meeting its thirst for *human skulls*.¹²⁴ Interestingly, in 1935 – the year of foundation of Medical College, Calcutta – the English practitioner Edween Lee commented, “the bodies of patients dying in the hospitals are examined, immense opportunities are afforded for the advancement of morbid anatomy...”¹²⁵

Dissection was required in every session (over 500 cadavers used in 1851) in addition to six terms of anatomy. “But to permeate the consciousness of the Indian masses, applied science in the form of surgery (anatomy) and the treatment of diseases (botany and chemistry) had to be successfully practiced by the doctor-scientists trained in Western methods.”¹²⁶ Dr. H. H. Goodeve, while delivering introductory lectures in 1848, remarked, “in less than two years from the foundation of the college, practical anatomy has completely become a portion of the necessary studies of the Hindu medical students as amongst their brethren in Europe and America. The practice of dissection has since advanced so rapidly that the magnificent rooms erected four years since, in which upwards of 500 bodies were dissected and operated upon in the course of last year, now amounting to upwards of 250 youths of all ...religions, and castes...as the more homogeneous frequenters of an European school.”¹²⁷ Think of the scenario! The first dissection was greeted with gun-salute, and resulted in even some amount popular furor.¹²⁸ But within a span of 10 years the number dead bodies available for dissection amounted to more than 500. In the first year of dissection there were only 20 bodies available. “This was due in the first instance to a virtually unlimited supply of cadavers. From the humanitarian viewpoint this was a regrettable situation, but the fact is that the Indian medical student was at an advantage over his counter parts in Europe and America.”¹²⁹ Advancement of anatomical education was made at the cost of the unclaimed bodies the poor Indian people. There was no like of Anatomy Act 1832 of UK to restrain the supply of poor and wretched Indian dead bodies for the purpose of dissection.¹³⁰ To note here, “None of the colonies had replicated the British way of dealing the destitute poor by providing indoor relief to paupers in workhouses.”¹³¹

DISSECTION AND MORE

The singular act of introduction of dissection-based anatomical knowledge in medical education brought in some permanent and indelible changes in the perception of body, disease, personhood and self of Indian

population. This scientific breakthrough had enormous sociological consequences, for it opened the door of western medicine to the natives of India as practitioners and beneficiaries.¹³² It reconstituted 'psychologized' epistemology of Indian knowledge in favour of objective, value-neutral, clinical detachment. As dissection became the primary means to know the human body, the living body was regarded in bio-medicine as a kind of 'animated corpse'. The dissector/doctor claimed the status of an epistemologically privileged cultural arbiter on the question of death and dying. In colonial India, unlike England, this education was intended to produce 'capable practitioners' instead of a mix of 'capable enquirers and practitioners'. The study of anatomy entailed a division among: (a) disease and non-disease, (b) science, reason, and modernity on the one hand; and superstition, tradition, and backwardness on the other; and (c) physicians and non-physicians and social hierarchy among modern medical practitioners and all other indigenous practitioners.¹³³ The lived experience of the body was reconstructed to become measurable and repairable. The body became a three-dimensional space (not a two-dimensional physical frame through which saps and humours flow, as perceived in *Āyurveda*) into the depth of which temporal marks of disease could be excavated through the study of pathological anatomy. Physiology was understood to be changes in organic activities over *time* within a circumscribed *space*. In India too, medicine, like pre-industrial Europe, was inextricably linked to larger rhythms and to the community.¹³⁴ Again, in scholarship in the Western tradition the sensitivity for temporal ordering dominates more and more.¹³⁵ It may be illustrated by the fact that in the classical Indian languages, there are no words which corresponded to the concept 'to become'. The verb formed from the root *bhu* can be translated as both 'to become' and 'to exist'. These two aspects of perceived reality, conceived as antithetical by the Western mind, are not even distinguished. The classic Western expression of the sense of flux uses a vivid and specific verb. 'All things flow', the corresponding idea is expressed in Sanskrit as *sarvam anityam*, "all existences are impermanent." To connect two ideas, Western languages use such conjunctions as and or then; Sanskrit, in contrast, will express the same idea by adding the demonstrative pronoun *sa* to the subject of the sentence, as if "John runs and jumps" were to be expressed as "John running he jumping." The conjunction emphasizes the separateness of events; the demonstrative focuses on the subject, unchanging

through time.¹³⁶ This particular inherent structure of Sanskrit texts might thwart the question of scientific structuring of time measurable in small quanta for well-structured patients' history. Time perceived to the level of a fundamental principle probably reflects the development of an agricultural economy.¹³⁷ Time acquired new meaning and disciplinary authority through an equally abrupt entry of clocks and watches, and there was among some a sense of moving forward in consonance with its linear progress.¹³⁸ Consequently, the learned literate knowledge/unlearned oral wisdom polarity arose. Among many other things contact with a culture with superior perception of time, rationality and science instilled through its education and language – far removed from everyday speech and perception – helped create this unique ethos.¹³⁹ I would like to add at this juncture a very recent observation on modern medical theories in Europe – “the experience of French medical doctors had in 1832 marked the turning point...between Ancient World of interpretations (miasma and the like) and modern understanding of disease causation.”¹⁴⁰

TIME AS PERCEIVED IN TWO MEDICAL SYSTEMS

I shall now very briefly touch upon some of the basic metamorphosing features of modern medicine marked by new knowledge of anatomy, technologies and beneficial practical surgeries.

In *Caraka Saṃhitā*, *Kāla* or time, in relation to disease-production, is described as of two types: *nityaga* and *ābasthika*.¹⁴¹ *Nityaga* is thought to be related with season and *ābasthika* is related with disease. In *Suśruta Saṃhitā*, time (*kāla*) is represented thus: “The Sun-god, by his peculiar motions, divides eternal time which is measured by years (*Samvatsaras*) into increasingly progressive but smaller subdivisions such as, *nimeṣas* (lit: time taken for closing eyelids), *kāṣṭhās*, *kalās*, *muhūrtas*, days and nights, fortnights, months, seasons, solstices, years and yugas. Time taken in articulating any of the short vowels (such as a, etc.) is called an *akṣi-nimeṣa*. Fifteen *akṣi-nimeṣas* make one *kāṣṭhās*. Thirty *kāṣṭhās* make one *muhūrta*. Thirty *muhūrtas* make one day and night. Fifteen days and nights make one fortnight. A fortnight is either dark or bright. Two fortnights make one month.”¹⁴² These are the smallest units of time we find related to medical practice. In precolonial India, measurable time had a minimal role to play in the everyday life of the majority, nor was there anything like state-regulated time. Coming to the

colonial period, time measured with precision, and uniform over a defined space, was considered necessary for modern systems of regulation. “The subjective experience of life-cycle time could now be projected into a new *epistemic* domain rendering it objective, measurable and linear.”¹⁴³

While applied to the modern medical body this particular notion of time is signified in a quite different way. “The essence of Sir Francis Bacon’s 17th-century conquest and dissection of nature was the transformation of time from static, ever-repeating cycles to linear progression. Modern science was made possible by the clock. Modern, scientific time is a one-way street, going from point X to point Y and never coming back.”¹⁴⁴ The sense and sensation of time are central to the differences between traditional and scientific medicine. Older units of time were transformed into universal, scientific quanta of time like second, minute and day. “The next significant technology of medicine to use time as its orienting focus is the clinical chart...Clinical charts thus provided clinicians with a comparative and comprehensive perspective on how their interventions influenced the illness, and so became visual health outcomes records.”¹⁴⁵ We should recall that (a) examination of pulse was reframed within a rubric of “universalized” time, rate/minute, though, not in its descriptive character as practiced by the *Āyurvedic* healer,¹⁴⁶ and (b) the use of stethoscope was instrumental to diagnose anatomico-physiological dys-functions inside the depth of the body (i.e. organ localization of disease) and ushered in miraculous *therapeutic* results instead of *prognosis* in *āyurvedic* practice. And, to add, all these were results of accurate anatomical knowledge of modern medicine. It is useful to note that even in 18th century England the classical authors like Hippocrates and Galen “remained the standard works read by medical students at the English universities.”¹⁴⁷

An interesting example may be adduced here. In his 1777 surgical lectures Monro Primus/Secundus gives the following course outline – “Medicine is Commonly Divided into five parts:

Ist: An extract Knowledge of ye humane Bodys.

2d: History of Diseases.

3d: Signs of Diseases.

4th: Means of preserving Health.”

Regarding surgery he says, “This particular Science is divided into four branches. 1st Synthesis or Joining or reuniting parts yt are contrary to ye Design of Nature seperated, as in Curing of Wounds, reducing Luxations, Setting of fractures. 2d Diaresis Dividing or seperating those parts yt by their Union are hurtfull as in perforating ye Anus or Vulva of Children, seperating of Members grown together after burning. 3d Exa resis Or taking away what is Superfluous or Noxious as in Amputating a Sphacelated Member, Extracting Bullets lodged within ye Body, Letting out extravasated blood, Matter or Pus. 4 Prothesis; or making up any Want or Supplying a defect; as fitting wooden Leggs to Stumps, setting in Artificial Eyes or Teeth. To perform these things right a Surgeon Besides being acquainted with all parts of Medecine.”¹⁴⁸ We must note that before the mandatory introduction of anatomical knowledge through dissection nature of teaching in both England and India proceeded through a quite similar nature – ranging from textual nature to dependence on classical authorities to explanatory model of diseases.

Coming back to modern medicine, it has used the *word* and the *line* to grasp the fleeting biographical and biological moments that fill and define the lives of the patients. In Indian context it entailed changes within two important aspects of Āyurveda: (a) narrative of illness – one of the two components of the 2-dimensional body – became marginalized, and (b) biological moments definable and compatible with humoral vicissitudes in āyurvedic medicine got stripped of its core and, consequently, reconstituted as an objective, replicable and reproducible data which correspond to the depth (volume) of the 3-dimensional body within which anatomical organs are localized. Though, Richardson remarks, “Corpses used in medical education are traditionally “depersonalized and biography-less”...The humanity of disembodied specimens is easy to overlook, even to deny.”¹⁴⁹

Possibly, the example of Soorjo Coomar Goodeve Chuckerbutty best illustrates the fact of acquiring new knowledge of anatomy and dissection to find pathologies inside and to make correspondence with disease causation. One of his papers on heart disease was entitled “The Connection between Rheumatism, Pericarditis and Jaundice.” In October 1864, he described twelve cases of long continued fever associated with maculated mulberry rash on the trunk, dusky red hue of the face, neck and hands. Postmortem was done. “The case records, post-mortem findings, critical analysis of symptoms presented in the paper, show that the diagnosis was very probably correct

and thus this was the first account of typhus fever in India¹⁵⁰ In medicine and related subjects, for example, student interests and competence in dissection led to the establishment in as early as 1831 of a small hospital. One graduate, N. K. Gupta, who had been trained as an apothecary was apparently doing quite well in that position at the hospital. Other students trained as assistant surgeons were regularly attending “99 House Patients and 158 out ones.”¹⁵¹ In another account we find that there were increasing numbers of “Surgical operations performed for expiration of tumours from various parts of the body, removing of cancer and other malignant parts, tying arteries...” Such measures, according to Dr. F. H. Brett, bear “sufficient evidence to prove what great benefit might be conferred on those destitute *creatures* by a well conducted and liberally supported institution, for as their confidence increases, and the means of relieving their wants, their number will also be greatly augmented.”¹⁵² He emphasizes the superiority of ‘Hospitals’ over ‘Dispensaries’ in that article. Greatly relieved of their incurable diseases (amenable to simple surgeries in most cases) people, with their mixed feeling of awe, skepticism and reverence were getting inclined towards European hospitals. Mainly the ‘destitute creatures’ were the first of goers to these hospitals and dispensaries. Contemporary public press began to manufacture opinion in favour of European surgery and therapeutics.¹⁵³ “If the body can be separated from a person’s selfhood and controlled, it can be corrected and improved...Medicine becomes a proper theme in development.”¹⁵⁴

We should now take note of some facts relevant to our discussion: (a) hospital admissions were of considerable number, (b) poor Indian destitute formed the bulk of this admission (and, ruefully enough, there was perhaps none to claim for their bodies after death in hospital and so could be used as an anatomical object for dissection),¹⁵⁵ (c) there appeared well marked professional hierarchy at two levels –between indigenous practitioners and western-trained physicians on the one hand,¹⁵⁶ and, between English and Indian physicians on the other. A report in this regard is informative, “In native society, all over the country, these men (i.e. traditional indigenous practitioners) have disappeared altogether from political life, and socially have little or no standing in European society, where they are virtually ignored.”¹⁵⁷ Before this situation emerged Sir William Sleeman remarked in 1839, “there was not a considerable town or village without its practitioners,

Hindu and Muslim. The educated classes sought the aid of European *surgeons* whenever they could obtain it, surgery being an art in which they felt *helpless*...¹⁵⁸ Regarding the rise of professionalism in medicine Poonam Bala notes, “Regulation of medicine in India was to a great extent influenced by the policies in Britain at that time...In India, the medical profession can be seen as a branch of the Army medical services which held sway over the medical profession...While in Britain, State intervention was in terms of regulating private practice, in India, practitioners were in State employment.”¹⁵⁹ The power of the medical profession lies in its success in having secured by political means a legal monopoly over the practice of healing in contemporary society. American experience reveals to us, “the identification of the profession with *autonomy* enabled the American profession to invest itself with the authority and prestige of the most advanced European medical science and distinguished itself from midwives, folk healers, the clergy, and other rivals.”¹⁶⁰ In Indian context, the extent of ramification of medical ideas can be gauged to an extent by the number of medical journals. By the end of the nineteenth century there were as many as fifty medical journals in the Indian languages.¹⁶¹ Between 1912 and 1917 a number of Medical acts set up Medical Councils in the various provinces, and laid down qualifications for registration of medical practitioners which excluded traditional physicians, and made it illegal for a registered practitioner to be associated with Indian medicine.¹⁶²

A Bengali magazine *Jñānānveśan* (Search for Knowledge) reports on 26th March 1836, “It is seen everyday how much harm is committed due to lack of just treatment. Lacking right treatment people are dying every hour due to fallacious knowledge of uneducated vaidyas. The number of people who are dying will possibly outnumber the total of dead people in India.”¹⁶³ It reveals the attitude of a section of educated Bengali people towards traditional treatment. Even common people were not exempt from this sentiment or mindset. Though, questions of religious beliefs and local customs came up to confront the advent of Western medicine from its ‘enclave’ origin to public health program. Small pox, cholera and plague, to name a few, were such contested areas.¹⁶⁴ But powerful therapeutics of Western medicine and the introduction of anatomical knowledge in medical curricula tilted the dialogue between East and West towards the later. Western medical practice was involved with better social position and monetary gain.

So, patients, being increasingly divorced now from their domestic setting and transported to hospital setting, were made amenable to completely new technologies of time measurement and case histories. They began to experience an altogether different form of subjectivity – incomprehensible so far and aggressive. One example may further help to understand it. In a letter to the editor of *The Englishman*, an English man complains about Medical College and Hospitals, “Enter and you will find East Indians and West Indians, Bengalees and Madrasees... These creatures wear the same clothes, and lie on, and use, the same beds and beddings as the Europeans; and as soon as they don the clothes they are *yclept* sahibs! They are of all classes; and (as all patients are distinguished not by *name*, but by *numbers*), were one to ask for ‘Now Number Sahib’...”¹⁶⁵ Besides social hierarchy it is interesting to note how patients became numbers. In other words, person was transformed into patient in the hospital setting. Person of the patient got transformed into pathology inside the body. It reminds us of clinical objectification of modern medicine. It also reminds us of careful separation between the White and ‘black’ bodies.

Assimilation of modern Western anatomical ideas to explain internal dynamics of *Āyurveda* and to judge all ancient works in ‘scientific’ light (bearing equivalence to being ‘civilized’) gradually became the call of the day. Such an effort is perhaps aptly illustrated in *śarīr Paricay* (Introduction to Anatomy), purportedly to resurrect old *Āyurvedic* knowledge of anatomy, written in 1924 by an eminent English-educated *kavirāj* Gananath Sen. In this book Gananath emphasized on a journey from atlas to cadaver to dissection for properly gaining anatomical knowledge. Throughout the book he reproduced diagrams and figures from different textbooks of anatomy taught in medical colleges. Ancient *Āyurvedic* anatomical terms of entirely different implications and connotations were conflated with modern concepts. As a result, he, perhaps inadvertently, opened up a space of Foucauldian clinical gaze. Through this new mode of conceptualization there occurred first, a spatial shift in perception from macrocosmic-microcosmic arrangement of the ‘Indian’ body to the circumscribed, three-dimensional anatomical space, and second, a shift from traditional philosophy of *tri-doṣa* theory to ‘modern’ notion of organ localization of disease. It was no wonder that the philosophical matrix of *Āyurveda* was dislocated through this ‘modernization’ of *Āyurvedic* knowledge of anatomy. Post-Renaissance medical concepts insinuated into

the interstices of classical Âyurvedic concepts and reconstituted their meanings. Gananath's epistemological inquiries were surreptitiously assimilated and reconfigured by metonymic language-metaphors of modern anatomy. Consequently, the Âyurvedic body as a self-reflexive and active agency began to metamorphose into an inert dead body – an 'object'. This becomes an illuminating example of how idioms of expression unique to a particular set of epistemology can be insidiously transformed and a new hegemony of text can operate. "In a complex civilization, as culture changes and innovations are introduced, healers and patients must continually adapt their perspectives to one another...healing systems adjust to the conditions imposed by the general culture and by one another."¹⁶⁶

As an aside, it may be added that even in an important Âyurvedic textbook published in 1890 the position of *garbhâûaya* (ovary) is thought to be in between *pittâûaya* (gall bladder) and *pâkvâûaya* (stomach).¹⁶⁷ Sheer lack of anatomical knowledge and dissection can only lead to such conclusions. It may be noted that, unlike Gananath Sen the compilers of this book were not possibly well trained in English education.

We can say that as a result of colonial introduction of modern anatomical knowledge the role of the 'divine' in medicine banished forever. Medicine in India was all set for a new paradigm of knowledge and knowing of the body. Along with it, 'healers' were transformed into learned and equipped doctors to repair the faulty parts of the body. The *person* of the patient was reconstituted merely as a 'patient' – a diseased person or, better to say, non-person. This particular status of medicine is euphemized as 'clinical detachment'. But this process of making Western medicine ubiquitous did face resistances from both Âyurvedic and Unani practitioners of medicine. "Its resistance to 'modern' medicine was not against the 'scienticisation' of the human body but also against the colonial project of the hegemonization of cultural consciousness."¹⁶⁸ Despite this fact anatomical knowledge of the body provided fuller understanding of disease and, consequent upon it, marvelous therapeutic results to the Indian population. When contrasted with Âyurvedic therapeutics it was much more efficacious, at least for short term results and, needless to say, built up the victorious edifice of modern medicine.

Finally, effectively, the body has been silenced. It has become a subject mechanism, a contrivance, which, if it malfunctions, may be restored to

proper functioning state through the imposition of the professional technology of medicine. Equally, the body has been divested of its latent capriciousness. Like the mechanically contrived universe in which the body existed, chance and random occurrence appear to have been banished. The body was no longer a sovereign entity in the constitution of the individual. “It offered no challenge to individuality, and set up no rival or competing alternative to the subject. The struggle between inside and outside, a material and non-material being was over.”¹⁶⁹

Herein, within the matrix of such a complicated scenario, lies the importance of the introduction anatomical knowledge in colonial India.

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111. Daniel Headrick, *The Tools of Empire: Technology and Imperialism in Nineteenth Century* (New York, Oxford: Oxford University Press, 1981), pp. 20-21.
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118. D. G. Crawford, *History of Indian Medical Service*, vol. II (London: W. Thacker & Co., 1914), p. 435.
119. Mark Harrison, "Medicine and Orientalism: Perspectives on Europe's Encounter with Indian Medical Systems," in *Health, Medicine and Empire: Perspectives on Colonial India*, ed. Biswamay Pati and Mark Harrison (New Delhi: Orient Longman, 2005), pp. 37-87.
120. Christian Hochmuth, "Patterns of Medical Culture in Colonial Bengal, 1835-1880" in *Bulletin of the History of Medicine* 80 (2006) 39-72 (44).
121. Gananath Mukhopadhyaya Bhisagacharya, *History of Indian Medicine*, vol. II, 2nd edn., (Delhi: Munshiram Manoharlal, 1974), 14. Reprint of the 1926 original. [Emphasis added]
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123. David Arnold, "Race, place and bodily difference in early nineteenth-century India" in *Historical Research*, 77.196 (2004) 254-273 (257).
124. Ibid, p. 268. [Emphasis added]
125. Ivan Waddington, "The Role of Hospital in the Development of modern Medicine: A Sociological Analysis" in *Sociology* 7 (1973) 211-224 (221).
126. Mel Gorman, "Introduction of Western Science into Colonial India: Role of the Calcutta Medical College" in *Proceedings of the American Philosophical Society* 132.3 (1988) 276-298 (295).
127. *Medical College Centenary Volume* (Calcutta, 1935), p. 14. [Emphasis added]
128. Mel Gorman, *ibid*, p. 285.
129. Mel Gorman, *ibid*, pp. 285-6.

130. The Anatomy Act 1832 in UK. The Act provided that anyone intending to practise anatomy must obtain a licence from the Home Secretary. Occasionally a person, following the example of Jeremy Bentham, left their body for the advancement of science, but even then, if his relatives objected, it was not received. For an account of Bentham's bequest for dissection see, Ruth Richardson and Brian Hurwitz, "Jeremy Bentham's self image: an exemplary bequest for dissection" in *British Medical Journal* 295 (1987) 195-198.
131. Helen MacDonald, "A Scandalous Act: Regulating Anatomy in a British Settler Colony, Tasmania 1869" in *Social History of Medicine* 20.1 (2007) 39-56 (49).
132. L. S. S. O'Malley, "The Hindu Social System", in L. S. S. O'Malley (ed.), *Modern India and the West* (London: Oxford University Press, 1941), pp. 366-69. He points out that dissection at the Calcutta Medical College was another example of the spirit of accommodation of Hinduism in the confrontation of the caste system with Western practice.
133. In a report in *Indian Medical Gazette* – "A Plea for Hakeems" – it is told, "Under the British Rule, however, they (i.e. all types of traditional practitioners) have disappeared altogether from political life and socially have little or no standing in European society where they are virtually ignored." – *Indian Medical Gazette*, April 1, (1868) 87.
134. E. P. Thompson, "Time, Work, Discipline and Industrial Capitalism" in *Past and Present*, 1967; 38: 56-97. Also see, Richard V. Lee, "Doctoring to the Music of Time" in *Annals of Internal Medicine* 132 (2000) 11-17.
135. Jan E. M. Houben, "The Brahmin Intellectual" in *Journal of Indian Philosophy* 30 (2002) 463-479 (473).
136. For this interpretation I owe to an essay by Charles Ress, *The Relation between Sanskrit and Indian Conceptions of Time*. URL: <http://www.postcolonialweb.org/india/philosophy/phil1.html>. Accessed 25 May 2006
137. Hajime Nakamura, *A Comparative History of Ideas* (Delhi: Motilal Bnarsidass, 1992), p. 64,
138. Sumit Sarkar, *Writing Social History:* (Delhi: Oxford University Press, 2002), p. 283.
139. Sumit Sarkar, *ibid*, p. 287.
140. Sheldon Watts, "Cholera Politics in Britain in 1879: John Netton Radcliffe's Confidential Memo on 'Quarantine in the Red Sea'" in *The Journal of the Historical Society* 7.3 (2007) 291-348 (340).
141. *Caraka Saṃhitā*, *ibid*, vol. II, p. 73.
142. *Sushruta Saṃhitā*, vol. I, Chapter VI, pp. 45-46. In another account we find some different sort of time measurement. See, B. N. Narahari Achar, "On the meaning of AV 19.53.3: Measurement of Time?" in *Electronic Journal of Vedic Studies* (EJVS), 4.2 (1998) 21–26. The relationships among these time units are given in *Útatapatha-Brâmaṇa* 12.3.2.5:

1 *muhūrta* = 15 *kṣipra*

1 *kṣipra* = 15 *etarhi*

1 *etarhi* = 15 *idāni*

1 *idāni* = 15 breathings

1 breathing = 1 spiration = 1 twinkling (*nimeṣa*).

The relationships among these time units can be found in *Vedāṅga-Jyotiṣa*:

124 *kāṣṭhās* = 1 *kalā*

20¹/₁₀ *kalās* = 1 *muhūrta*

30 *muhūrtas* = 1 *ahorātra* (day and night)

2 *parvans* = 1 *cāndramāsa*

2 months = 1 *ṛtu*

2 *ayanas* = 1 year

143. U. Kalpagam, “Temporalities, History and Routines of Rule in Colonial India” in *Time and Society* 8 (1999) 141-159 (149). Also see, Romila Thapar, *Time as a Metaphor of History: Early India* (Delhi: Oxford University Press, 2006).
144. Richard V. Lee, “Doctoring to the Music of Time”, p. 15.
145. Stanley Joel Reiser, “The Technologies of Time Measurements: Implications at the Bedside and the Bench” in *Ann Intern Med.* 132.1 (2001) 31-36 (33).
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154. Ashis Nandy, *The Savage Freud and Other Essays on Possible and Retrievable Selves* (Delhi: Oxford University Press, 1995): pp. 145-146.
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157. "A Plea for Hakeems" in *Indian Medical Gazette* April 1 (1868) 87.
158. L. S. S. O'Maley, "General Survey" in *Modern India and the West: A Study of the Interaction of their Civilization* (London, NY: Oxford University Press, 1981), pp. 576-812(636). [Emphasis added]
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160. Michael Sappol, *Traffic of Dead Bodies: Anatomy and Embodied Social Identity in Nineteenth-Century America* (Princeton, Oxford: Princeton University Press, 2002), p. 2. [Emphasis added] Also see, David Armstrong, "The subject and the social in medicine: an appreciation of Michael Foucault" in *Sociology of Health and Illness* 7.1 (1985) 108-117, and Stephen R. Latham, "Medical Professionalism: A Parsonian View" in *The Mount Sinai Journal of Medicine* 69.6 (2002) 363-369.
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