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## SITUATING PROFESSOR MAHALANOBIS AS A PUBLIC INTELLECTUAL IN THE SOCIAL HISTORY OF HIS TIMES\*

SABYASACHI BHATTACHARYA\*\*

There is a tendency today to ceremoniously remember some iconic individuals in Bengal's history — while we usually forget the message in their life and work. However the present occasion, the 125th birth anniversary of Professor Prasanta Chandra Mahalanobis is a little different. His contribution to science has not been forgotten and in fact that has been carried forward in the institutions he founded, particularly the Indian Statistical Institute. However, there are many other unremembered aspects of his life and work. In fact very little is known of many aspects of his life beyond his professional domain. For instance, little is known of his role in studying meteorological data and floods in the Indian river system and hence his pioneering thinking leading to the construction of the Hirakud and Damodar Valley projects. Again, no one has studied his role from 1921 to 1931 as the first Karma-Sachiva or Secretary of Visva Bharati along with Rathindranath Tagore. It is also not generally known that he was the author of the first draft constitution of Visva Bharati Society in 1921, as well as one of the makers of Visva Bharati Granthan Vibhag for the publication of Tagore's writings. (I had an opportunity to read the connected documents now in the Tagore archives which throw light on that part of Prasanta Chandra's life while I was Vice-Chancellor at Santiniketan in 1991-1995). Moreover there are many letters exchanged between Tagore and Prasanta Chandra which remain unpublished; some of them have been published recently (2015) in a volume edited by Prasanta Pal.<sup>1</sup> As yet only some selected fragments of Prasanta

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\* Prasanta Chandra Mahalanobis Memorial Lecture, delivered at the Asiatic Society, Kolkata on 20th November 2017, jointly organised by Indian Statistical Institute & Asiatic Society Kolkata.

\*\* This is a posthumous publication.

Chandra's personal reminiscences and private papers are available in extracts given by Ashok Rudra (1996) in his biography of Prasanta Chandra.<sup>2</sup> The latter work has clearly superseded the sketchy biography by A. Mahalanobis and the information put together in various essays on the ISI and its founder, in collections edited by Dhires Bhattacharya (1996) and U. Dasgupta (2011).<sup>3</sup>

As a result of many gaps in available data base, little is known of the engagement of Prasanta Chandra Mahalanobis beyond the professional domain in various domains of social and cultural activities. What is generally known is his official work connected with the ISI, the Planning Commission, the Central Statistical Organization in Delhi, and the National Sample Survey. It is my impression that unlike our times, the previous generation of scholars who worked under PC from the 1930s to the 1960s were more aware of his multi-dimensional activities beyond his professional and academic activities. I recall in particular the speech of Professor C.R.Rao on occasion of PC's *sradh* ceremony where he pointed out that unlike the common scientists who are confined only to advancing their career in the profession, Prasanta Chandra's work spilled over into many social and cultural economic domains. In this lecture I will like to focus on those social and cultural aspects of his life as well as the social philosophy which motivated P C Mahalanobis's scientific work in the academic world. Let us begin with recalling that one can observe in the life and work of some outstanding individuals in twentieth century Bengal *a social philosophy connecting the academic world with the society around them through the application of academic knowledge*. You may recall among scientists Sir Prafulla Chandra Ray who promoted development of chemical industry and business entrepreneurship in Bengal, Professor Meghnad Saha who pioneered hydro electric power generation and river control for prevention of floods in western Bengal, and Professor Prasanta Chandra Mahalanobis who led the field not only in statistical theory but also in the application of statistics to social issues and economic planning in India in his times. They were front rank scientists in their respective fields as well as deeply involved in the social

application of their scientific knowledge. In this lecture an attempt will be made to examine Professor Mahalanobis's life and work to understand that trend in some intellectual's role in public affairs. We shall use the concept '*public intellectual*' in describing and analyzing the above mentioned trend.

What is the need for this generally unfamiliar concept of 'public intellectual'? The need arises because in the examples above we observe an unusual category, individuals who are not public leaders like politicians, nor purely and exclusively engaged in intellectual activity in the world of learning. We observe a tendency of these scientist intellectuals to go beyond the call of duty as a scientist employed by a university to get involved in issues of concern to the public or the community they belonged to. If we look back upon their life we might see that they appear to be larger than life, they play a role beyond that expected of them as scientists, being motivated by a sense of public duty. To characterize them in social history we need a concept other than the concept 'intellectual' or 'public leader'. Hence we employ the concept of public intellectual. Their defining characteristic is their role *as intellectuals who respond to their sense of public duty*. We differ from authors like Richard Posner (2003) or Romila Thapar (2016) in thus defining the public intellectual; in their definition their important characteristic is their influence on the public, through the command they have over the media.<sup>4</sup> We differ in that our emphasis is on the notion of public duty, not on public visibility.

The idea of public duty in the twentieth century sense of the term was a new notion in India. In fact the very idea of 'public' did not exist till the end of the nineteenth century, according to Rabindranath Tagore. In 1894 Tagore wrote a long essay to argue that the concepts public and private were European ideas with no roots in India.<sup>5</sup> After the death of Bankim Chandra Chatterjee Tagore tried to organize a 'shok sabha' memorial meeting and he met with strong opposition from many intellectuals. The objection was that 'shok-sabha' was alien to Indian tradition. Tagore's response was that India needs to develop the ideas of a public and public duty; from ancient times duties were

conceived only in terms of duty to one's parents, family, clan, caste etc – there was no idea of public duty. Tagore pointed out that even the words public and private did not exist in Indian languages, particularly in Bengali. Hence Tagore's objective was to build and install in the mind of his people the notion of public and the consequent need to perform public duties. We may say that there was the beginning of the notion of *jana-hita*.

In later times European scholars like Jurgen Habermas pointed out how the idea of a public sphere developed in Europe in the post-Renaissance period, specially in the eighteenth century. Tagore anticipated these later scholars in his writings in 1894. In the early half of the twentieth century the ideas of a 'native public' and that of public duty developed slowly and intellectuals motivated by a sense of public duty evolved a new social philosophy. I propose that we may conceptualize the role of P.C.Mahalanobis or Meghnad Saha or Sir P.C.Ray in terms of development of intellectual activity in response to public duties, and hence we use the concept of public intellectuals. There were public intellectuals in contemporary Europe, like Benedetto Croce in Italy, Romain Rolland in France, Bertrand Russell in England, etc.

Now, we turn to the particular instance we shall focus on, the life and work of P.C.Mahalanobis. I think that in the formation of Prasanta Chandra's social philosophy there were three formative factors in PCM's early life. First, his family was in business enterprise while his contemporaries in comparable social status were of zamindar families or professional families. Second, his link with the Brahma Samaj was a formative influence on his outlook on social issues. Third, Mahalanobis came under the overwhelming influence of Rabindranath Tagore from the age of eighteen when he was a student in Presidency College.

As regards the first of these factors, business enterprise was a characteristic of the Mahalanobis family which marked it apart from most others. While the vast majority of the Calcutta elite were from the zamindar or landowning class and middle class professionals, the

Mahalanobis family was in business enterprise. Prasanta Chandra Mahalanobis's grandfather Guru Charan Mahalanobis left behind an autobiography in which he says that as an orphan child he received no formal education. He was taught by a zamindar's *sarkar* or clerk how to read and write and he had to earn a living from the age of ten as a clerk copying documents for a few *annas* at a time in the courtyard of the magistrate's court. An enterprising youth, he migrated from East Bengal to Calcutta and set up a medical shop. In this business of a middleman or *dalal* in the retail of medicines, Mahalanobis Co. eventually became prosperous. We have indirect evidence of Guru Charan's success in business; for example he spent Rs. 42,000 rupees to built a temple for Keshab Sen's Bharatbarshiya Brahma Samaj, and he constructed for his own family a mansion on Cornwallis Street. His son Probodh Chandra, Prasanta Mahalanobis's father, joined the medicine company at a young age and later he set up his own business, Carr and Mahalanobis Company, in the business of making and selling sports goods, particularly footballs. He too was quite successful in business; for instance he founded the Brahma Mission Press, and he was wealthy enough to pay for his son Prasanta Chandra's education in Cambridge. In the World Depression of the 1930s his business collapsed but he retained his properties and other assets. Prasanta Chandra Mahalanobis was proud of this background of business enterprise and he wrote of his enterprising father and grandfather: "It is some successes and some failures of many like Prabodh Chandra and their various efforts that laid the foundations of business in Bengal".

Prasanta Chandra Mahalanobis's familiarity with the business world and perhaps some of the entrepreneurial initiative of his ancestors may be seen in his own life and work. Building an institution is somewhat like entrepreneurship and one can see a business strategy in Prasanta Chandra Mahalanobis's management of his institution, ISI. For example he acquired property for the ISI like a good businessman investing in land as the safest asset and as an investment yielding profit in the future. When he passed away the accounts of

the ISI of the 1972-73 indicate that huge investment was made by ISI in land, usually land in the periphery of big cities. Thus ISI under Prasanta Chandra Mahalanobis's management acquired in Calcutta 34 acres, in Giridi 15 plots of land, in Bangalore 30 acres, in Madras, Baroda and Hyderabad urban land amounting to 2 to 7 acres, and shortly before Prasanta Chandra Mahalanobis's death more land was bought in the margins of Delhi. What was the purpose of acquiring so much land in these years 1949-71? There was criticism in the Council of the ISI as well as in the reports of government Review Committees; the critics felt that most of this land remained unutilized by the ISI. Even his biographer Ashok Rudra has criticized this policy of land acquisition as irrational. The only explanation of this policy was the expectation of rise of the value of such assets. Apart from these capital investments, on the revenue side Prasanta Chandra Mahalanobis showed a strong business sense. His strategy seems to be to earn revenue from application-oriented commissioned work (e.g. work under schemes sponsored and funded by the Bengal government, the Meteorological Department, the Planning Commission, ministries of the government of India, etc). Thus purely theoretical research and training were funded from revenue earned from applied research which attracted government funding. That seems to be his business strategy.

My second point about Prasanta Chandra's social background is that his father and grandfather were part of the Brahma Samaj and he was equally a part of the Sadharan Brahma Samaj. My hypothesis is that this was the social context in which Prasanta Chandra's notion of public duty evolved. His grandfather Guru Charan was a colleague of Keshab Chandra Sen in setting up a new Brahma Samaj. And later his father Prabodh Chandra was one of the founders of the Sadharan Brahma Samaj. In the Brahma Samaj there was on the one hand a commitment to duty to the Brahma Samaj, and on the other hand a sense of duty to the general public. Many leaders of Brahma Samaj worked hard for the benefit of tea garden labourers, or jute mill workers, or Hindu women's education. Guru Charan Mahalanobis's



autobiography, published after Prasanta Chandra's death by Mrs Rani Mahalanabis, records many efforts made by Guru Charan through the Brahma Samaj to provide financial support to impoverished Brahma families, to offer shelter to women persecuted in society, to promote girls' education, and of course also acts of personal charity. (His grandfather Guru Charan's autobiography was prepared by Prasanta Chandra for publication and after his death Mrs Rani Mahalanabis had it printed in 1974; it is rare book now brought to public attention by Muntassir Mamoon, professor at Dhaka University, in his recent history of Brahma Samaj, *Unish Shatake Purba Bange Brahma Andolan*, Dhaka, 2017, pp. 719-725). Manifestations of a sense of public duty were seen more generally in the Brahma Samaj than in traditional Hindu society. (Iswar Chandra Vidyasagar is a rare example of a non-Brahma motivated by public duty). I think that in respect of public duty Mahalanobis's world outlook was deeply influenced by his Brahma Samaj background. An example of this was the 'Kalyanshree Project' at the ISI offering shelter and free training in handicrafts to refugee women from East Pakistan in 1956-1966; this project was terminated due to pressure from the government's Review Committee auditing the ISI expenditure. More generally speaking, he was motivated by a generous sympathy for the poor in his applied statistical work and design of economic surveys.

The third formative influence on Prasanta Chandra was the influence of Tagore. That is vaguely known to everyone but we now have a description in Prasanta Chandra's own words. He wrote in a letter to his future wife Nirmal Kumari or Rani Maitra on 13 August 1916: '3rd year পুজোর সময়ে প্রথম বোলপুরে আমার মনকে খুব একটা নাড়া দিল। আশ্রমের শান্তি একদিকে যেমন মনকে টেনে নিল — অপরদিকে নিজের জীবনের অনেক অভাব যেন আমার নিজেকেই বাইরের দিকে টেনে বের করল। রবিবাবুর সঙ্গে আমার খুব অল্পদিনের মধ্যেই বিশেষ পরিচয় হয়ে গেল। ....মাস-দুয়েক পরে আমি (3rd year এর শেষে) বোলপুরে দু মাস প্রায় কাটলাম, তখন আমি যেন আশ্রমের চিরকালের লোক। ....যাহোক আমি একদিন রবিবাবুর কাছে গিয়ে পড়লাম - বললাম আমাকে কিছু বলুন... সেদিন থেকে আমার জীবনের গতিটা ফিরে গেল - অন্যপথে চলতে আরম্ভ করলাম। রবিবাবুর কাছে তখন যাওয়ায় আমি যেন বেঁচে গেলাম।'<sup>6</sup>

This happened in 1912 when Prasanta Chandra was barely 18 years of age. Even before that we have three letters from Tagore to Prasanta Chandra dated 29 June, 13 July, 17 July 1911; here is an extract from one of these letters : “তোমার প্রতি বারবার আমার এই উপদেশ আপনাকে দিয়ে আপনাকে ঢেকে রেখো না। যত রকম উপলক্ষ্যই হোক নিজের আবরণ ছিন্ন করে বেরিয়ে পোড়ো। ....আপনার ভিতর থেকে বাইরে ছুটে আসা, সকল সময়ে যে কাজ করবার জন্যে তানয় - তাতে পৃথিবীর কোনো বিশেষ হিতসাধন হবে কি না সেও চিন্তা করবার বিষয় নয় — আর কিছু নয় চিন্তকে অস্বাস্থ্যের আক্রমণ থেকে রক্ষা করবার জন্যেও ক্ষণে ক্ষণে বাইরে বেরিয়ে পড়া দরকার।”<sup>7</sup>

Others close to Tagore called him ‘Gurudev’, but Mahalanobis refers to him as ‘Rabibabu’. But to him Tagore was the nearest approximation to a ‘guru’ in the Indian tradition. The best of evidence of the influence of Tagore on Mahalanobis is a pamphlet Mahalanobis wrote in 1920 entitled ‘কেন রবীন্দ্রনাথকে চাই’; at this time Prasanta Chandra along with Sukumar Ray had proposed that the Sadharan Brahma Samaj may offer to Tagore membership as a mark of honour. Conservative members of Sadharan Brahma Samaj opposed this proposal. Mahalanobis’s pamphlet and persuasions eventually won the day and Rabindranath was offered membership with four hundred and ninety six votes in favour and three hundred twenty two against.

What is more, Mahalanobis began to work for the advancement of the project of Visva Bharati and he not only drafted the constitution but also advised Tagore as regards choosing members of the Visva Bharati Committee. For example, in a letter to Tagore of 18 December 1921, he writes: ‘ট্রাস্টি, জেনারেল কমিটির সদস্যদের নাম আরেকটু অপেক্ষা করে নির্বাচন করলেই ভাল হয়। তেমন তাড়াতাড়ি নেই। আপাতত শিক্ষা সমিতি আর কর্মসমিতি নিযুক্ত করে দিলেই চলবে। কর্মসমিতিতে জেনারেল কমিটির পক্ষ থেকে ৪জন আর আপনি নিজে একজন নিযুক্ত করবেন কথা আছে, সুরেনবাবু, রামানন্দবাবু, নেপালবাবু, হীরেনবাবু, আর যদুবাবুর নাম প্রথমেই মনে আসে - কর্মসমিতিতে এইরকম জনকয়েক বাইরের লোক নেওয়াতে বোধহয় ভালই হবে’<sup>8</sup>

However, his tenure as the Joint *Karmasachiva* along with Rathindranath Tagore, was not very comfortable since he met with internal opposition from residents of Santiniketan and he expressed desire to submit his resignation in 1923, 1925, 1927 and 1929. Eventually

in 1931 his resignation was accepted, because Rathin Tagore felt that Prasanta Chandra was not acceptable to many members of the Santiniketan community. Even after that he continued to be Tagore's advisor in respect of Visva Bharati and publications. This is witnessed by about 150 letters which passed between Tagore and Mahalanobis.<sup>9</sup>

Now let us turn to the social philosophy that may be observed in Prasanta Chandra's academic life. In the first place, what was the role of the 'culture' in his world outlook? Unfortunately the concept of culture in common usage is associated with only the performing arts, literary writings, and the various creative crafts and arts. To Prasanta Chandra it meant something more than that. Apart from those aspects of culture he was interested in the culture of science. Behind his endeavour in the domain of statistics, there was an objective of a wider kind. The objective was to bring about cultural change in his own country to instill in his people a scientific attitude. He had a historical view of the growth of science in human civilization. He wrote in an article in *Sankhya* in 1969: "the industrial revolution in the western countries and Japan [was] the outcome of social transformation and the scientific revolution. In USSR and in China, rapid advancement of science and technology started with a social revolution. The scientific revolution, the social revolution, and the process of industrialization of every society, these three aspects may be distinguished but cannot be separated."<sup>10</sup> He emphasized "influence of scientific outlook". As if he had a foresight in respect of the regressive tendencies and opposition to rationality in India of our times, Prasanta Chandra spoke of the need to attack "authoritarian structure of institutions ....superstitions, and ritualistic religious practices, devoid of spiritual values". In this process Prasanta Chandra regarded science education as a basic requirement. In an essay on national development written in 1963 he wrote of "the need of building up a system of school education with a definite orientation to science ....As most of the peoples will be living in villages it would be of great advantage if agriculture and some rural industries can be adopted as a base for the teaching of science".<sup>11</sup> In 1957 in a volume entitled *University Teaching*

*of Social Sciences: Statistics*, commissioned by UNESCO, Mahalanobis undertook a survey of the teaching of statistics in 25 countries. This piece of research seems to have been inspired by a project for the propagation of the value of scientific method. He believed that “through such subjects as Arithmetic, Geography, Physics, Chemistry and Biology, the statistical approach could be introduced and the pupil could be made to think in terms of aggregates, variations and relationships and variables.”<sup>12</sup> In another article on the objectives of science education in under developed countries in 1964 Prasanta Chandra looked back on the historical experience of developed countries: “the transformation of all the advanced or rapidly advancing countries has been brought about by the acceptance....of a scientific and rational view of life and nature....This is the foundation of the modern age.”<sup>13</sup>

On the whole the culture of science to PC was the acceptance of certain values inherent in the scientific revolution which, as everyone knows, began in the Western world in the seventeenth century. These values were, according to Prasanta Chandra, “principles of objective or scientific validity based on relevant data and correct reasoning, instead of on the sanction of authority based on status and power or custom and conventional or revealed rules and laws. This may be called the scientific revolution.”<sup>14</sup> T.N.Srinivasan has suggested that Prasanta Chandra’s approach to cultural change was close to Jawaharlal Nehru’s outlook. We may add that there was a similar affinity between Prasanta Chandra and Rabindra Nath Tagore who similarly denounced the hold of superstition and *shastriya* authority on the Indian mind and thus impeding the growth of rational culture.

Prasanta Chandra’s rationalism was in evidence in his activities inside the Brahmo Samaj, e.g. his opposition to casteism and his rejection of a parochial outlook. Ashok Rudra makes a significant point that PC in the trust deed of the Mahalanobis Trust declared that the first objective was “to promote the study and diffusion of the ideals and cultural ideas associated with the life and work of Rammohun Roy and Rabindra Nath Tagore”. Rudra comments: “It is

only in the second place that he mentions the objective, “to promote the advancement of knowledge of statistics and other branches of natural and social sciences and technology....for national development of India and welfare of the people of India”.<sup>15</sup>

One of the examples of the application of statistics to the welfare of the people was the flood control measures and production of hydro-electric power as a consequence of Prasanta Chandra’s statistical studies in meteorology, rainfall, rivers in flood, etc. As a result Prasanta Chandra pioneered thinking on flood control and dams for hydel power which eventually developed in the Hirakud and Damodar Valley projects. For this purpose in 1927 Mahalanobis made a statistical study of rainfall and floods in Bengal from 1870 to 1922, and in 1931 another project on rainfall in Orissa 1868-1928. Dr. Meghnad Saha took up this question with reference to Prasanta Chandra’s research and it is generally known how the Damodar Valley Project developed as a result. Prasanta Chandra provided some crucial historical data on rainfall in that region from old records of the Meteorology department.<sup>16</sup>

Needless to say, in the organization of economic data collection the idea of public welfare pre-dominated in Prasanta Chandra’s thinking. For example, the influence of Prasanta Chandra’s emphasis on social welfare is evident in his approach to the development of the science of statistics and his institute. “In our institute we have pursued a policy of closely integrating research, training and project work. Also we have taken the view that statistics is not a branch of Mathematics but is a technology which is essentially concerned with the contingent world of reality....as distinguished from the world of abstractions (of numbers, geometrical points, lines, logical relations, axioms etc.)”. In this note circulated internally in the ISI by Prasanta Chandra on 14 July 1964, his objective of addressing socio-economic issues is stated very clearly.<sup>17</sup> Prasanta Chandra was aware that “many eminent and influenced persons do not accept the above view”, but he believed that there was no conflict between the objective of addressing social reality and on the other hand the task of pursuing research, particularly pioneering research for the advancement of science.

Prasanta Chandra had a difficult time in establishing the above principle and in obtaining financial support for that purpose. One of the many instances of his struggle was a financial crisis he faced in 1954 when he submitted to the Finance Minister government of India, C.D.Deshmukh, a letter of resignation from the post of Director of the ISI. He saw that the easiest way to ensure government support was to convert ISI into a government organization; "I have been consistently resisting this for more than fifteen years ....As I have no faith in the government system, the only way in which I can help in the institute being taken over by government is by getting out of the institute."<sup>18</sup> For the time being offer of financial support from Deshmukh ended the crisis but the problem recurred again and again until in 1960 Prime Minister Jawaharlal Nehru passed in Parliament Indian Statistical Institute Act of 1959. The basic problem was that in the bureaucratic circles there was little appreciation of the value of the statistical work of Prasanta Chandra and the ISI. The Review Committee appointed by the government often questioned, to the annoyance of Prasanta Chandra the usefulness of the data and policy inputs of the ISI. At the same time the highest decision making bodies, particularly due to the influence of Jawaharlal Nehru, supported PC's plan of action for the ISI. For example when PC proposed the foundation of the Central Statistical Organization (CSO) at their meeting in July 1952 the entire cabinet supported the proposal; the Cabinet included then farsighted man like Nehru, Abul Kalam Azad, Jagjivan Ram, C. D. Deshmukh etc.

That brings us to another question: what was PC's political position? Very little is known about that. His political position before independence is now known through his letters to Tagore. During the non-cooperation movement he wrote : "ছেলেরা যে দলে দলে জেলে যাচ্ছে সেটা আমি সমর্থন করতে পারিনে, কিন্তু তাদের মনের অবস্থাটা বেশ বুঝতে পারছি এবং তাদের সঙ্গে যে একেবারেই সহানুভূতি নেই তাও নয়। দেশের লোকের মনে ক্রমেই গভর্নেন্টের প্রতি অশ্রদ্ধা বেড়ে যাচ্ছে — রাগও বাড়ছে — এটা কোন দিক দিয়েই ভালো নয়। এই বিরোধের ভাব বেড়ে গেলে আমাদের দেশের পক্ষেই ক্ষতি হবে, এতে করে ক্ষণিক উত্তেজনার মোহে আমরা আসল বড় বড় লক্ষ্যগুলিকে হারিয়ে ফেলব। ...গভর্নেন্টের অত্যাচারে দেশের মডারেট দলের যদি কিছু চৈতন্য

হয় তবে সেটা সুখের বিষয় সন্দেহ নেই — কিন্তু তাতে করে আমরা যদি ভারতবর্ষের আর সমস্ত কথা ভুলে কেবল পলিটিকস নিয়েই মেতে উঠি তবে তাতে দেশের ক্ষতি। নন-কো-র মধ্যে যেটুকু দেশের কাজ করা সেদিক থেকে এতে করে মনোযোগ আরো চলে আসাই স্বাভাবিক”<sup>19</sup> After the end of the non-cooperation movement PC appears to be critical of the limitations of Gandhian politics. “অনেকেরই মত যে মেশিনস বাদ দিয়ে চরকার যুগে ফিরে যাওয়া সম্ভবপর বা বাঞ্ছনীয় নয়, যেমন আইনস্টাইন সেদিন বলেছিলেন যে চরকা দিয়ে পৃথিবীর সমস্ত সুতো তৈরী হবে এ আমি সম্ভবপর মনে করিনে, এবং সম্ভব হলেও তা ভালো বলে স্বীকার করতে পারিনে। কোন না কোন কম্যুনাল ওনারশিপ দরকার।”<sup>20</sup>

In the twenties and thirties many intellectuals were attracted to socialist ideas and PC’s attitude was one of qualified support to the idea of socialism while he remained apprehensive of “রেড টেরর”. He wrote in 1927: “কম্যুনিজম-এর আলটিমেট আইডিয়াল ভালো হলেও রেড টেরর জিনিসটা যে ভয়ানক তাতে সন্দেহ নেই। চীনে যা ঘটেছে বা ঘটছে, ভারতবর্ষেও তাই ঘটবার যথেষ্ট সম্ভাবনা আছে। পোলিটিক্যাল ডিসকন্টের সঙ্গে সঙ্গে ইকনমিক আনরেস্ট জুটে আমাদের দেশের জনসাধারণের মন কম্যুনিজমের দিকে ঝুঁকতে পারে - অথচ তাতে রক্তগরজি ছাড়াও কালচারাল লাইফ অন্তত অনেক দিনের মত চাপা পড়বে।”<sup>21</sup>

In the years after independence PC’s political views seem to be similarly sympathetic but critical towards the Left. It is a fact that he gave employment to a large number of Left intellectuals in the ISI. These included Ramkrishna Mukherjee, Ambika Ghosh, Santosh Bhattacharya, Kalyan Dutta, B.P.Adhikary and Shafiq Naqvi. Prasanta Chandra was also corresponded occasionally with CPI leaders like PC Joshi, Ajoy Ghosh, Dr. G.Adhikary etc. However, it is difficult to accept Ashok Rudra’s view that “his social and political views were very akin to what may be loosely called the Left.”<sup>22</sup> I beg to differ from Rudra since I think that basically Mahalanobis’s position was that of a nationalist while being keenly aware of the need to correct the social and economic inequalities in India. The fact that many of the recruits he made in ISI were inclined towards Communism was not an evidence of his bias towards the Left. It was due to the fact that some of the best minds of the younger generation were attracted to socialist ideas and thus on the ground of intellectual competence they were taken into the ISI. There is a draft of a letter to Nehru on this matter in which he stated that his recruitment of scholars for the ISI

was “on the basis of their ability and proved merit irrespective of their political views or affiliations, provided they refrain from such political activities as are likely to interfere with their work in the institute.”<sup>23</sup>

To conclude, this brief survey of Mahalanobis’s social philosophy and world outlook raises many questions which may be answered when research at the ISI or elsewhere throws new light on those questions. I hope and trust that this lecture today would persuade researchers in the discipline of statistical science as well as in social science disciplines to take up further explorations into Mahalanobis’s life and work.

While I have highlighted in this lecture on Mahalanobis’s social philosophy, some of the relevant aspects of Prasanta Chandra’s life and work, objectivity demands that we should not forget that some other aspects were often criticized in his times. In framing proposals for the Second Five Year Plan for Nehru’s government he is often seen as unresponsive to the needs of the agricultural sector and in particular he failed to apply his mind to the need for land reforms. C N Vakil and Beahmanand (1956) of Bombay University were critical of the emphasis on heavy industry and some economists abroad like Ragnar Nurske (1957) were of the same opinion.<sup>24</sup> Sukhomoy Chakravarty (1987), an admirer of Mahalanobis, regretted the absence of an ‘adequate and effective policy frame for agriculture’.<sup>25</sup> Ashok Rudra reminisced later that he had questioned Prasanta Chandra sharply on the absence of land reforms.<sup>26</sup> Then again Mahalanobis was often accused of a dictatorial style of functioning in his institute. Thirdly, it has been said that he dispersed the endeavour in the ISI in many directions by taking up too many projects. His tendency to ignore financial rules and regulations of the government were often criticized by the governments Review Committees.

Today when we celebrate the 125<sup>th</sup> birth anniversary of PC Mahalanobis we shall fail in our duty if we do not recall his commitment not only to statistical science but also to his objective of people’s welfare. Let us remember how in the trust deed of the



Mahalanobis Trust, he stated his objective: it was the advancement of knowledge of statistical science “for national development of India and the welfare of the people of India”.<sup>27</sup> Again, let us not forget in these days of communalist intolerance how he upheld in his writings the culture of science against obscurantist traditionalism and worship of the past. Let us not forget how he fought against conservative members of the Sadharan Brahmo Samaj in defence of Tagore’s progressive outlook. And let us also remember how he built the ISI as an institution free of political and government control by asserting the principle of academic autonomy. In all these matters he responded to his sense of public duty as a public intellectual and set an example to intellectuals in our country.

#### Notes

- <sup>1</sup> Prasanta Pal, editor, *Kalyanyieshu Prasanta*, selected correspondence between Tagore and Mahalanobis, Calcutta, 2015.
- <sup>2</sup> Ashok Rudra, *Prasanta Chandra Mahalanobis: A Biography*, Delhi, 1996.
- <sup>3</sup> A. Mahalanobis, P. C. Mahalanobis, Delhi, 1983; Jayanta Ghosh, A K Bera et al., ‘Indian Statistical Institute: Numbers and Beyond, 1931-47’, in U. Dasgupta, editor, *Science and Modern India, an institutional history, 1784-1947*, Delhi, 2011; Dhires Bhattacharya, editor, *Science, Society and Planning, Calcutta, 1996, A centenary tribute to P C Mahalanobis*, Calcutta, 1996.
- <sup>4</sup> Richard Posner, *Public Intellectuals: A Study of Decline*, Harvard, 2003; Romila Thapar, ed., *Public Intellectuals*, Delhi, 2016.
- <sup>5</sup> Tagore, ‘Shok Sabha’, first published in the journal *Sadhana* in 1894, *Rabindra Rachanabali (Sulabh Sanskaran)*, vol V, pp. 613-617.
- <sup>6</sup> Prasanta Pal (editor), *Kalyaniyeshu Prasanta*, Selected correspondence between Tagore and Mahalanobis, 2015 p.135.
- <sup>7</sup> P.Pal, p. 1.
- <sup>8</sup> Pal, Mahalanobis to Tagore, 18 December 1921; p. 217.
- <sup>9</sup> According to Rani Mahalanobis there were actually 550 letters, but most of them were stolen by an unnamed person; Pal, pp. 138-39.
- <sup>10</sup> Mahalanobis, ‘The Asian Drama’, *Sankhya*, vol. 31, 1969.
- <sup>11</sup> Mahalanobis, ‘Social transformation for national development’, *Sankhya*, vol. 25, 1963.
- <sup>12</sup> Mahalanobis, *University Teaching of Social Sciences: Statistics*, UNESCO, Paris, 1957, p. 16.
- <sup>13</sup> Mahalanobis, ‘Objectives of Science Education in under Developed Countries’, *Sankhya*, series B, 1964, pp. 253-256.

- <sup>14</sup> Mahalanobis, 1963, pp. 49-50; we owe to T.N.Srinivasan the first exposition of views of PCM on this matter, in his chapter in Ashok Rudra, *Prasanta Chandra Mahalanobis : A Biography*, Delhi, 1996, Ch. II.
- <sup>15</sup> Rudra, 1996, p. 64.
- <sup>16</sup> A.C.Mukhopadhyay, 'PCM's work on *Meteorology and Flood Control and Irrigation*, Appendix C, pp. 159-163, Rudra, 1996.
- <sup>17</sup> This unpublished note by Mahalanobis is available in Ashok Rudra, 1996, p. 176.
- <sup>18</sup> Letter from Mahalanobis to C.D.Deshmukh, Finance Minister, 3 February 1954, vide Rudra, 1996, pp. 201-203.
- <sup>19</sup> Letter from Mahalanobis to Tagore, 18 December 1921, P. Pal, p. 220.
- <sup>20</sup> Letter from Mahalanobis to Tagore, 11 January 1927, P.Pal, p. 223.
- <sup>21</sup> Letter from Mahalanobis to Tagore, 11 January 1927, P.Pal, p. 225.
- <sup>22</sup> Rudra, 1996, p. 339.
- <sup>23</sup> Rudra, 1996, Chapter 17, Appendix, p. 379.
- <sup>24</sup> Ragnar Nurke, 'Reflections on India's Development Plan', *Quarterly Journal of Economics*, 71, 1957, pp. 188-204.
- <sup>25</sup> Sukhomoy Chakravarty, *Development Planning*, Oxford, 1987, p. 13.
- <sup>26</sup> Rudra, 1996.
- <sup>27</sup> Mahalanobis Trust Deed, Rudra, 1996, p. 64; see also Mahalanobis, *Presidential Address, Indian Science Congress, Puna, 1950*.

PHILOSOPHICAL NOTIONS OF VIDYĀ (UPĀSANĀ) IN  
THE LIGHT OF ŚAṄKARA'S COMMENTARY ON  
BRAHMASŪTRAS

SANDHYA PRUTHI

The Upaniṣadic texts throughout utilize prescripts which enjoin meditations. But the substitution of meditation for the ritual act must also have been influenced by the fact that many of the sacrifices required materials which only a wealthy person like a king could afford. Meditation gradually takes the place of the ritual act and comes to share in all its particular powers. Though the inner sacrifice tends to reject the ordinary sacrifice, it preserves in itself all the significant characteristics of the latter. Meditation which replaces ritual act naturally has the same efficacy.

There are various types of practitioner among the followers of the Vedānta school, such as householders, recluses, those who perform or do not perform the rituals, but all must meditate on Brahman, regardless of what kind of life they pursue. Meditation on Brahman is an indispensable requisite for attaining liberation.

The author of the Brahmasūtra believed that the main purpose of the Upaniṣads is to teach meditation. The *sūtras*<sup>1</sup> support this view and refute critics who propose that meditation on the *Udgītha* (*Udgītha-vidyā*)<sup>2</sup> is a mere glorification because of having been accepted as subservient to ritual acts and that the stories in the Upaniṣads are for the sake of ritualistic application called *pāriplava*<sup>3</sup> of the horse sacrifice (*aśvamedha*).

Various terms are used as synonyms of meditation, such as reverence (*upāsanā*), cognition (*vijñāna*), knowledge (*vidyā*)<sup>4</sup>. Other synonyms include concentration (*dhyāna*<sup>5</sup>, *dhī*<sup>6</sup>), contemplation (*dr̥ṣṭi*)<sup>7</sup> and awareness (*buddhi*)<sup>8</sup>. The concept of meditation therefore, contains all of these connotations and all of these terms may be translated into English as meditation. The Upaniṣads frequently teach the importance of meditation as the practice of constantly thinking of a

sacred object. The *sūtra* “*māntravarṇikameva ca gīyate*”<sup>9</sup> interprets it as directing one’s mind (*ceto’rpaṇa*). *Mantra* portion supports it as “one who knows Brahman, attains Brahman”<sup>10</sup>.

The manifold and complex descriptions of meditation in the Upaniṣads led to the necessity of examining each form of meditation, clarifying their respective significances and pointing out the similarities and differences between the various meditations.

Despite secondary differences (differences in minor matters) among the explanations of the diverse forms of meditation prescribed in the Upaniṣads, do not affect their essential unity. It is reasonable to assume that the meditations of the same class are one and not different. Śaṅkara holds that differences in details are permissible even in the case of one and the same *vidyā*. If the two *vidyās* agree in essential points, differences in details do not make them separate *vidyās* as it could be seen when dealing with the ‘meditation on the five fires’<sup>11</sup>. The followers of the Vājasaneyya branch mention a sixth fire thus, “this fire becomes his fire”<sup>12</sup> etc. The Chāndogas do not mention it and they conclude with number five, “now then, he who knows (i.e. meditates on) these five fires thus”<sup>13</sup>. Now, how can the meditations be the same for both, those who have that additional factor and those who have not? Similarly in the parable of the Chāndogas read of four other *prāṇas* i.e. speech, eye, ear and mind, over and above the *prāṇa* that is the greatest whereas the Vājasaneyins read of a fifth as well, “the seed is *prajāti* (having the power of generation). He who knows it to be such becomes enriched with children and animals”<sup>14</sup>. Here, the Vedāntins explain that this kind of variation in details is admissible in the very same meditation. Although on account of the irreconcilability of the number five, the sixth fire cannot be added by taking it from elsewhere, still the five fires counting from heaven being in evidence in both the places, there cannot be a difference in the meditation, just as the *Atirātra* sacrifice<sup>15</sup> does not differ in spite of taking up or not taking up the sacrificial vessel called *ṣoḍaśī*<sup>16</sup>. Moreover, the Chāndogas also read of a sixth fire, “when he departs for attaining the world earned by his merit, they carry him to the funeral fire itself”<sup>17</sup>. The Vājasaneyins

however in their eagerness to eliminate from the funeral fire the imagination of smokes, faggot etc. that are associated with the imaginary five fires, read thus, “the material fire becomes his (i.e. dead man’s) fire, the (material) fuel his fuel” etc.<sup>18</sup>. That is only by way of a restatement of a commonly known fact<sup>19</sup>. Or even if this sixth fire be meant for meditation, then the Chāndogas also can add this trait to theirs. And it should not be apprehended that the number five will stand in the way, for this number, enumerating the five imaginary fires involved in the meditation based on superimposition, is a restatement of the fact already known (earlier that the fires are five), so that it is not a part of any injunction. Hence there is no conflict.

Similarly in the anecdote of the *prāṇa* and so on, it is nothing contradictory to add somewhere a new trait. It should not be apprehended that either the entity meditated on or the meditation differs in accordance as a detail is added to or given up, for though a certain small trait may be added or deducted from the entity meditated on, yet the meditation is recognized to be the same from the persistence of the greater quantum of the thing to be known. Hence the meditations are the same in the different Upaniṣads.

Further an objection taken i.e. inasmuch as in the case of the followers of *Atharvaveda*, ‘the ritual of holding of the fire on the head’ is a *sine qua non* for learning the *vidyā* and it is not so necessary in the case of others, therefore there is difference in the *vidyās*. It is answered by Vedānta as this is a feature of the study of *Atharvaveda* and not of the *vidyā*. Because the Ātharvaṇikas mention that it is a feature of the study of *Atharvaveda* in the ‘*samācāra*’, a book which gives instruction about the rituals (*vratas*) to be observed in the study of Veda and which mentions this ritual as being related to the *Atharvaveda*. It is also conclusively determined to be such a feature of the study of their own Upaniṣad only and not of the *vidyā*, on account of the word ‘this (knowledge of Brahman)’<sup>20</sup> which refers to the qualification for the study of the *Muṇḍaka Upaniṣad* and the word ‘study’ also, in the passage, “no one who has not performed this ritual, can study this (i.e. the *Muṇḍaka Upaniṣad*)”<sup>21</sup>. But if

objection is further raised that as the Muṇḍaka passage “this *Brahma-vidyā* should be imparted only to those who have performed the ritual of ‘the holding of the fire on the head’ according to the instruction (*vidhivat*)”<sup>22</sup> speaks of its (i.e. of the ritual of *śirovrata*) relation to *Brahma-vidyā*, this feature of *śirovrata* would get mixed up with the other *Brahma-vidyās* in the other Vedas and apply to all *vidyās* generally because *Brahma-vidyā* is the same everywhere. Vedāntins say no, because the context is relevant to the *Brahma-vidyā* mentioned in the *Muṇḍaka Upaniṣad*. As this relevancy of *Brahma-vidyā* is with reference to this particular book i.e. *Muṇḍaka Upaniṣad*. Therefore this feature of *śirovrata* also relates particularly to that particular book only. That the rule is analogous to the libations (*sava*), is an illustration indicated in support of the argument. Just as the seven libations, beginning with the libation to the sun and ending with the *śataudana* libation, having nothing to do with the three *agnis* referred to in the other Vedas but having a relation with only the one *agni* referred to in the Atharvaveda are restricted to the followers of *Atharvaveda* only. Similarly this feature of *śirovrata* related as it is, to the study of the Atharvaveda by the Ātharvaṇikas is restricted to that study only. Therefore also the statement that the *vidyās* are identical everywhere is flawless.

The scriptures also declare similarly that the *vidyās* (cognitions) are one and the same in all Vedānta texts, inasmuch as they all give instruction that the object to be known is one and the same, thus “that abode i.e. Brahman about which all the scriptures speak”<sup>23</sup>, “so do the *bahvṛcās* i.e. *hotṛs*, the followers of Ṛgveda consider it (i.e. Brahman) only, in the *mahatyuktha* (*śāstra* i.e. collection of glorificatory *Sāma* hymns and the *Adhvaryu* (the officiating priests, who follow the *Yajurveda*) meditate on Brahman in the sacrificial *agni* and the Chāndogas in *Mahāvratā* (a particular religious act for propitiating Indra)”<sup>24</sup>. Similarly it is seen that the fear inspiring nature of the lord, spoken of in the Kamha Upaniṣad thus, “the great fear, the uplifted thunderbolt (*vajra*)”<sup>25</sup>, is referred to in the *Taittirīyaka*, for the purpose of censuring the viewing of difference between the *jīva*-Self and the lord, thus “whenever this (soul) makes in this one the smallest

interval then, for him, there is fear. That indeed is where the person who does not accept the unity of *jīva*-Self and Brahman but considers them to be different, becomes subject to fear"<sup>26</sup>. Similarly the gastric fire (*Vaiśvānara*), fancifully or notionally conceived to be of the size of a thumb, in the Vājasaneyaka (i.e. Bṛhadāraṇyaka), as accepted in the *Chāndogya Upaniṣad*, as something which is already established thus, "but, he who meditates on the *Vaiśvānara* as of the size of a thumb or as the *abhivimāna* Self"<sup>27</sup>. Again it is seen that by way of demonstrating the unity of the purport of all the Upaniṣads, the *Ukthās* (collections of *Sāma* hymns) etc. enjoined in one Upaniṣad are adopted in other Upaniṣads for the sake of meditation. So it is thus proved that the *upāsanās* (meditations) in all Vedānta texts are the same everywhere, on the authority of the maxim of, a thing that is often seen everywhere (*prāyadarśana*).

One and the same meditation may also be transmitted through different Vedic schools, of the Vedas, as for example the *Śāṅḍilya-vidyā* attributed to the hermit *Śāṅḍilya* and the *Vaiśvānara-vidyā* which teaches the worship of the universal Self. Though transmitted in different schools, it is the Selfsame meditation and the explanations concerning the auxiliaries may be collected together. The same has been supported in the *sūtra* "*sarvābhedādanyatre*"<sup>28</sup>. *Prāṇa* is mentioned in *Chāndogya Upaniṣad*<sup>29</sup>, *Bṛhadāraṇyaka Upaniṣad*<sup>30</sup> not only as the eldest and the best but also as the richest and so on. In the text of the *Kaṁha Upaniṣad*, only the former are mentioned. The question is whether the other attributes are to be imported into it also. The Vedāntins answer that, as the meditations relate to one entity, *prāṇa*, the qualities mentioned in one context are likely to occur to our minds even in another and so are included in the significance of the particular form of meditation presented.

For if Devadatta is well known in his native land for his qualities of valor etc., he does not become alienated from these qualities even when he goes to another country where the people are not cognizant of his qualities of valor etc. And as from better acquaintance, those qualities of Devadatta can come to be recognized in that country as well. So also as a result of better knowledge, the attributes to be

meditated on in one branch come to be added to the meditation in another branch. Hence the attributes associated with the Selfsame principal entity have to be added in every other branch as well, although they are mentioned in one place only.

Further, regarding the conceptions of the immutable<sup>31</sup> also same concept has been comprehended. When the doubt occurs, in the *Bṛhadāraṇyaka Upaniṣad* it is said, "O Gārgī, the knower of Brahman says, this immutable (Brahman) is neither gross nor minute, neither short"<sup>32</sup> etc. Similarly it is heard of in the *Muṇḍaka Upaniṣad*, "then there is the higher knowledge by which the undecaying is apprehended"<sup>33</sup>, "that which cannot be perceived and grasped, which is without source, features"<sup>34</sup>. So also elsewhere the Supreme Brahman is taught by way of eliminating distinctions. Now should all these ideas involving elimination of distinctions be combined together everywhere or are they to be restricted to where they occur? Vedāntins answer that all the conceptions of the immutable that is to say the conceptions involving the negation of distinctions are to be combined everywhere since the process of presentation is the same and the object dealt with is the same. For the process of presenting Brahman, consisting in the negation of all distinctions, is similar everywhere and that very same Brahman is sought to be explained everywhere. And this is how it has been explained under the aphorism, "*ānandādayaḥ pradhānasya*"<sup>35</sup>. The case is analogous to the *Upasāda* offerings<sup>36</sup>. Though the *mantras* are found only in the *Sāmaveda* the priests of the *Yajurveda* also use them. Similarly here also, the attributes of the immutable that are dependent on the immutable, irrespective of the place of their occurrence. This has also been said by Jaimini in the first part i.e. *Pūrva-Mīmāṃsā* aphorism<sup>37</sup>, "in a case of disparity between the subsidiary text revealing the *mantra* for the first time and the principal text revealing the application, the subsidiary text has to be associated with the main injunction, since the former is meant for the latter".

Further when the doubt is regarding the conceptions of the *Muṇḍaka Upaniṣad*<sup>38</sup> and *Kaṭha Upaniṣad*<sup>39</sup> that in the former one eats the fruits while the other does not, in the latter both of them enjoy



the results of their good actions and therefore the object of meditation is not identical. The *sūtra*<sup>40</sup> contends that they form one *vidyā*. As both describe the same lord as existing in the form of the individual. The object is to teach about the Supreme Brahman and show the identity of the Supreme and the individual. Since the object of meditation is one, the *vidyās* are also one.

Again the combination of traits in *Bṛhadāraṇyaka* and *Chāndogya Upaniṣad* has been seen starting with the text, “now, here in this city of Brahman is an abode, a small lotus flower, within it is a small space. What is within that should be sought, for that, assuredly, is what one should desire to understand”<sup>41</sup>, it is said “this is the Self free from sins and from dirt, death, sorrow, hunger and thirst which has true desire and irresistible will”<sup>42</sup> etc. And the Vājasaneyins have this, “he is the great unborn Self who is this (person) consisting of knowledge among the senses. In the space within the heart, lies the controller of all, the lord of all, the ruler of all”<sup>43</sup> etc. Here with regard to the traits like desires etc. It is explained that ‘desire’ is unfailing true desire, just as one would call Devadatta simply Datta or Satyabhāmā simply Bhāmā. The attributes like unfailing desires that are met with in the *Chāndogya Upaniṣad*, as applied to the space within the heart have to be inserted elsewhere in the *Bṛhadāraṇyaka* in the text, “that great birth-less Self” etc. And the attributes like controller of all, met with in the *Bṛhadāraṇyaka*, have to be inserted in the *Chāndogya* text, “this is the Self free from sin” etc. because of the sameness of the abode etc. For in both the places the heart is equally the abode, god is equally the entity to be realized and god is equally the barrage (*setu*) serving to maintain the boundaries of the things of these world, that is to say to prevent promiscuity and so also many other similarities are met with.

There is however one difference. The *Chāndogya Upaniṣad* passage treats of Brahman with qualities and the *Bṛhadāraṇyaka Upaniṣad* passage of Brahman without qualities. But then the determinate Brahman is one with the indeterminate. So the combination of qualities must be understood for glorifying Brahman and not for the purpose of worship<sup>44</sup>.

However in all meditations on Brahman, essential and unalterable qualities like naturally bliss and knowledge are to be included everywhere because of non-difference in all the places for that very principal entity, Brahman, is equally the substantive everywhere in accordance with the illustration of the valor of Devadatta shown above.

Whereas the attributes of 'having joy as the head' and so on mentioned in the *Taittirīya Upaniṣad* are not to be added elsewhere, since joy, enjoyment, hilarity and bliss are perceived to be of different degrees of intensity or feebleness in relation to one another and in respect of the different enjoyers. Intensity or feebleness co-exists only with difference, whereas Brahman is without any difference as is known from such texts as, "one only without a second"<sup>45</sup>. And it was taught by us under the aphorism, "he who is full of bliss is Brahman on account of repetition"<sup>46</sup> and these attributes of 'having joy as head' etc. do not belong to Brahman, but to the blissful sheath. Moreover, these are imagined as means for concentrating the mind on the Supreme Brahman but they are not meant for realization as actual characteristics. While this is their purpose, this is all the more reason why the attributes of 'having joy as the head' and so on are not to be added elsewhere but admitting for the sake of argument that these are attributes of Brahman. This reasoning is to be applied to other attributes also that undoubtedly belong to Brahman and are enjoined for meditation such for instance as "resort of all blessings"<sup>47</sup> (*saṁyadvāma*) and "containing all desires"<sup>48</sup> (*sarvakāmaḥ*). Even though the Brahman to be meditated on is the same in all of them, yet the meditations differ according to the different contexts and as such the attributes found in one are not to be transferred to another. Just as the two wives of a king may adore him in two ways, one with a fly-whisk and the other with an umbrella and the behavior of the king may differ according to the mode of adoration. Although the person adored is the same, so also is the case here. The possession of intensive or feeble attributes is possible in the case of the qualified Brahman alone with regard to whom dualistic ideas persist but not so in the case of the unqualified Supreme Brahman. But all other attributes like bliss which are spoken of for propounding the real nature of

Brahman are to be understood everywhere, since they have an identity of purport i.e. Brahman which possesses these attributes and which they seek to establish, is the same. Hence there is a difference between the two groups of attributes, inasmuch as these latter are meant simply for the attainment of knowledge and not for meditation.

A certain form of meditation transmitted in one school may be at the same time practiced in other school. Some meditations that are connected with the accessories of rites like *Udgītha etc. are enjoined in all the Vedas in their different branches*<sup>49</sup> are even to be adopted in all the branches of the Vedas and are not to be confined to the branches of the Vedas in which they obtain. Though there is a difference in intonation etc. in the different branches, still on account of the fact that the *Udgītha is one and the same, this kind of meditation should be undertaken with regard to the Udgītha etc. in all the branches*. Even in the case of *mantras*, acts and qualities of acts which are enjoined in one branch are taken over by other branches also. The aphorism "*mantrādivadvā' virodhaḥ*"<sup>50</sup> speaks the same.

Two forms of meditation transmitted as separate within one school may also be actually the one and same meditation. Just as it is proper that the meditation should be the same and the traits also should be combined in the different branches, so also it should be the case in the same branch, for the entity meditated on is non-different. We recognize that 'the meditation of *Śāṅḍilya*' occurring remotely in the 'secret teaching about fire' is shown to be the same as the meditation here in the *Bṛhadāraṇyaka Upaniṣad*<sup>51</sup>, as the very same Brahman is to be meditated on in both the places.

Second with regard to the doubt that the two passages in *Bṛhadāraṇyaka Upaniṣad*, "explain to me the Brahman that is immediately present and directly perceived, the Self that is within all"<sup>52</sup>, just one after the other, in course of the questions of Uṣasti and Kahola, refer to two separate teachings and two separate objects. The answer is given that the Supreme Self is the object in both cases since two different selves cannot be simultaneously the innermost of all in the same body, even as none of the elements constituting the body can be the innermost of all in the true sense of the term though, relatively speaking, one

element may be said to be inside another. The same Self is taught in both the texts. Śaṅkara in the *sūtra* “*antarā bhūtagrāmavat svātmanaḥ*”<sup>53</sup>, gives *Śvetāśvatara Upaniṣad*<sup>54</sup>, as a possible scriptural text intended by the author, “the one god hidden in all beings. He is all pervasive and the inmost Self of all beings”. The object of knowledge is one and therefore the teaching is one. In the next aphorism i.e. “*anyathā bhedānupapattiriti cennopadeśāntaravat*”<sup>55</sup> the repetition is intended to make the inquirer understand the subject convincingly.

Third is discussed in *sūtra* “*saiva hi satyādayaḥ*”<sup>56</sup>, where the *Bṛhadāraṇyaka Upaniṣad*<sup>57</sup> two texts speak of one meditation and the results are the same.

On the other hand, there are cases where similar descriptions of two different meditations may not necessarily refer to the same meditation. Similarities in explanatory words or designation (*saṃjñā*) in two different places do not always mean that the same meditation is being discussed.

For instance, in *Chāndogya Upaniṣad*<sup>58</sup> only a part of the *Udgītha*, the syllable *aum* is meditated upon as the *prāṇa*, whereas in *Bṛhadāraṇyaka Upaniṣad*<sup>59</sup>, the whole *Udgītha* hymn is meditated on as *prāṇa*. So the two *vidyās* cannot be one. The case is similar to the meditation on *Udgītha* enjoined in the passage, “this is indeed the highest and greatest *Udgītha*” *Chāndogya Upaniṣad* 1.9.2, which is different from the one enjoined in *Chāndogya Upaniṣad* 1.6, where the *Udgītha* is meditated on as abiding in the eye and the Sun.

Another example, the meditation *Udgītha-vidyā* taught in *Bṛhadāraṇyaka Upaniṣad*<sup>60</sup> and that taught in *Chāndogya Upaniṣad*<sup>61</sup> are not necessarily identical.

There are cases where a particular meditation taught in one passage may consist of two different forms of meditation like in meditation on *satya* Brahman<sup>62</sup> and another in the *Bṛhadāraṇyaka Upaniṣad*<sup>63</sup>, where it is said, “the person who is there in that orb and the person who is here in the right eye, these two rest on each other”. On the analogy of the *Śāṅḍilya-vidyā*, these two require to be combined. If this doubt occurs, the Vedāntins say, though the *vidyā* is one, still owing to difference in abodes the object of meditation

becomes different. The scripture distinctly states that the attributes are to be kept separate and not combined. It compares the two persons which are distinct. Signs indicative of the separate treatment of such attributes are in evidence thus, “the form of this one is the same as the form of that (person seen in the Sun). The songs of the former are the songs of this. The name of the one is the name of the other”<sup>64</sup>.

Various meditations teaching different attributes, of the same object of meditation such as *īśvara* must also be different. As discussed in “because of the difference of terminology etc.”<sup>65</sup>, inasmuch as such difference of terminology is met with as ‘veda (knows)’, ‘*upāsita* (should meditate)’, “*sa kratum kurvīta* (he shall make a resolve)”<sup>66</sup> and so on. And it was ascertained earlier in Pūrva-Mīmāṃsā<sup>67</sup> that a difference in terminology causes a difference in the rites, “when there is a difference of words conveying different ideas e.g. *yajati* (sacrifices), *dadāti* (gives), *juhoti* (pours oblation), the rites differ since they are accepted as denoting separate actions”. From the use of ‘etc.’ in the aphorism it follows that attributes etc. are also to be understood as making difference in rites as far as possible<sup>68</sup>.

Now the author of the *sūtra* interpreted the complex and manifold varieties of meditations, taught in the Upaniṣads to be mainly meditation upon Brahman. Even in the numerous cases where the Upaniṣad do not specify Brahman as the object of meditation, they can be interpreted as referring to Brahman, for the following reasons; since it is very difficult to meditate upon the absolute at large, some clue to, is needed and therefore the Upaniṣads teach that meditation should be made on the *Gāyatrī* metre<sup>69</sup>, on something very small<sup>70</sup>, or on the fire in the body<sup>71</sup>. But, even in the case where meditation thus relies on a symbol, Brahman is the ultimate goal of meditation (*īkṣatikarman*<sup>72</sup>). Again in the aphorism “*arbhakaukastvāttadvyapadeśācca neti cenna, nicāyyatvādevaṃ vyomavacca*”<sup>73</sup> it has been explained that for the purpose of meditation the omnipresent Brahman may be said to occupy a limited space. Although present everywhere Śaṅkara says the lord is pleased when meditated upon as limited in, for example connection with the eye of a needle. The lord of the entire universe may be said to be the lord of Ayodhyā, so the Supreme Self

abiding everywhere may very well be denoted as abiding within the heart. We worship the Supreme through an image, *yathā śālagrāme hariḥ*. For Śaṅkara the limitations are not real. So we cannot say that if Brahman has its abode in the heart and these heart abodes are different in different bodies, it is affected by the imperfections of the different bodies. In aphorism “and because activity and agent are separately mentioned or *karmakartr̥vyapadeśācca*”<sup>74</sup> also this concept has been explained. The various specifications of the size of Brahman are also merely for the purpose of meditation<sup>75</sup>.

For the preceding reasons meditation is to be conducted on a temporary symbol (*pratīka*) as Brahman and it would be erroneous to take Brahman as the individual symbol. The basic principle is that the superior reality is to be meditated upon by means of that which is inferior. We can make progress only by looking upon an inferior object as symbolic of the superior and not vice-versa. Since our objective is to get rid of the idea of diversity and see Brahman in everything, we have to meditate on the symbols as Brahman.

Furthermore, the various forms of meditation on Brahman are one and the same and no essential difference among them exists. In different branches of learning the same meditations are described with slight or major modifications. But there is unity on the nature of Brahman and the relation to it of the human soul. In the *sūtra* “*sarvavedāntapratyayaṁ codanādyaviśeṣāt*”<sup>76</sup>, attempts are made to remove the contradictions in the sacred texts and achieve reconciliation of the different Vedānta texts on this matter. The meditation on *prāṇa* is described in one way in *Bṛhadāraṇyaka Upaniṣad*<sup>77</sup> and in a different way in *Chāndogya Upaniṣad*<sup>78</sup>. They are non different because of the similarity as regards injunction, connection, name and form. There is non-difference even as regards the fruit or the result of meditation. This is true not only of *Prāṇa-vidyā* but *Dahara-vidyā*, *Vaiśvānara-upāsanā*, *Śāṅḍilya-vidyā* etc. Śaṅkara believes that all these *vidyās* are concerned with *saḡuṇa* Brahman and not *nirguṇa* Brahman. Some of them lead to the attainment of results on earth while others lead on gradually to salvation by way of producing knowledge.

Thus, the distinction of 'higher knowledge' (*Parā-vidyā*) and 'lower knowledge' (*Aparā-vidyā*) made by Śaṅkara was not entertained. Since the Brahmasūtra differentiates between Brahman and the individual Self. It does not seem to have recognized any significance in worshipping the individual Ātman. In a passage like, "let one meditate on the mind as Brahman"<sup>79</sup>, the mind is not to be identified with the Self. If the mind is cognized as identical with Brahman, then it ceases to be a symbol, even as a gold ornament loses its individual character when it is identified with gold. Again, if the meditator is conscious of his identity with Brahman, then he ceases to be the individual soul, the meditator. The act of meditation is possible only where distinctions exist and unity has not been reached.

Various forms of meditation other than that on Brahman were also taught in the Upaniṣads. The meditation, for example, on the members of the sacrificial acts, such as *Udgītha* etc, was meant to free from hindrance (*apratibandha*) the operation of the rite and to increase its effectiveness. Certain meditations are mentioned in connection with some sacrifices. The sūtra "*tannirdhāraṇāniyamas taddṛṣṭeḥ pṛthag hy apratibandhaḥ phalam*"<sup>80</sup> says that these meditations are not a part of the sacrifices. *Chāndogya Upaniṣad*<sup>81</sup> make out that there is no inseparability between the two. Besides, meditations and sacrifices have separate results. The meditation does not interfere with the result of the sacrifice. The result of the sacrifice may be delayed owing to the interference of the *karman* of the sacrificer but the meditation destroys the effects of that and the results are attained earlier. But the sacrifice does not depend on the meditation for its results. Meditation is not a part of the sacrifice and it is therefore optional. Again sūtra "*yadeva vidyayeti hi*"<sup>82</sup> conforms that all obligatory works performed before the rise of true knowledge, whether with or without knowledge either in the present state of existence or a former one, by a person desirous of release with a view to release, all such works act according to their several capacities as means of the extinction of evil desire which obstructs the attainment, subserving the more immediate causes such as the hearing of and reflecting on the sacred texts, faith, meditation, devotion etc.



And this *Udgītha* meditation was not limited to any special school but was to be performed equally by all because the Vedic text about *Udgītha* etc. is stated in a general way. If it be confined to its own branch then the text 'one shall meditate on the *Udgītha*', which is stated in a general way and is not meant for any restricted application, will remain confined to a particular context on the strength of proximity and thus the general express statement will be adversely affected. But this is not proper. For an express statement is more authoritative than proximity. It cannot also be argued that no concept and hence meditation is possible with regard to a general factor. So, though there is a difference in intonation etc. in the different branches, still on account of the fact that the *Udgītha* is one and the same, this kind of meditation should be undertaken with regard to the *Udgītha* etc. in all the branches.

There was a difference of opinion between certain thinkers (Ātreya and Audlomi) as to whether the worship in regard to certain sections of the rite should be undertaken by the sacrificer or by the priest but the author of the *sūtra* follows the latter view and states that it should be the priest<sup>83</sup>.

In the meditation on Brahman it is necessary to select (*vikalpa*) and practice only one of the numerous meditations and there is no necessity to practice more, for the results do not differ. The result of these meditations consisting in the direct perception of the object of meditation, is the same and when the perception of the object of meditation, be it god or any other entity, occurs as result of a single meditation, the other meditations become useless. Moreover the theory of combination will lead to an impossibility of direct perception, since such a combination will lead to distraction of the mind. And the result i.e. illumination achievable through direct perception, is shown in such Upaniṣadic texts as, "an aspirant who has such a vision that he is Brahman and has no doubt, attains Brahman"<sup>84</sup>, "becoming god (in this life) he attains godhood (even after death)"<sup>85</sup> etc., as also by *smṛtis* in texts as, "continuously engaged in his thoughts"<sup>86</sup> and so on<sup>87</sup>. So an aspirant should choose one of the meditations, bearing the same result and he should continue in



it wholeheartedly till he attains the result through the direct perception of the object of meditation.

In contrast the meditations conducted for special ends and not for the realization of Brahman may be practiced together or singly because the effects differ. The aphorism "*kāmyāstu yathākāmaṁ samuccīyeranna vā pūrvahetoabhāvāt*"<sup>88</sup> by way of illustrating the opposite of what was stated above determine an alternative adoption at will. In meditations through symbols which are undertaken for obtaining particular desires and which like rites yield their own fruits by being first converted into *adr̥ṣṭa* i.e. unseen potential results, there is no expectancy of direct perception. These may be combined or not combined at will. Moreover, the worship of the various parts of the sacrificial rite is never practiced together since their co-existence is not mentioned in the Upaniṣads.

In order to conduct such meditation one must sit quiet (*āsīna*) because one is unable to unify the thought unless one is seated. *Upāsanā* consists in setting up a current of similar thoughts and that is not possible for one while walking or running because movements etc. disturb the mind. Even for a standing man, the mind remains busy about keeping the body erect so that it is not able then to look into subtle things. A man lying on the ground may suddenly fall asleep. But for a sitting man, innumerable troubles of this kind are easy to avoid so that *upāsanā* becomes possible for him.

Its effect is that both the mind and body become steady. In such sentences as, "contemplation, assuredly, is greater than thought. The earth contemplates as it were"<sup>89</sup>, the assertion of meditation in the cases of the earth etc. is made from the standpoint of motionlessness alone. That also is a sign that *upāsanā* is to be undertaken by a man when seated. It is believed that the contemporary practitioners used to sit in the lotus or half lotus posture and they did not subscribe to the peculiar distorted postures of the later *yogins*. No special time, place or direction to face was prescribed by the author of the aphorism "*yatraikāgratā tatrāviśeṣāt*"<sup>90</sup>. It states that the regulation about direction, place and time is concerned only with that much regarding them as conduces to meditateness. One should meditate facing

any direction in any place, at any time that leads to ones concentration of mind easily. Unlike the regulations fixing the eastern direction, forenoon and a place sloping down to the east and so on, as we met with in the cases of rites, no such specific regulation is mentioned in the Upaniṣads, while the one thing desirable is that one should always have concentration of mind while engaged in *upāsanā*. Practitioners of this kind of meditation were by the *sūtra* distinguished from yogins in general<sup>91</sup>.

When such meditations were repeatedly practiced there would soon be a direct perception of Brahman in a state of ecstasy (*samrādhana*). Brahman though not apprehended by the senses, is realized in the state of meditation. The scriptures declare even so thus, "the Self is not to be sought through the senses. The Self-caused pierced the openings (of the senses) outward. Therefore one looks outward and not within oneself. May be a wise man who has become introspective (by closing his eyes in contemplation) and desirous of immortality, occasionally sees the innermost Self"<sup>92</sup>, "when one's (intellectual) nature is purified by the light of knowledge then alone he, by meditation, sees him who is without parts"<sup>93</sup>. By *samrādhana* is meant the presentation before the mind of Brahman which is effected through meditation and devotion (*bhakti-praṇidhānāt anucmhānam*).

The ultimate datum is consciousness which is above reason. Western thought stresses reason as the capacity by which ultimate reality can be known and expressed in a clear, intelligible form. Conceptual thought which posits the object over against the subject becomes the dominant feature. While the stress is on dualism in western thought, non-dualism is the prominent feature in eastern philosophy. Further if it is said that Brahman as the object of meditation and the individual as the meditator are different, the reply is just as light, the *kṛa* and the Sun etc., appears different as if they have special aspects because of the actions in the form of such limiting adjuncts as a finger, an earthen pot or water respectively but they do not lose their natural non-difference. Even so, is the appearance of difference in the Selfs, the result of limiting adjuncts only, they are one and the same highest Self in themselves. Similarly the Vedānta texts have oftener than once

explained the non-difference between the *jīva* Self and the intelligential highest Self i.e. *Prājñā*. The intuition of Ātman is also taught in the *sūtra* “*śātradr̥ṣṭyā tūpadeśo vāmādevavat*”<sup>94</sup>, the individual Self Indra, perceives through the intuition of transcendental truth that his own Self is identical with the Supreme Self and so instructs *Pratardana* about the highest Self through the words “know me alone”<sup>95</sup>. By a similar intuition, the sage Vāmādeva attained the knowledge expressed in the words, ‘I was Manu and the Sun’.

Intuitive insight is defined in Govindānanda’s *Ratnaprabhā* as the Self-evident intuition rendered possible through the knowledge acquired in previous existences. Compare the famous statement, the knower of Brahman becomes Brahman (*brahma vid brahmaiva bhavati*<sup>96</sup>). The individual in a supreme effort stretches towards the indefinable and adorable and in that condition he is lost and absorbed.

Since the *sūtra* “*āvṛttirasakṛdupadeśāt*”<sup>97</sup>, states that the meditation on Brahman (the act of acquiring knowledge) must be repeated, it is clear that it did not teach sudden attainment. Such repeated instruction as, “that the Self should be seen, heard, cogitated upon and meditated upon”<sup>98</sup> indicates a repetition of the mental act. Such mental acts are meant ultimately to culminate in the intuitive realization of Brahman. It is only when they so culminate in such intuitive realization of Brahman by such repeated hearing etc. that they have their tangible fruit just as the threshing of rice which has its husk on it has its culmination in the dehusking of such rice grains. Besides ‘cogitation and meditation’ are said to imply action in which this aspect of repetition (*āvṛttiguṇa*) is implicit. For instance, in ordinary life when we say that a man worships his preceptor or his king, we understand that it means that he serves his preceptor or his king with continued unswerving loyalty (*tātparyeṇa*). Similarly it is only when a *proṣitanāthā* wife (i.e. whose husband has gone away on business) constantly remembers her absent husband and is eager to meet him, she has no other thought but that of thinking constantly and wistfully remembering her absent husband. It is seen that the terms ‘he should know’, ‘he should meditate’ are used in Vedānta texts without any distinction i.e. as synonymous. In some

places a scriptural statement begins with the term 'let him know' and concludes with 'let him meditate upon', as for instance in, "he who knows in the same manner in which he (Raikva) knows it (earns the same fruit which Raikva earned), is thus spoken by me"<sup>99</sup> and "Oh lord teach me the deity whom you meditate"<sup>100</sup>. Elsewhere as in *Chāndogya Upaniṣad*<sup>101</sup> also it is established that the repetition is necessary even when instruction is given only once, while several instructions of course suggest repetition of such mental acts.

And since it teaches that meditations have to be continued until death, it is also clear that even after the intuition of Brahman meditation is to be repeated because the acquisition of the unseen potential result of action is dependent on the final contemplation on the idea. For even the fruits of past actions which are destined to produce a result enjoyable in a subsequent birth, arouse at the time of death a pattern of consciousness replete with the thoughts confirming to that, as is known from such Upaniṣadic texts as, "then the soul has consciousness of the fruits in the form of impressions that it has to experience and it goes to the next body which is the fruit associated with that consciousness"<sup>102</sup>, "whatever is one's thinking therewith one enters into life. His life combined with fire alongwith the Self leads to whatever world has been fashioned (in thought)"<sup>103</sup>. This is so because of the illustration of grass and a leech (caterpillar)<sup>104</sup>. Hence those ideas are to be revolved in the mind till death which are nothing but a contemplation of that very result which is to be achieved. "He shall think of these three at the time of death"<sup>105</sup> shows the last duty that remains to be done at the time of death. The knowledge (*vidyā*) obtainable as the result of meditation on Brahman was not necessarily assured in this life. If there were no hindrances (*pratibandha*), knowledge could be gained. By this is meant that when the means of knowledge, while they are operating, have no impediment caused by some other ripe for fruition, knowledge is generated even here in this world but if there were hindrances it would arise in the next life. Such ripening of actions for fruits takes place when the environment and causes present themselves. It is not possible to regulate that the same time,

environment and causes which cause one action to ripen, would also cause another action to ripen because actions can have fruits contradictory to each other. The *śāstra* merely concludes by saying that a particular action will have a particular fruit but does not mention any specific time, environment or cause for it. As a result of the peculiar strength of the means, some supersensuous power manifests itself in the case of some actions while in the case of some other actions it stands arrested.

Inasmuch as intentions are uncontrolled, it cannot be that a man cannot have any such general intention as that knowledge may be generated in him either in this life or in the next, just as it pleases. Similarly even though knowledge is generated by hearing etc., it is so generated only when the impediment to it is removed. The scriptures also indicate the inscrutability of the Self, thus “he who cannot even be heard of by many, whom many, even hearing, do not know, wonderful is the one who can teach him and skilful is he who finds him and wonderful is he who knows even when instructed by the wise”<sup>106</sup>. The scriptures which declare that Vāmadeva attained brahmahood even while he was in the embryonic stage, show that through the means accumulated in the previous life, knowledge is attained during the next birth. *Smṛti* also says, how Vāsudeva questioned by Arjuna thus, “Oh Kṛṣṇa, to what end does that one go, who has not attained perfection?”<sup>107</sup>, replied “Oh son, nobody who has performed meritorious actions ever goes to a bad end”<sup>108</sup> and further having spoken about the attainment of the world of the blessed by such a man, he says that such man is reborn in a good family and then he goes on further to say that “there (i.e. in the next birth) he comes into contact with the knowledge gained during the previous body”<sup>109</sup> and ultimately concludes by indicating, thus “having attained perfection through many such births, he at last attains the highest goal”<sup>110</sup>. Hence it is thus established that knowledge is generated in this birth or in the next, depending upon the measure in which impediment is removed. Thus, the practice of meditation even into the next life came into consideration.

When Brahman is perceived directly through the practice of meditation, all the sinful deeds previously performed will dissolve and no *karman* committed thereafter will cling to the individual Self. This relates to the state of *jīvan-mukti* or liberation in life. If it is said that one must experience the results of one's deeds committed before the attainment of liberation, the aphorism "*tadadhigama uttarapūrvāghayoraśleṣavināśau tadvyapadeśāt*"<sup>111</sup> observes that when a person attains knowledge, all his earlier sins are destroyed and later one does not cling to him as the sense of agency is lost and the effects of deeds do not affect him<sup>112</sup>. The law of *karman* does not apply to the knower of Brahman. The injunction to do work is for the glorification of knowledge. Knowledge destroys all ignorance with its distinctions of agent, act and result. It is antagonistic to all work and so cannot be subsidiary to work. When we attain liberation, the chain of work is broken. We become superior to time.

In the same way neither would good deeds cling to the individual self since he is devoid of the sense of agency and they too would dissolve at death i.e. liberation takes place at death. With the intention of further clarifying, *sūtra* "*ato'nyāpi hyekeṣmubhayoḥ*"<sup>113</sup> states that besides the obligatory works like the daily *Agnihotra* and the like, there are other good works which are performed with a view to certain results. Of these later works, it is said that 'his friends enter on his good works', (*śuḥṛdas sādhu kṛtyam upayanti*) i.e. others profit by one's good deeds. Both Jaimini and Bādarāyaṇa are agreed that works undertaken for the fulfillment of some special wish do not contribute to the origination of true knowledge.

Although on the rise of knowledge there is dissolution of sinful and good deeds, this is only in respect of those sinful and good deeds which have not yet begun to produce (*anārabdha*) their effects, whereas those sinful and good deeds which have already produced some effect cannot be dissolved by knowledge. That must await the exhausting of the effects of the deed and its natural extinction thereby. That is, the complete extinction of the deed and its effects occurs when they have been exhausted by means of experience (*bhoga*) and the body is completely extinguished. Thus, spiritual liberation occurs

only after death<sup>14</sup>. Since knowledge does not necessarily appear in the present life, as has been explained, complete liberation is realized in the life following the one in which knowledge was born<sup>15</sup>.

At any rate the author of the *sūtra* recognized the quite unique spiritual power of the knowledge of Brahman. And those who realized this knowledge could walk the path of gods after death and achieve union with Brahman. Going on the path of the gods is connected equally with all those *vidyās* which have prosperity for their aim. Scripture declares that not only those who know the *Pañcāni-vidyā* but also those who understand other *vidyās* and those who in the forest follow faith and austerities proceed on the path of the gods<sup>16</sup>. This concludes our discussion on the meditation taught in the Brahmasūtra. Its chief characteristic is that the content of meditation is very concrete and of definite form. One might say that the meditation and *samādhi* are within the field of differentiated forms. This is probably due to the fact that they derive from the varied forms of meditation in the old Upaniṣads. Such practices of meditation formed the orthodox tradition in early Vedānta philosophy. People who opposed this tradition began to appear and this opposition reached a peak with the idea of *asparśayoga* in the Māṇḍūkya-kārikā.

### Notes

<sup>1</sup> *Brahmasūtra* 3.4.21-24

<sup>2</sup> *Chāndogya Upaniṣad* 1.1.3 and 1.6.1

<sup>3</sup> There is an injunction that in the course of the horse-sacrifice, the priests should tell stories to the sacrificing king and his family and councillors. On the first day is to be related the story of Vaivasvat Manu, on the second of Vaivasvat Yama and on the third of Varuṇa and Sūrya.

<sup>4</sup> *Brahmasūtra* 3.3.5

<sup>5</sup> Setting up of a continuous stream of similar thoughts. The verb "to concentrate" is applied figuratively to one having his limbs relaxed, gaze fixed and mind concentrated on a single object, as in such sentences as, "the heron has its mind concentrated", "the woman who has her lover in exile has her mind fixed (on him)". This proceeds easily for one in a sitting posture. Hence also *upāsanā* is to be undertaken by one when seated (*Brahmasūtra* 4.1.8).

<sup>6</sup> *Ibid.* 3.3.33

<sup>7</sup> *Ibid.* 4.1.5

<sup>8</sup> *Ibid.* 3.2.33

<sup>9</sup> *Ibid.* 1.1.15

<sup>10</sup> *Taittirīya Upaniṣad* 2.1.1

- <sup>11</sup> *Chāndogya Upaniṣad* 5.3-10
- <sup>12</sup> *Bṛhadāraṇyaka Upaniṣad* 6.2.14
- <sup>13</sup> *Chāndogya Upaniṣad* 5.10.10
- <sup>14</sup> *Bṛhadāraṇyaka Upaniṣad* 6.1.6
- <sup>15</sup> *Brahmasūtra* 3.3.2 (Translation quoted from *Brahmasūtra Śāṅkarabhāṣya* at some places).
- <sup>16</sup> In regard to this sacrifice two contradictory injunctions about using and not using the *ṣoḍaśī* are met with, still the Mimāṃsakas argue that the sacrifice is the same, the use of the *ṣoḍaśī* being optional.
- <sup>17</sup> *Chāndogya Upaniṣad* 5.9.2
- <sup>18</sup> *Bṛhadāraṇyaka Upaniṣad* 6.2.14
- <sup>19</sup> That the common fire burns the dead meditator. This is not a fire to be meditated on, the five foregoing ones only being meant for that.
- <sup>20</sup> *Brahmasūtra* 3.3.3
- <sup>21</sup> *Muṇḍaka Upaniṣad* 3.2.11
- <sup>22</sup> *Ibid.* 3.2.10
- <sup>23</sup> *Kaṭha Upaniṣad* 1.2.15
- <sup>24</sup> *Aitareya Āraṇyaka* 3.2.3.12
- <sup>25</sup> *Kaṭha Upaniṣad* 2.3.2
- <sup>26</sup> *Taittirīya Upaniṣad* 2.7.1
- <sup>27</sup> *Chāndogya Upaniṣad* 5.18.1
- <sup>28</sup> *Brahmasūtra* 3.3.10
- <sup>29</sup> *Chāndogya Upaniṣad* 6
- <sup>30</sup> *Bṛhadāraṇyaka Upaniṣad* 6.1.14
- <sup>31</sup> *Brahmasūtra* 3.3.33
- <sup>32</sup> *Bṛhadāraṇyaka Upaniṣad* 3.8.8-9
- <sup>33</sup> *Muṇḍaka Upaniṣad* 1.1.5
- <sup>34</sup> *Ibid.* 1.1.6
- <sup>35</sup> *Ibid.* 3.3.11
- <sup>36</sup> It is enjoined that in connection with the *Ahīnasatra* (lasting for more than a day) of Jāmadagni, one has to perform the *Upasad* sacrifice in which *puroḍāśas* (cakes) have to be offered.
- <sup>37</sup> *Jaiminīsūtra* 3.3.8
- <sup>38</sup> *Muṇḍaka Upaniṣad* 3.1.1
- <sup>39</sup> *Kaṭha Upaniṣad* 1.3.1
- <sup>40</sup> *Brahmasūtra* 3.3.34
- <sup>41</sup> *Chāndogya Upaniṣad* 8.1.1
- <sup>42</sup> *Ibid.* 8.1.5
- <sup>43</sup> *Bṛhadāraṇyaka Upaniṣad* 4.4.22
- <sup>44</sup> *Brahmasūtra* 3.3.39
- <sup>45</sup> *Chāndogya Upaniṣad* 6.2.1
- <sup>46</sup> *Brahmasūtra* 1.1.12
- <sup>47</sup> *Chāndogya Upaniṣad* 4.15.2
- <sup>48</sup> *Ibid.* 3.14.2
- <sup>49</sup> *Chāndogya Upaniṣad* 1.1.1, 2.2.1 and *Aitareya Āraṇyaka* 2.1.2 and *Śatapatha Brāhmaṇa* 10.5.4.1
- <sup>50</sup> *Brahmasūtra* 3.3.56
- <sup>51</sup> *Bṛhadāraṇyaka Upaniṣad* 5.6.1



- <sup>52</sup> Ibid. 3.4.1 and 3.5.1
- <sup>53</sup> *Brahmasūtra* 3.3.35
- <sup>54</sup> *Śvetāśvatara Upaniṣad* 6.11
- <sup>55</sup> *Brahmasūtra* 3.3.36
- <sup>56</sup> Ibid. 3.3.38
- <sup>57</sup> *Bṛhadāraṇyaka Upaniṣad* 5.4.1 and 5.5.2
- <sup>58</sup> *Chāndogya Upaniṣad* 1.1.1
- <sup>59</sup> *Bṛhadāraṇyaka Upaniṣad* 1.3.2
- <sup>60</sup> Ibid. 1.3
- <sup>61</sup> *Chāndogya Upaniṣad* 1.2
- <sup>62</sup> *Brahmasūtra* 3.3.20-22
- <sup>63</sup> *Bṛhadāraṇyaka Upaniṣad* 5.5.1-2
- <sup>64</sup> *Chāndogya Upaniṣad* 1.7.5
- <sup>65</sup> *Brahmasūtra* 3.3.58
- <sup>66</sup> *Chāndogya Upaniṣad* 3.14.1
- <sup>67</sup> *Pūrva-Mīmāṃsā* 2.2.1
- <sup>68</sup> The meditations are different according to the (1) different characteristics attributed to the object in different contexts, (2) the difference of results, (3) difference of names, or (4) impossibility of combining all the characteristics.
- <sup>69</sup> *Brahmasūtra* 1.1.25
- <sup>70</sup> Ibid. 1.2.7
- <sup>71</sup> Ibid. 1.2.26
- <sup>72</sup> Ibid. 1.3.13
- <sup>73</sup> Ibid. 1.2.7
- <sup>74</sup> Ibid. 1.2.4
- <sup>75</sup> Ibid. 3.2.33
- <sup>76</sup> *Brahmasūtra* 3.3.1
- <sup>77</sup> *Bṛhadāraṇyaka Upaniṣad* 6.1.1
- <sup>78</sup> *Chāndogya Upaniṣad* 5.1.1
- <sup>79</sup> Ibid. 3.18.1
- <sup>80</sup> *Brahmasūtra* 3.3.42
- <sup>81</sup> *Chāndogya Upaniṣad* 1.1.10 and 1.10.9
- <sup>82</sup> *Brahmasūtra* 4.1.18
- <sup>83</sup> *Brahmasūtra* 3.4.44-46
- <sup>84</sup> *Chāndogya Upaniṣad* 3.14.4
- <sup>85</sup> *Bṛhadāraṇyaka Upaniṣad* 4.1.2
- <sup>86</sup> *Bhagavad Gītā* 8.6
- <sup>87</sup> The *Brahmasūtra* 3.3.59 deals with *aham-graha-upāsanā*, meditation based on Self identity with divinity. The opponent can argue that these meditations yield results through *adr̥ṣṭa* just like rites and hence direct perception is uncalled for. But the texts quoted show that *aham-graha-upāsanā* leads to direct perception.
- <sup>88</sup> *Brahmasūtra* 3.3.60
- <sup>89</sup> *Chāndogya Upaniṣad* 7.6.1
- <sup>90</sup> *Brahmasūtra* 4.1.11
- <sup>91</sup> Ibid. 3.2.21
- <sup>92</sup> *Kaṭha Upaniṣad* 2.1.1
- <sup>93</sup> *Muṇḍaka Upaniṣad* 3.1.8

- <sup>94</sup> *Brahmasūtra* 1.1.30  
<sup>95</sup> *Kauṣītaki-Brāhmaṇa Upaniṣad* 3.1  
<sup>96</sup> *Bṛhadāraṇyaka Upaniṣad* 1.4.10  
<sup>97</sup> *Brahmasūtra* 4.1.1  
<sup>98</sup> *Bṛhadāraṇyaka Upaniṣad* 2.4.5, 4.4.21 and *Chāndogya Upaniṣad* 8.7.1  
<sup>99</sup> *Chāndogya Upaniṣad* 4.1.4  
<sup>100</sup> *Ibid.* 4.2.2  
<sup>101</sup> *Ibid.* 3.18.1 and 3.18.3  
<sup>102</sup> *Bṛhadāraṇyaka Upaniṣad* 4.4.2  
<sup>103</sup> *Praśna Upaniṣad* 3.10  
<sup>104</sup> *Bṛhadāraṇyaka Upaniṣad* 4.4.3  
<sup>105</sup> *Chāndogya Upaniṣad* 3.17.6  
<sup>106</sup> *Kaṭha Upaniṣad* 1.2.7  
<sup>107</sup> *Bhagavad Gītā* 6.37  
<sup>108</sup> *Ibid.* 6.40  
<sup>109</sup> *Ibid.* 6.43  
<sup>110</sup> *Ibid.* 6.45  
<sup>111</sup> *Brahmasūtra* 4.1.13  
<sup>112</sup> *Chāndogya Upaniṣad* 4.14.3, 5.24.3 and *Muṇḍaka Upaniṣad* 2.2.8  
<sup>113</sup> *Brahmasūtra* 4.1.17  
<sup>114</sup> *Brahmasūtra* 4.1.15 and 19  
<sup>115</sup> *Ibid.* 3.4.52  
<sup>116</sup> *Bhagavad Gītā* 8.26.

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# GLEANINGS OF GRIEF, MOURNING AND FUNERARY RITES OF ANIMALS AND BIRDS IN ANCIENT INDIAN TEXTS

K. G. SHESHADRI

## **Introduction**

Birds and animals have fascinated people from very ancient times. Ancient civilizations had observed their behaviour keenly and had recorded several myths about them in mythology, folklore and beliefs. Some were so close to them that people set up tombs and crematories for their loved pets as seen in various Egyptian pyramids, Chinese tombs and several other cultures all over the world. It is therefore not surprising that the ancients wove a set of special funerary rites for these dead animals and birds so that they would rest in peace and accompany their soul in the afterworld just as they lived along with them on earth. Among the different emotions displayed by animals one is profound grief at the loss or absence of a close friend or loved one. Grief itself is a mystery that still astounds all living beings in ways that it is expressed. Mourning strengthens social bonds among survivors who band together to pay their last respects. Though the experience of grief may not be the same as in humans, they do offer evidence of importance of social bonds in animals. Humans are beginning to discover these behaviours among animals and may transcend species<sup>1</sup>.

## **Animal Grief and Mourning - A Brief Survey of Recent Studies**

Field biologists and anthropologists have contributed much to the observations of animal mourning. Cognitive differences play a role in animal grief. Scientists have debated hotly whether some animals display emotions beyond those associated with parental care or other aspects of survival. Biologist E. O. Wilson observed ants carrying the dead bodies of other ants as it recognizes the release of Oleic acid<sup>2</sup>.

Death related behaviour in insects is driven purely by chemical recognition. However, entomologists just haven't any means of recognizing displays of insect emotions.

Underwater death rituals have been observed among dolphins and whales. A dead female dolphin of eastern coast of Mikura island, Japan in 2000 was observed to be surrounded by two males guarding the dead body<sup>3</sup>. Likewise a dead sub-adult male dolphin attended by 20 other dolphins both male and female nudging and pushing the carcass with beaks and heads appearing agitated and stressed has been observed. A Mother dolphin pushing their dead newborn calf away from observer's boat against the ocean current with her snout and fins off Greece's Amvrakikos Gulf in 2007 has been reported<sup>4</sup>. Fabian Ritter of Mammal Encounters Education Research observed a rough toothed dolphin mother pushing and retrieving her dead calf's body along with two adult dolphin escorts as well as 15 dolphins that altered their pace of travel to include mother and dead body off Canary Islands in 2001. The mother's persistence was so remarkable that it was observed that the escorts supported the infant on their own backs. Studies in Atlantic spotted dolphins off Madeira Islands (Portugal) have shown that they try to support their dead calves at the surface either involving a single or several individuals<sup>5</sup>.

Nonhuman primates also grieve the loss of others. Jane Goodall observed a young chimpanzee withdraw from the group, stop eating and die of broken heart after the death of his mother and recorded it in her book *Through a Window*<sup>6</sup>. Some chimps display aggression while others bark in frustration. When a female chimp in her late forties died of congestive heart failure at Cameroon's Sanaga Yong Chimpanzee Resource Centre, a dozen chimpanzees gazed on the body as one of their own in a stunning reaction of tangible silence. Baboon and chimpanzee mothers in Wild African populations sometimes carry the corpse of their dead babies for days, weeks or months - a behaviour that might look like grief. Researchers from University of Pennsylvania record baboons physiologically respond to bereavement in ways similar to humans with an increase in stress hormones. When a predator killed a close companion such as a

grooming partner or offspring, the stress levels of female baboons increased<sup>7</sup>. Chimpanzee grieving rituals have been researched by Katherine Cronin in Zambia<sup>8</sup>. Similar practices have been observed among gorillas, lemurs, macaques and other primates. Apart from primates, excellent observations of mourning among elephants have been carried out by researchers like Cynthia Moss and Joyce Poole. They have reported that elephants attend to dying comrades and stroke the bones of deceased relatives. A particular example comes from Kenya's Samburu National Reserve where Iain Douglas Hamilton tracked elephants' responses to a dying matriarch called Eleanor. Her swollen trunk had been dragging on the ground while her ears and legs displayed evidence of another fall with the tusks also broken. An elephant from a different social group stayed with her, pushing on her body for at least an hour even though the matriarch's own family moved on. During the next few weeks, females from five different elephant families showed keen interest in the body. The elephants sniffed, poked the body, touching it with their feet and trunks<sup>9</sup>.

Giraffes are highly social animals. Wildlife biologist Zoe Muller of Rothschild's Giraffe project in Kenya records about 17 female giraffes showing keen interest in the dead calf along with the mother in 2010 at the Soysambu Conservancy in Kenya. By afternoon 23 females and four juveniles were involved and some nudged the carcass with their muzzles. A most surprising mourning ritual was reported in 2006 at a Farm sanctuary, Watkins Glen in New York wherein two Mallard ducks suffered from Hepatic lipidosis, a liver disease. One of them had deformed legs and the other was blind in one eye. When the former's leg pain increased and could no longer walk, she was euthanized. The other bird pushed hard on the former's body, putting her head and neck over it, never recovering the loss as well as it sat near a small pond where he had gone often with her<sup>10</sup>. Barbara J. King recounts examples of cats, dogs, rabbits, horses and birds mourning their loved ones in her book *How Animals grieve*<sup>11</sup>. Cases of grief and mourning in Wolf packs (Jim and Jamie Dutcher), Coyotes (Marc Bekoff), Alaskan Llamas (Betsy Webb), Magpies have been reported in literature<sup>12</sup>. Scientists in Tasmania have examined the teeth of 100

whales that have stranded and died on North and Western coasts of Tasmania and show that when a whale is taken from a pod, rest of the whales go into mourning that is detrimental to their health<sup>13</sup>. The grief experienced by circus animals is highlighted by one such outstanding case of an elephant named Topsy<sup>14</sup>. It was born in the wild around 1875 in Southeast Asia and was captured soon after by elephant traders. Adam Forepaugh, the owner of the Forepaugh Circus had the elephant secretly smuggled into the United States (US) with plans that he would advertise the baby as the first elephant born in America. She was shipped by goods-wagon and ships to the US, had to suffer fateful accidents by a drunkard stabbing cigarettes on her lips and trunk, was sold many times and finally decided to be put to death. The plans to hang Topsy at a park in a public spectacle were stopped by the American Society for the Prevention of Cruelty to Animals. On January 4, 1903, in front of a small crowd of invited reporters and guests Topsy was fed poison, electrocuted and strangled. The electrocution ultimately killed her indicating the extreme grief and mental trauma that the elephant must have endured before her death.

The present paper discusses such cases of animal grief, mourning and funerary rites for animals as gleaned from ancient Indian literature.

#### **Means of Addressing Animal Grief in Vedic Texts**

In the Vedic texts one finds mention of several animals of which the horse, goat, tortoise and some other animals are related to sacrificial rites. Ever since the times of *Ṛgveda*<sup>15</sup> (RV), animals were held in high respect. The expressions of grief or mourning arise from loss of life, or due to separation and various other causes. The motif of grief and mourning for animals is rare in Vedic texts. However, these texts suggest in minimizing grief or not causing grief to such animals. The slaughter of cows by any person was held to be a grave sin. One had to perform expiation for the sin committed. The *Taittirīya Saṃhitā*<sup>16</sup> (YV) [13.43] states that one must not harm a cow. Similarly the text YV [13.48] states that one must not harm horses and other one-hooved animals. The *Taittirīya Saṃhitā*<sup>17</sup> (5.4.4.3) makes frog as a victim absorbing all heat in rite of *Agnicayana*. This rite also involved the burying of a living tortoise under one of the layers in the belief that

it would survey and protect all the bricks. But in these rites, the animals are not killed. Even if animals were killed, it was in a dignified manner as suggested by the *Maitrāyaṇi Saṁhitā*<sup>18</sup>. In order to dispose of aged cattle, clarified butter oozing from the cow's legs were applied to its face and then only after hymns were chanted was the cow killed. In the *Agniṣomīya* sacrifice, the priest and sacrificer avoid watching slaughtering of animals. A complete hymn to goats in the sacrificial ritual is given in the *Atharvaveda Saṁhitā*<sup>19</sup> (AV) [*Pañcaudāna Ajasūkta*] by sage Bṛḡu. The hymn deals on bringing in the goat to the sacrificial place, slaughtering and cooking of a goat. The hymn AV [9.5.1] conducts the goat with a prayer to step to the third firmament.

महान्त्यजो नाकमा क्रमतां तृतीयम्।

There is a hymn to the slaughterer asking him to cut along the skin with a dark metal, joint by joint with the knife and not being hostile to him.

अनुच्छद्य श्यामेन त्वचमेतां विशस्तर्यथापर्वऽसिना माभि मंस्थाः।  
माभि द्रुहः परुशः कल्पयैनं तृतीये नाके अधि वि श्रयैनम्॥

- AV [9.5.4]

However, even in the descriptions of symbolized killing (not being the actual slaughter) of the horse in *Aśvamedhayajña* (the horse-sacrifice), one finds that the priests put life into the animal's body by the sacred hymns and makes it as a living offering to the immortal Gods. The expressions of grief or mourning are not found in these rituals but transformed into finer expressions of conferring immortality on the animal along with the Gods. While binding animals to the sacrificial post, the priest had to recite hymns indicating that whatever was being done was at the will of God. Similarly, we do have glimpses of certain rituals and hymns associated with *Aśvamedhayajña* (the horse-sacrifice) in the *Śatapatha Brāhmaṇa*<sup>20</sup> (ŚB). The sacrificial horse is soothed by water wherever it is wounded or hurt. ŚB [3.8.2.9] has hymns that prays for the mind, speech, breath, eyes and ears of the horse to grow thus putting the vital airs into it and reviving it. There are also hymns to plants to protect the horse and also for the knife to not injure or harm the victim. In this context, the animal is ritually

conferred with life with a hymn as stated in ŚB [13.2.7.12] where the priests cheer the victim thus :

“O Horse, you shall neither die nor suffer harm. On easy paths you go to the Gods where dwell the pious, where they have gone, the God Savitā shall lead thee”.

Further the text ŚB [3.8.3.8] states that the heart of the victim is basted with clotted ghee as the heart is the soul and mind and the ghee represents the life breath. ŚB [11.8.4.1] mentions that a tiger killed a *Samrāg* cow (which supplies milk for *Pravargya* rites) of those sacrificing with king of Keśi. The priests suggested that there was no atonement for it and only Khaṇḍika Audbhari knew it. The later Vedic texts especially the *Dharmasūtras* and *Smṛtis* have elaborate expiations for killing of various animals and thus it is to be known that the earlier rituals were symbolic and involved no cruelty to animals resulting in grief or mourning. The *Pāraskaragrhyasūtra*<sup>21</sup> [III. 14.1-5] describes the *Rathārohaṇa* rite for mounting chariots, horses and elephants. In this context, the text states that one must not bring grief or harm to the draught animals in the rite. It also states :

नमो माणिचरायेति दक्षिणं धुर्यं प्राजति। “Honour to Māṇicarā, he drives on the right animal”.

The commentator *Jayarāma* states that the animal is to be driven on silently. The text also states that when one has finished his way (of riding) and unyoked the horses, let him have (barley) grass and water given to the draught animals. For in doing so, satisfaction is given to it according to the *Śruti* thus clearly indicating as to how grief must not be caused to draught animals even if they were used in such chariot races for ritual purposes or for entertainment.

यात्वाऽध्वानं विमुच्य रथं यवसोदके दापयेदेष उ ह वाहनस्यापन्हव इति श्रुतेः॥

The *Vaitānasūtra*<sup>22</sup> [II.5.18] of *Atharvaveda* states that there were rites wherein fire was transported by a chariot drawn by a horse (रथेनाग्नौ प्रणीयमाने). In case of rites of *Agnicayana* also there is mention of *Ukhya*, *Gārhapatya* and *Dakṣiṇa* fires being transported in a cart drawn by oxen. Though the texts are not explicit in mentioning any care to be taken, it is to be considered in this context that there is no



grief brought to the animal while transporting such fires. Thus in the later Vedic texts one finds that precautionary measures described so as to not cause grief to animals.

### Animal Grief and Mourning in Epics and Purānas

The love for animals and birds expressed by humans is portrayed to reach almost a divine level in the epics and *Purānas*. These texts have some instances where the grief and mourning is expressed in various contexts. These may arise due to separation, loss of life, or due to mutual bondings between humans and animals. These are expressed both by humans as well as the animals in the text. Vālmiki's *Rāmāyana*<sup>23</sup> begins with the episode of a hunter killing one of the two *Krauñca* (Sarus crane) birds that were in sexual union. Being overcome by grief due to the death of the male, the female also gave up its life. The text [Bāla Kāṇḍa, 2.11-12] describes the grief of the bird as-

तं शोणितपरीताङ्गं चेष्टमानं महीतले। भार्या तु निहतं इष्ट्वा रुराव  
करुणाम् गिरम् ॥

वियुक्ता पतिना तेन द्विजेन सहचारिणा। ताम्रशीर्षेण मत्तेन पत्रिणा  
सहितेन वै ॥

“She who has been ever together with her husband, a lusty male bird is now separated from him. On seeing her slain husband whose body is blood soaked and reeling on the ground in pain, she bewailed with piteous utterances”.

Seeing this incident Sage Vālmiki cursed the hunter in words that are said to have echoed in his mind again and again reflecting on them thus giving rise to the poetic verses that form the text. The text [*Aranya Kāṇḍa*] also depicts such a scene of divine love between humans and birds in the death of *Jaṭāyu*, the vulture which attacked Rāvaṇa when he kidnapped Sītā. Lord Rāma on seeing Jaṭāyu learnt all that had happened and wept considering him like his own father. He then went into the forest, hunted a robust bodied *Rohi* (an unidentified animal), spread sacred grass on the ground to place that offering, lumping the flesh into goblets and placed it as obsequial offerings in respect of the great bird. He then asked Lakṣmaṇa to

bring certain banana leaves and firewood and thus cremated the great bird with due honour in the forest. The text further goes on to describe that Rāma chanted Vedic hymns for the funeral ceremonies in the same way as for the Pitṛ-s (Manes). Thereafter both the brothers went to river *Godāvārī* and offered oblations with waters for Jaṭāyu followed by a funeral bath [*Aranya Kāṇḍa*, 68.27-36].

Likewise, in the *Kiṣkindhā Kāṇḍa* [LX. I], the text speaks of how Sampāti offered ablutions to his dead brother recollecting the memories of the sky-high competition between them to fly to the sun.

ततः कृतोदकं स्नातं तं गृध्रं हरियूथपाः।  
उपविष्टा गिरौ रम्ये परिवार्य समन्ततः ॥

“Then the monkey commanders sat on that beautiful mountain surrounding the eagle from all over, after that eagle has offered water-oblations for his deceased Jaṭāyu and bathed for purification”.

Sage Vyāsa’s *Mahābhārata*<sup>24</sup> speaks about the duel of a pigeon and a hawk (*śyena*) that were ready to sacrifice their lives for King Śibi as narrated by Sage Mārkaṇḍeya to Yudhiṣṭhira in the *Vana Parvan*. The text *Śānti Parvan* [*Āpaddharma Parvādhyāya*, Chap. 142-144] also speaks of the episode of two pigeons - a male and female who lived on the branches of the tree. The female had gone out for food but did not return. She had been caught in a storm and while returning had been put into a cage by a fowler. The male pigeon lamented as he missed his wife -

नास्ति भार्यासमं किञ्चिन्नरस्यार्तस्य भेषजम्॥ नास्ति भार्यासमं बन्धुर्नास्ति  
भार्यासमा गतिः।

नास्ति भार्यासमो लोके सहायो धर्मसाधनः ॥

“One’s home is not a home; it is a wife that makes a home. There is no equal medicine for a man than his wife, nor a relative equal of her. There is no friend like a wife”.

The pigeon in the cage called out her husband, and asked him not to worry about her or his own desire, but to treat the fowler as a guest to the best of his abilities and not to grieve for her. The pigeon husband, so moved by his wife’s request, flew down and welcomed

the fowler. The pigeon asked him how he could make the fowler comfortable. The pigeon collected some dry leaves and set them ablaze to drive away the cold at the fowler's request. Thereafter the male pigeon walked around the fire three times and asked the fowler to eat him, and thus entered the fire to provide a meal for the fowler. The pigeon's compassion shook the fowler, who began reflecting on his own life. The fowler resolved to be compassionate to all creatures. He silently released the female pigeon from the cage. The grief of the female pigeon is recorded by the text as follows :

कन्दरेषु च शैलानां नदीनां निझरिषु च। द्रुमाग्रेषु च रम्येषु रमिताहं त्वया प्रिये॥  
आकाशगमने चैव सुखिताहं त्वया सुखम्। विहृतास्मि त्वया कान्त तन्मे  
नाद्यस्ति किञ्चन॥

"Alas! How did we spend our days together in the caves, hills, rivers, waterfalls, branches of trees and also together while flying in the sky enjoying each other".

न कार्यमिह मे नाथ जीवितेन त्वया विना। पतिहीनापि का नारी सती  
जीवितुमुत्सहेत् ॥

एवं विलप्य बहुधा करुणं सा सुदुःखिता। पतिव्रता संप्रदीप्तं प्रविवेश  
हुताशनम्॥

"Without you there is nothing for me to live. How can a wife sustain without a husband. Thus grieving much with pity and sorrow that chaste female pigeon entered into the Fire lit by the fowler (thus sacrificing her life also)".

Likewise, at the end of the great Kurukṣetra war several animals like horses and elephants who gave up their lives were honoured. In fact during the slaying of Aśvatthāmā, the elephant used to cunningly outwit Droṇa and Bhīma praises the great elephant on its death that it had forsaken its life for such a great cause. The epic indicates in several contexts that the weeping of horses or other animals either as an evil omen or sign of grief portends calamity for the master. The text [*Virāṭaparvan, Gograhaṇa Parvādhyāya, 6*] states :

हयाश्चाश्रूणि मुञ्चन्ति ध्वजाः कम्पन्त्यकम्पिताः॥

Likewise in the text [*Bhīṣmaparvan, Jambūkhaṇḍavinirmāṇa Parvādhyāya, 33*] states-

अनभ्रे च महाघोरं स्तनितं श्रूयतेऽनिशम्। वाहनानां च रुदतां  
प्रपतन्त्यश्रुबिन्दवः॥

A case where several horses and elephants appear dull and weeping is also mentioned in the text [*Bhīṣmaparvan, Jambūkhaṇḍavinirmāṇa Parvādhyāya, 42*] as :

ध्यायन्तः प्रकिरन्तश्च वालान्वेपथुसंयुताः। रुदन्ति दीनास्तुरगा मातङ्गाश्च सहस्रशः॥

The *Gṛdhra Gomāyu Saṁvāda* [conversation between vulture and a jackal] described in *Śānti Parvan [Āpaddharma Parvādhyāya]* in context of lamentations of the brāhmaṇa and his kinsmen over the death of his boy in the crematorium near a forest has reflections of both the wisdom of the vulture asking them to abandon the corpse as everyone who is born was sure to die. A smart jackal came out of his hole and called them back stating that they had no affection for the child. In this context the text mentions clearly that -

न पश्यथ सुतस्नेहं यादृशः पशुपक्षिणाम्। न येषा धारयित्वा तान्कश्चिदस्ति  
फलागमः॥  
चतुष्पात्यक्षिकीटानां प्राणिनां स्नेहसङ्गिनाम्। परलोकगतिस्थानां मुनियज्ञक्रिया  
इव॥

“Surely, you have no affection for that young child (who used to gladden you greatly). Behold the affection that even birds and beasts bear towards their offspring. They bear no return for bringing up their young ones. Like the sacrifices of the sages (that are never undertaken from desire of fruit or rewards) the affection of quadrupeds, of birds and insects bears no reward in heaven”.

This shows how ancient Indian sages were aware of such mourning and grief of fauna that were bonded affectionately during their life. The *Brahmapurāṇa*<sup>25</sup> [*Gautamī Māhātmya, Chap. X*] also mentions the story of a pigeon couple who sacrificed their lives for satisfying hunger of a hunter as stated in the *Mahābhārata* and the sacred place came to be known as *Kapotatīrtha*. The *Bhāgavatapurāṇa*<sup>26</sup> [*Skandha VIII, 2.31-32*] also mentions how the elephant (*Gajendra*) grieved on being pulled

by a crocodile and sensing that it would not be helped by anyone else and resorted to Lord *Viṣṇu*. In *Skandha X*, the same text shows the mental anguish that tormented Lord Kṛṣṇa on seeing the several cows dying after drinking the waters of river Yamunā that had been poisoned by the snake Kālīya. Further, the text mentions that though the Lord did not kill Kālīya, extinguished the puffed pride of the snake by dancing on its hoods and sparing its life at the request of his wives.

The *Varāhapurāṇa*<sup>27</sup> [137.72-73] mentions how a she jackal hit by the arrow of prince Somadatta tormented by heat went to a Sakhotaka tree and gave up her life without any desire in Somatīrtha.

The *Padmapurāṇa*<sup>28</sup> [*Pātālakāṇḍa*, Chap. 57] contains a conversation between Ādiśeṣa, the divine serpent and Sage Vātsyāyana in which the story of earlier birth of a washer man in *Uttarakāṇḍa* portion of *Rāmāyaṇa* is repeated, highlighting the knowledge gained by two parrots at sage Vālmīki's hermitage. Devi Sītā had captured the pregnant female parrot in a cage which did not being able to bear the grief of separation from the male bird. In this context, the male bird lamented for her and then carrying the dead female parrot pronounced the curse that was to befall Devi Sītā.

### **Animal Grief and Mourning in Other Post-vedic Texts**

Buddhist texts also speak of cremation of animals and birds. In Buddha's early life, a pigeon was hurt and he treated its wounds with great care. The *Caddanta Jātaka*<sup>29</sup> mentions about the Bodhisattva reborn as an elephant living with his two queens Cullasubhaddā and Mahāsubhaddā along with 8000 other elephants in the *Himālaya* mountains. When a hunter cut the tusks of the chief elephant, it died. In this context the text mentions an instance of elephant mourning when all the 8000 elephants approached the 500 *Pacceka Buddhas* (Enlightened ones but do not preach for spiritual evolution) passing through the air who then alighted in the sacred enclosure. At that moment two young elephants lifted up the body of the king elephant with their tusks causing it to do homage to the *Pacceka Buddhas* who raised it aloft on a pyre and burnt it amidst chanting of scriptures. The 8000 elephants after extinguishing the flames, first bathed and

returned to their abode. Jain texts also speak of king Ajātaśatru Kuṇika who usurped the throne. His brothers Halla and Vihalla resorted to guerilla war tactics and rode an elephant named Sechanaka. On seeing a large pit or moat, they goaded him to move further. But the elephant sensed the danger and fell into the pit of burning charcoal and died, thus sacrificing its own life. The brothers wept for the elephant. Similarly, the *Jñātasūtra* [Chap. I] another Jain text speaks of the former birth of Meghākumāra when he was born as an elephant king named Sumeruprabha. Tormented by the heat and quicksand near the river, unable to quench his thirst, the king elephant was gorged to death by the piercing of tusks of an enemy elephant. It further describes how wild animals like lions, tigers, deer, rabbits and other beasts forgot their hostility in an urge to escape forest fire<sup>30</sup>.

Several texts of the Saṅgama period of Tamil literature also portray grief and mourning of animals and birds. The Tamil Anthology *Ahanānūrū*<sup>31</sup> AN [31] has poet Māmūlanār drawing attention to an eagle which plucks eyes of dead men and puts them into beaks of its young. An elephant calf that shouts in fear when its mother falls into a trench, flees to a hamlet and is suckled by a buffalo [AN, 165]. The anthology *Puranānūrū*<sup>32</sup> [PN] has an unknown poet mentioning an old cow that feeds a calf whose mother was killed by a tiger [PN 323]. Poet Katunthot Karaveerānar in *Kuruntokai*<sup>33</sup> [69], mentions a monkey who bereaved of its loving mate hands over its young to its kith and kin and commits suicide by falling down a cleft thus indicating the extent of emotions among primates. Another poet Cheṭṭinātanār in *Kuruntokai* [119] gives a picture of the young ones of a small white snake biting and grieving a massive wild elephant. Poet Orampokiyar in the anthology *Aiṅkurunūru*<sup>34</sup> mentions about an unloving crocodile that devours its own young [41]. It also speaks about several baby tortoises that have hatched, climbing and sleeping on back of their mother resembling a bushel. Poet Nalvelliyar in the anthology *Narrinnai*<sup>35</sup> [47] speaks of a female elephant that lies prone in the deepest anguish locked in embrace with its calf seeing the slaughter of her mate killed by a tiger. The grief of the female elephant at the loss of her mate is expressed by the poet. Poet Kapilar in *Narrinnai* [222]

mentions about a male tusker that wanders on trumpeting in grief searching for a female elephant who is slumbering in the wooded slopes. The text of *Malaipaḍukadam*<sup>36</sup> [16] mentions about cries of grief let out by a black Fingered monkey set up with its leaf eating kin when it lost its child failing to hold it safe and letting it fall in a deep cavern.

In the *Kāvya* literature, one finds descriptions of animals grieving due to separation or death of humans, or their own mate and offspring.

Kālidāsa in his *Abhijñānaśakuntalam*<sup>37</sup> [IV.9] describes how peacocks give up dancing, doe mourns and does not touch grass with the little fawn clinging to Śakuntalā's dress at the time of her farewell. Kālidāsa's *Raghuvamśam*<sup>38</sup> [VIII. 39] mentions an instance when birds mourn the death of queen Indumatī as follows :

उभयोरपि पार्श्ववर्तिनां तुमुलेनार्तरवेण वेजिताः। विहगाः कमलाकरालयाः  
समदुःखा इव तत्र चुक्रुशुः॥

“Frightened at the confused cries of distress of the servants of them (both), the birds which had taken their abode in the (collection of) lotuses began to cry as if they were their fellow sufferers (in sympathy)”.

Kālidāsa's *Meghadūtam*<sup>39</sup> also has some verses referring to the grief of animals and birds. One such instance is where he describes a lover seeking relief from her favourite bird and tells the *Sārikā* about her grief. She mourns over the fate of the feathered prisoner and fondly questions of its separated mate.

पृच्छन्ती वा मधुरवचनां सारिकां पञ्जरस्थां काच्चिद्भर्तुः स्मरसि निभृते त्वं  
हि तस्य प्रियेति॥

The Yakṣa also compares his wife with a *Chakravākī* (Ruddy geese) bird separated from her faithful husband.

तां जानीयाः परिमितकथां जीवितं मे द्वितीयं दूरीभूते मयि सहचरे  
चक्रवाकीमिवैकाम्॥

गाढोत्कण्ठां गुरुषु दिवसेष्वेषु गच्छत्सु बाला जातां मन्ये शिशिरमथितां  
पद्मिनीवान्यरूपाम्॥

Bhāsa in his *Karṇabhāram*<sup>40</sup> [11] mentions that the horses and elephants also appear dull, weak, frightened with their eyes (being

closed due to grief) as if reflecting the fear that Karṇa had about his impending death :

हमे हि दैन्येन निमिलितेक्षणा मुहुः स्वलन्तो विवशास्तुरङ्गमाः गजाश्च  
सप्तच्छददानगन्धिनो निवेदयन्तीव रणे निवर्तनम्॥

An instance of a curlew (*kurarī*) crying plaintively at the loss of her young ones is mentioned by Aśvaghoṣa in his *Buddhacarita*<sup>41</sup> [VIII.51]

विषादपरिप्लवलोचना ततः प्रनष्टपोता कुररीव दुःखिता। विहाय धैर्यं  
विरुराव गोतमी तताम चैवाश्रुमुखी जगाद च॥

The sorrowful wail of young ladies has also been compared by poets like Kālidāsa and Bhavabhūti in their works to the mournful cries of curlews. The *Buddhacarita* [VI.53] also mentions that having heard the words of its master, the noblest of steeds namely Kaṁṭhaka licked his feet with its tongue and dropped hot tears (due to grief from separation) as stated :

इति तस्य वचः श्रुत्वा कंठकस्तुरगोत्तमः। जिह्वया लिलिहे पादौ वाष्पमुष्णं  
मुमोच ह॥

In Bāṇabhaṭṭa's *Kādambari*<sup>42</sup> parrot Vaiśampāyaṇa narrates his story of his father who had with great care nourished him. At the time of his birth, his mother left for next world. His father suppressing his grief devoted himself to the task of bringing him up. Due to old age his body was always quivering. Unable to wander abroad in his ripe old age, he used to bring grains of *śali* rice fallen on the ground from other nests using his blunt beak and also collect the tit-bits of fruits nibbled off by flocks of other parrots to feed his son Vaiśampāyaṇa. Thus, his father had to witness the killing of other parrots by a group of *śabaras* (hunters) and meet his death at their hands leaving orphaned Vaiśampāyaṇa.

Glimpses of animal grief are also found in the *Pañcatantra* of Viṣṇuśarman, *Hitopadeśa* of Nārāyaṇa and Buddhist *Jātakas*. The *Bhojarājīyanī*<sup>43</sup> of Ananta Amātya, a Telugu poet of 15th c. A.D is a work in Telugu describing on some untold stories of king *Bhoja*. In



one episode, the text narrates how a mother beetle discusses about a pilgrimage to Gaṅgā and persuades her young child beetle to not go to Gaṅgā and instead go to the Gautamī river. The young beetle embraced his brothers affectionately and taking leave of the frogs that lived by side of their hole, went to river Gautamī and gave up its life taking rebirth as a cow and as a prince. Panditarāja Jagannātha's *Bhāminivilāsa*<sup>44</sup> [1.32] mentions about female jackals howling and mourning near the den where a lion lay dead, where elephant pearls were scattered and where elephants whose eyes were tremulous owing to excessive fear, from whose temples bees were hovering, dare not stand steadily at the place even for a moment. The *Chandraprabhā Purāṇa* [IX. 77]<sup>45</sup> of Aggaladeva, a Kannada poet of Karnataka describes a female elephant with full heaviness and grief that was unable to go to the river bed keeping small steps and was watching the waters while the male elephant with its trunk filled the water and was spraying it on the female. The *Tuzuk-i-Jahangiri*<sup>46</sup> (Memoirs) of Mughal emperor Jahangir (1605-1627 A. D.) has a description of grief when two Sarus cranes (*Grus antigone*) had been caught by an eunuch in Deogaon about 50 miles from Ajmer in 1616 A. D. The emperor noticed their cries due to grief and came to know that their young ones had been taken. When he summoned the eunuch and was presented the young ones, the Memoir states that the two cranes threw themselves upon them and placed food in their mouths, made much lamentation, fondled them and took them to their nests.

#### **Animal Grief in Ancient Indian Veterinary Texts**

Ancient Indian veterinary texts portray glimpses of animals grieving over the loss of offspring or grief arising due to diseases. Interestingly, these texts have several methods to soothe the animal in grief and then treat their diseases. The relation that veterinary physicians had with their animal patients in removing their grief and treating the diseases has been recently discussed<sup>47</sup>. Maharshi Pālakāpya's treatise titled the *Hastyāyurveda*<sup>48</sup> is an elaborate text dealing extensively with elephant diseases and their remedies. It runs to about 20000 or more verses in the form of a discourse between king Romapāda and Sage Pālakāpya and divided into four sections

named *Mahārogasthāna*, *Kṣudrarogasthāna*, *Salyasthāna* and *Uttarasthāna*. In the chapter titled *Mūḍhagarbhāpanayanam* the text deals on a case of dead foetus and its removal as follows :

सर्पिषा कल्कमिश्रेण शाल्मल्या धन्वनस्य च। दक्षिणं करमभ्यर्च्य योनिद्वारं  
च सर्वशः।

विश्वासयित्वा सर्वस्वं यन्त्रयित्वा च हस्तिनीम्। प्रवेश्य हस्तं योनौ तु  
गर्भमार्गेण वा हरेत्॥

ऋजुमार्गेण नाऽगच्छेतं तु शस्त्रेण निहरेत्॥ छित्त्वा तथाऽऽनुपूर्व्येण  
तस्याङ्गानि पृथक् पृथक्।

अक्लीवो दारुणो भूत्वा त्वरमाणो जितेन्द्रियः॥ सूतिकारक्षणार्थं तु निःशेषं  
निहरित्तु तम्॥

“Using a decoction of clarified butter, *sāli* rice, *dhanvana* [*Grevia tilifolia*, *Vahl*] plant, one must worship the right portion of trunk and also genital openings, slowly instilling confidence in elephant and slowly injecting one’s hand into the womb of elephant one must pull out the dead foetus. If it cannot be removed through the normal way, one must use instruments, slowly allowing the excision of obstructing parts, cruelly or hurriedly one must stitch the parts to protect it and removing the others.”

Some glimpses of grief caused to elephants in various other cases have also been indicated in the *Hastyāyurveda* text. Grief may also arise when it is being brought from the jungles into human habitats due to separation from the herd or companions causing psychological disorders due to old memories tormenting it. The *Akṣirogādhyāya* [*Mahārogasthāna*, XVIII] gives great details about the causes and diagnosis of several eye diseases. The *Akṣirogādhyāya* also mentions that sleeplessness in the night causes eye diseases like *Nāyamprekṣi* in elephants leading to headache, blurring vision and pain in the eyes that leads to grief. The section on *Dantoddhāraṇa* [Chap. 34] describes extraction of tooth/tusks of elephants interestingly by means of needles and other *Yantras* wherein instances of grief due to toothache is mentioned. The text [*Rātrikṣiptādhyāya*, Chap. 47] states that insanity in

elephants is caused by sleeping at wrong places. Grief may also arise from sleeping disorders that are to be treated well by suitable medication.

In this context it is worthwhile noting that ancient sages had given tremendous thought into the grief and pain suffered by animals and thus elaborated means to minimize their grief. Elephants were actively involved in sports for amusement of royalty in ancient India. In this context, the *Mānasollāsa*<sup>49</sup> of Chalukya king Someśvara (1131 A.D) of Karnataka deals on some precautions to minimize risk of accidents during elephant sports (*Gajavāhyāvalīvinoda*) in the arena. The text [*Vimśati* IV, Chap. 3, 528-530] states that people with pot-bellies, pregnant women, children and physically challenged people were not permitted to watch sports. Similar precautions and measures are given in context of elephant races with mahouts and horse riders so as not to cause any untoward incidents leading to grief. The *Mātāṅgalīta* [1.19]<sup>50</sup> of Nīlakaṇṭha endorses the hospitality of this great sage who played with the elephants from his young age, roamed with them through rivers and mountains, learning about their behaviour, their joys and griefs and gestures. The *Aśvaidyakam*<sup>51</sup> of Jayadatta dated to 15th c. A.D. a text devoted to treatment of horses gives details of nursing of new born colts and the mother horse in chapter titled 'Sūtikopacāra' thus minimizing their grief and pains during pregnancy. Treatment of old age in animals and birds was also undertaken by these ancient veterinarians that has been treated in literature.<sup>52</sup>

#### **Animal Grief in Modern Indian Literature and Media**

Animal grief and mourning have also been reported in modern literature and media. Of these, some of the prominent cases have been mentioned in the current paper. The Tamil novel *Tekkaḍi Rāja* describes the mourning of an elephant. The case of the Kerala elephant *Guruvāyūr Keśavan* who served Lord *Kṛṣṇa's* temple for more than fifty years also portrays the mourning and grief of animals<sup>53</sup>. On the occasion of a festival in December 1976, the elephant became ill at the time of a procession. His body began to tremble and was moved to a nearby stable where it fasted for the night. Next evening when the conch blew to announce the appearance of deity in the temple, the elephant rushed there, bowed to the deity and amidst thousands of

devotees departed his body. The temple authorities built a good memorial for the elephant.

Recently also newspapers have reported of Elephants mourning the death of their close mahouts with whom they have been living for years. One such case is that of *Thechikottukavu Ramachandran*, an elephant in the courtyard of the *Thechi-kottukavu* goddess temple at *Peramangalam* in *Thrissur*, Kerala<sup>54</sup>. He was a celebrity and employed for various temple rituals and was also involved in the death of five people in the present human-elephant conflicts. On one such occasion, razor blades were found in his food and the mahout unknowingly fed it to the elephant. A police probe was ordered on August 8, 2015 and six days later, the mahout consumed poison and rushed to the elephant floor. Clutching *Ramachandran's* front leg, he started crying and pleading his innocence. As the elephant was in Musth, no one else dared approach it. The mahout died later in a hospital and since then the elephant has been in mourning over his loss. Temple authorities have found it difficult to find a suitable caretaker to replace the mahout's place as the elephant does not allow others to approach it.

Media also reported the wonderful act of a monkey saving the life of another monkey that was electrocuted and fell into a garbage drain in Kanpur railway station (Uttar Pradesh, India)<sup>55</sup>.

Such instances occur daily all over the world that even today as development progresses. In the modern context, the mental, physical and emotional trauma that all fauna undergo is very complex that mankind needs to document and address in all entirety so as to put an end to cruelty caused to animals. Sharing their world of grief should be one of mankind's prime duty so as to at least give comfort to these beings on this planet and living harmoniously with them.

### Conclusion

Ancient Indian literature is rich in the vivid descriptions of behavior of animals. Modern biologists researching in animal behaviour owe much to these observations. Some of these behavior patterns may be of an earthly nature while some others are spiritually inclined. However it is rare that one finds descriptions of mourning and grief of animals in early Vedic literature. The later Vedic texts do address the killing of animals and offer various expiations for the sin of killing

it. The Vedic texts also give some means to avoid causing grief to draught animals or those being used in different rituals. The epics and *Purāṇās* also give interesting details of funerary rites and grief noticed among various animals and birds. They highlight the mutual affection between humans and animals and how they exhibit grief at the loss of each other. Some methods of reducing the grief of animals during pregnancy related issues or during surgical procedures are discussed in ancient Indian veterinary texts. Such glimpses of mourning, death and grief among animals are also found in the Buddhist, Jain and *Kāvya* literature that needs further research from yet unexplored literary sources. These will help support cognitive based studies in fauna as support described in ancient literature and may even help in finding solutions to such problems that animals face in the modern world. Even modern day biologists and animal behavior experts have much to study about the old age symptoms and grief behavior of the vast species of animals, birds and insects that share our planet. The present paper stresses on pursuing research into the grief and mourning of animals that may serve the protection of such animals. In fact there are several orphanages for disabled, handicapped, wounded and orphaned elephants, horses, dolphins, birds and so on in various parts of the world. A venture into the study of grief of these animals as well as those employed for entertainment purposes as in zoos and circuses would be rewarding.

From the above discussions, it is clear that ancient sages had a harmonious view of living with fellow humans, animals, birds and trees. They even envisioned funerary rites for animals and birds. What is more surprising is that such rites were inculcate into the traditions of all princes and students so that they love wildlife and care for them. Such a philosophy is to be included in modern education so that people preserve Mother Nature's fauna with all due care.

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# SOME STUDIES ON THE FADING EFFECT OF LAMPS ON ARCHIVES

ANUBRATA MONDAL & KAMALIKA GHOSH

## Introduction

In order to visualize an object illumination on the same is essential. For indoor illumination purpose nowadays artificial Electrified lamps are in use. Most of the lamps liberates ultra violet ray.

The archival materials, textiles, paintings and other such artifacts of a museum usually composed of multiple colours. UV has been reported to having fading effect on colours too. The different types of light sources have different proportion of UV. Ultraviolet ray considering its wavelength are also broadly classified in three groups, UV-A, UV-B, UV-C<sup>1</sup>.

Table 1 : Range of UV Radiation

Class of UV	Range of UV
UV-A	400nm - 315nm
UV-B	315-nm - 280nm
UV-C	280nm - 100nm

The UV content of the lamps varies with its operational technology, rating etc,. The amount of UV rays liberates from different lamps also varies with the intensity of illumination, CCT (Correlated Colour Temperature) of the lamp.

Thus before application of light sources on archival materials, textiles, paintings and such materials proper analysis on fading effect of the same lamp is essential. Because of the ability to maintain their original appearance in spite of exposure to radiant energy, air, and moisture is a major determinant of the value of paints, textiles, and many other manufactured materials. Accordingly the term fading is widely used to refer only to changes of colour resulting from exposure. The paper describes an attempt to evaluate quantitatively the fading of a number of paintings in museum. Although methods for measuring

changes in colour have been in existence for a number of times, these have seldom been used to measure the extent or rate of fading. An effort has been made to analyze the fading effect of commercially available lamps which are / may be in use for illumination of the said artifacts in museum.

## 2. Experimental set up

- i. *Painting Materials* : There are lots of different types of archival paper materials (for painting) available in museum i.e. water colour, fabric color and oil painting. So, these types of papers have been chosen for this experiment.
- ii. *Colour of paper under test* : The fading of five paint<sup>2</sup> finishes have been studied here. Out of three from these are red, green and blue, chosen because these three are basic colours. In traditional colour theory (used in paint and pigments), basic colours are the three pigment colors that cannot be mixed or formed by any combination of other colours. All other colours<sup>3</sup> are derived from these three hues. Another two are gold and silver which are pearl metallic colours that are perfectly suited for fabric painting and other works of art.



Fig 1 : Archival paintings under test

### iii. *Testing device under use*<sup>4</sup>

- a. *Colour and reflective wavelength tester* :- A common application for the OPT101 sensor is testing archival paper materials. Information can be gained about a test material by determining the optical reflection, transmission or absorption properties at particular wavelengths. These test materials could be solid objects, biological or chemical liquids, or any other type of materials.

- b. RGB LED:-* It creates individual red, green, and blue wavelengths. Red material has a strong reflection of red wavelengths, and a weaker reflection of green and blue wavelengths. Green and blue materials follow a similar pattern reflecting the respective primary colour wavelengths stronger than other colour wavelengths.
- c. Power Supply:-* In general, an AC supply of 230V, 50Hz is in use, but this power has to be changed into the required form with required values or voltage range for providing power supply to different types of devices. There are various types of power electronic converters such as step-down converter, step-up converter, voltage stabilizer, AC to DC converter, DC to DC converter, DC to AC converter, and so on. For example, consider the micro controllers that are used frequently for developing many embedded systems based projects and kits used in real-time applications. These micro controllers require a 5V DC supply, so the AC 230V needs to be converted into 5V DC using the step-down converter in their power supply circuit.
- iv. Market - available artificial lamps which have been used for this experimental purpose<sup>5</sup>:-*
- a. Compact Fluorescent Lamp (CFL):-* A compact fluorescent lamp (CFL), also known as a compact fluorescent light or energy saving light, is a type of fluorescent lamp. Most CFLs are designed to replace incandescent lamps and fit into most existing light fixtures. CFLs radiate a different light spectrum compared to incandescent lamps. New phosphor compositions have improved the colour of the light emitted by CFLs in such a way that the best warm white CFLs are nearly similar in colour to standard incandescent lamps.
- b. Light Emitting Diode (LED):-* LED the solid state light, free from mercury, fully dimmable lamp for the future usage. It provides us 200 lumen/watt, which is a very high efficacy having approx. 50,000 hrs. life. It utilizes DC supply, so rectifier & filter assembly is needed for the operation. LEDs are generally





damaged due to high heat production so suitable heat sink / heat management is required. In nearer future it will lead the lighting industry in both Indoor and Outdoor areas. LEDs produce more light per watt than other lamps; this is useful in battery powered or energy-saving devices. LEDs can emit light of an intended colour without the use of color filters that traditional lighting methods require. This is more efficient and can lower initial costs. The package of the LED can be designed to focus its light. Incandescent and fluorescent sources often require an external reflector to collect light and direct it in a usable manner. LEDs are ideal for use in applications that are subject to frequent on-off cycling, unlike fluorescent lamps that burn out more quickly when cycled frequently, or HID lamps that requires a long time before restarting.

- c. *UV-Lamp* : - Short wave UV-lamps have their main emission at 254 nm and are mostly used for air, water and surface disinfection purposes. UVA-lamps mostly emit a spectrum between 350 nm and 400 nm. Their main use is reprography and insect traps. Due to special quartz glass, the 185nm wave length is blocked for both types of lamps. So there is no ozone generation. In this experiment same has also been employed to check the fading effect of this high UV intensity lamp.

### 3. Methodology Adopted<sup>6</sup>

3.1 *Test set up* :- In this experiment four (3ft\*3ft) chambers have been made for housing the archival painting materials, lamp set up etc. Each chamber has six walls, out of the six walls the archival painting is set up at three walls and the artificial lamp is set up opposite to archival painting of any three walls and rest of all walls for these four chambers have been made with a matte black foil so that the chamber wall absorbs as much light as possible. The distance between archival painting and the artificial light is 2 ft. here are four artificial electric lamps are used for four chambers in this experiment. The rating of the lamps with experimental set up are described below.

Table 2 : Rating of artificial lamps with experimental set up

Sl no.	Type of lamps	Wattage	Set up
1.	CFL (Cool White-4000K)	11 watt	
2.	CFL (Warm White-2700K)	11 watt	
3.	LED (Cool White-4200K)	5 watt	
4.	UV Lamp (6400K)	8 Watt	

### 3.2 Measurements with measuring device<sup>6</sup>:

- i. OPT101 sensor has been used as measuring device. The schematic diagram of the same is given below in Figure 2. In a box RGB LED an array of 1 watt each have been fixed to illuminate the test materials and allows the OPT101 to receive the resulting reflection, as shown in figure below:

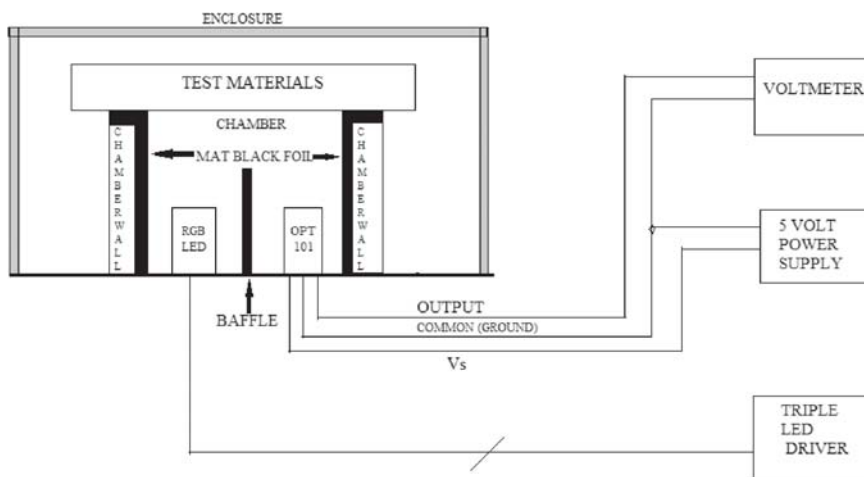


Fig 2 : Schematic diagram of the Test set up of OPT 101 sensor

- ii. Designed the chamber to keep out ambient light from the room. Line the chamber with a matte black foil so that the chamber wall absorbs as much light as possible. The matte black foil helps the OPT101 sensor measure reflections primarily from the test material and only minimally from the chamber walls.
- iii. A baffle structure of separator has been placed between the RDG LED and the OPT 101 sensor, so that light does not transmit directly from the RDG LED to the OPT 101 sensor without reflecting off of the test material. An additional enclosure over the chamber has been provided to enhance the isolation from any light in the room.
- iv. The power supply to OPT101 sensor pin has been fed through; Vs. with a 5 volt and measure the output pin voltage with a voltmeter. This voltmeter can easily be replaced with an ADC (Analog to Digital converter).
- v. LED with various voltages of 3.2 volt, 3.6 volt and 4 volt has been set to drive currents for each of the RGB LED's.
- vi. The fixture was calibrated by measuring archival painting materials (initial stage) as test materials. Powered the red LED's, and record the resulting voltage from the OPT101 sensor. Repeated this procedure with the green and blue LED's too.

- vii. The process was repeated on the same archival painting materials (gradually fading) with same procedure used. Normalize the results by dividing the test materials result for each LED. That means differentiate the voltage variations to measure for before and after fading effects.

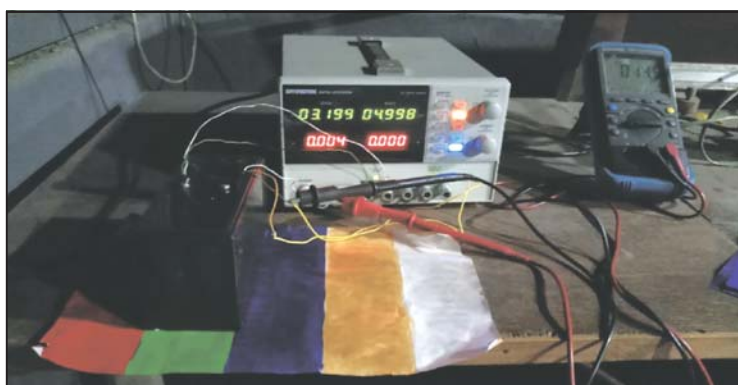


Fig. 3 : Experimental set up in laboratory

#### 4. Experimental Result<sup>7</sup>

This paper describes how a painting affected or faded by artificial lights. Fading of a painting material is time taking process. So, this experiment has been done throughout one year. At first taking the result before the fading process (exposure to artificial light) has been done. The measurements were taken at the interval of 4 months and compared the data with previous one. The variations of data throughout one year are discussed here.

Table 3 : Initial records of Archival Painting (Before fading by artificial lights)  
Recording Date:-3rd July 2017 (Initial condition)

Sl. No.	Input Voltage (Volt)	Output voltage from OPT101 sensor corresponding to				
		Red Color (Volt)	Green Color (Volt)	Blue Color (Volt)	Gold Color (Volt)	Silver Colour (Volt)
1	3.2	18.2	15.2	12.7	39.1	55.6
2	3.6	31.0	25.2	17.5	70.5	128.8
3	4.0	45.4	40.5	26.2	128.0	219.0

Table 4 : 1st phase records of Archival Painting (After fading by artificial lights)

Recording Date:- 3rd November 2017 (Duration of 4 months)

Lamp Type	Sl. No.	Input Voltage (Volt)	Output voltage from OPT101 sensor corresponding to				
			Red Color (Volt)	Green Color (Volt)	Blue Color (Volt)	Gold Color (Volt)	Silver Colour (Volt)
CFL (COOL)	1	3.2	17.6	14.5	11.9	35.1	42
	2	3.6	28.6	22.7	17.1	65	86.2
	3	4.0	43.2	33.1	24.6	112.6	177
CFL (WARM)	1	3.2	16.5	12.4	10.1	32.2	38.8
	2	3.6	27.1	20.8	15.9	63.2	81.1
	3	4.0	43.2	30.9	22.8	108.6	165
LED	1	3.2	17.9	14.7	12.2	37.2	50.6
	2	3.6	29.9	24.1	17.5	68.7	100.2
	3	4.0	44.8	36.5	25.1	118.8	201.1
UV lamp	1	3.2	15.5	12.4	10.8	32.8	38.7
	2	3.6	25.3	20.8	15.4	60.1	81.1
	3	4.0	40.1	30.1	21.6	103.7	157.2

Table 5 : 2nd phase records of Archival Painting (After fading by artificial lights)

Recording Date:- 3rd March 2018 (Duration of 8 months)

Lamp Type	Sl. No.	Input Voltage (Volt)	Output voltage from OPT101 sensor corresponding to				
			Red Color (Volt)	Green Color (Volt)	Blue Color (Volt)	Gold Color (Volt)	Silver Colour (Volt)
CFL (COOL)	1	3.2	15.2	12.3	11.0	33.1	38.1
	2	3.6	25.1	20.4	16.2	63.2	80.2
	3	4.0	42.2	30.3	23.8	109.5	166.3
CFL (WARM)	1	3.2	14.1	10.7	9.1	30.6	31.7
	2	3.6	24.9	17.2	14.7	57.6	70.2
	3	4.0	38.9	27.8	20.9	100.1	155.7
LED	1	3.2	16.1	12.8	11.2	36.1	47.2
	2	3.6	27.8	22.7	15.1	67.2	96.1
	3	4.0	43.1	33.6	24.7	112.4	190.5
UV lamp	1	3.2	11.2	9.2	8.4	25.1	29.1
	2	3.6	20.1	14.6	11.5	49.8	69.5
	3	4.0	32.7	23.1	16.2	85.1	139.2



Table 6 : 3rd phase records of Archival Painting (After fading by artificial lights)

Recording Date:- 2nd July 2018 (Duration of 12 months)

Lamp Type	Sl. No.	Input Voltage (Volt)	Output voltage from OPT101 sensor corresponding to				
			Red Color (Volt)	Green Color (Volt)	Blue Color (Volt)	Gold Color (Volt)	Silver Colour (Volt)
CFL (COOL)	1	3.2	13.2	11.1	10.2	31.6	35.1
	2	3.6	22.7	18.6	14.8	58.8	75.1
	3	4.0	39.5	28.7	23.2	100.4	158.5
CFL (WARM)	1	3.2	11.3	8.2	7.5	26.5	23.2
	2	3.6	18.6	14.6	12.5	49.8	58.1
	3	4.0	29.5	24.4	19.3	89.7	138.5
LED	1	3.2	14.2	11.2	10.2	32.5	43.1
	2	3.6	25.5	19.8	14.3	63.1	62.1
	3	4.0	41.5	29.8	24.1	108.9	179.8
UV Lamp	1	3.2	8.1	6.2	6.3	18.2	19.2
	2	3.6	13.7	9.7	8.4	38.2	58.5
	3	4.0	22.3	15.2	13.8	71.5	112.9

Summary of results: - From earlier studies<sup>8</sup> it has been observed that within 2ft. distance the intensity of UV content is highest for UV lamp and gradually decreases in CFL (warm), CFL (cool) and LED respectively. From the above table it has been observed that the output voltage of OPT101 sensor is varied according fading of color using four types of artificial lamps. Now a table is furnished below with a 2 ft. distance of separation of how much percentage of color reduced! Fading occurs using these four types of lamps.

Test result for 2ft. distance:-

Sl no.	Lamp type	UV-A <sup>8</sup> (micro watt/cm <sup>2</sup> )	UV-B <sup>8</sup> (micro watt/cm <sup>2</sup> )	UV-C <sup>8</sup> (micro watt/cm <sup>2</sup> )	Percentage reduction of according color for 1 year (For 4volt)
1	CFL COOL	12.1	0.3	0.6	Red 12.99%
					Green 29.13%
					Blue 11.45%
					Gold 21.56%
					Silver 27.62%
2	CFL WARM	15.2	0.7	0.4	Red 35.02%
					Green 39.75%
					Blue 26.33%
					Gold 29.92%
					Silver 36.75%
3	LED	0.6	0	1	Red 8.59%
					Green 17.03%
					Blue 8.01%
					Gold 14.92%
					Silver 17.89%
4	UV	250	106	50	Red 50.88%
					Green 62.46%
					Blue 47.32%
					Gold 44.14%
					Silver 48.44%

The graphical representation of the above data has been furnished in Fig. 4 below:

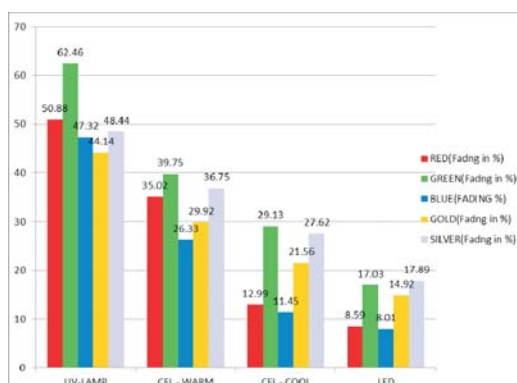


Fig 4: Fading effects of various lamps upon tested colors

From the above study it has been observed that the set of fundamental colors, green fades highest and in metallic color silver is so. Figure 5 furnishes the effect of light from various lamps upon them.

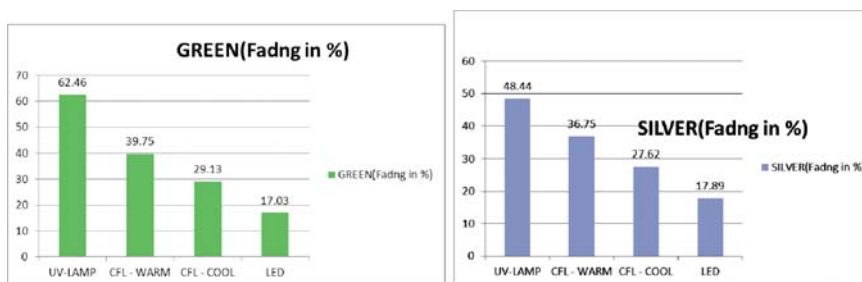


Fig 5 : Fading effect of test lamps on green color & silver color

### 5. Observations & Analysis<sup>9</sup>

From above table, following observations can be made:

- i. The percentage of color reduction is highest for using of UV lamp; because earlier studies<sup>8</sup> it has been observed that the percentage of UV content is highest for UV lamp.
- ii. Out of three basic colors, green is most faded by all these four types of lamps.
- iii. According graphical representation it has been observed that percentage of reduction of fading is highest for UV lamp and lowest in case of LED compare to other lamps.

### 6. Future Scope<sup>10</sup>

Since illumination level can't be reduced in museum on visibility ground of visitors. So, special experiment/research needs to be carried out for absorption of UV content from these artificial lights, to project and protect our heritage in the Global Village.

### 7. Acknowledgement

The authors are thankful to Mr. Vigneshwaran M. of Indian Institute of Chemical Biology for making the OPT101 sensor available for the work.

### Notes

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GLEANINGS FROM THE PAST

JOURNAL  
OF THE  
ASIATIC SOCIETY OF BENGAL.

VOLS. LXVIII, LXIX, and LXX.

PART III. (ANTHROPOLOGY, &c.)

(No. I—1899, 1900; and Nos. I and II—1901) : with Index.

EDITED BY THE  
ANTHROPOLOGICAL SECRETARY.

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"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society of Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.  
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CALCUTTA:  
PRINTED AT THE BAPTIST MISSION PRESS,  
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ASIATIC SOCIETY, 57, PARK STREET.  
1903.

1901.] P. O. Bodding—*Stone implements in the Santāl Parganas.* 17

*Ancient stone implements in the Santāl Parganas.*—By REV. P. O. BODDING,  
[*Mohulpahari, Santāl Parganas*].

[Received 14th March, 1900: Read 7th November, 1900.]

[With four Plates.]

Ancient stone implements seem to be more common in India than was thought some years ago. They had not, so far as I remember, been noticed before 1865. Since that time they have been found in many places, and at one place, *viz.*, in Mirzapur, the remains of what was apparently a regular factory for them have been found (*vide* Mr. Cockburn's paper in the *Journal A.S.B.*, Vol. LXIII, Part III, No. 1, 1894).

By a mere chance I got to know some four years ago, that stone implements are found in the Santāl Parganas. Before that time I had heard the Santāls say that the destruction wrought by lightning was caused by means of stones hurled down, and that such stones had various forms, especially axe-shaped; but I did not give the matter any attention at the time. Afterwards I happened to stumble over it in this way. I had a stiff neck, and had called a Santāl to shampoo me; while he was doing this, I had a book by Captain Forbes on the languages, etc., of Burma, and in it found a short chapter on shoulder-headed celts with a picture of one. I showed the picture to the Santāl, simply asking him, "What is this?" He took a long look at it and at length said "It is a *ceter dhiri*" (i.e., *lit.* "a stroke-of-lightning stone," "a thunderbolt.") His answer roused my attention, and on reading about the belief common in Burma and elsewhere, that ancient stone implements are believed to be thunderbolts, it dawned upon me that there might after all be something in what the Santāls said about thunderbolts. On my further questioning him whether he had himself seen any thunderbolts, he told me he had, and that they were found here and there in the villages. I asked, "Did he think it was possible to get any?" "Yes, perhaps," he replied, "but the Santāls believe them to be a great medicine against this and that, so they will not readily part with them."

After this I commenced to make investigations, and have been able to get a good many "thunderbolts." Not being an expert, I cannot speak much about the archæological side of the matter, and shall here mostly confine myself to saying a few words about the part which these stone implements play amongst the Santāls of our day.

J. III. 3



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As already remarked, the Santāls call them *ceter dhiri* or “thunderbolts.” When a Santāl sees a tree split, animals or people wounded, holes dug in the earth, etc., all done by lightning, he draws the conclusion, that to effect this the lightning must have a special implement; how could it otherwise be accounted for? When I have made the objection that such a stone, if hurled down by a stroke of lightning, must be crushed to atoms, they have answered, that such might very well happen and has probably indeed often happened, as few “thunderbolts” are found, and by having a look at some of them, it could be seen that they had been rather damaged (those namely of which pieces had been chipped off at the time of manufacture); besides which they are blazing hot when coming down. I have then explained to them that these implements belonged to ancient peoples who did not know and use iron or other metals, and had to use such stones for their work, and that there are still people among whom such implements are used. “Well,” they replied “the Sāhibs are very wise, and the thing may not seem altogether impossible; but we have had so many proofs of their excellent qualities that, all things considered, it is safer to keep to the old belief.”

When the lightning strikes anything, the “thunderbolt” is believed to go down into the earth. If anybody wishes to get the bolt, he must, as quickly as possible, fetch some *kañji* and pour it over the place where the lightning has struck. *Kañji* is sour stale rice water, an abominably smelling stuff, which is sometimes kept for years and is used for various purposes. It is used as food for pigs and to fatten buffaloes; it is employed as a vehicle for different kinds of native medicines for both external and internal use, and it is believed to quench fire caused by lightning, which according to Santāl belief water is incapable of doing. It is probably this last supposed virtue which has caused it to be used for the purpose mentioned. As soon as *kañji* is poured on the place, the further penetration of the bolt into the earth is believed to be stopped, according to some “authorities,” because the *kañji* quenches the fire of the bolt.

There are probably very few who have undertaken this experiment. I have one stone implement, which, according to what the owner told me, had been found in this way by his father about thirty yards from a tree which the lightning had struck. The man may, of course, have happened to find the stone in the way described; but as he was an *ojha* (i.e., a native medicine man), it is more likely he had found the “bolt” somewhere and had performed the digging, etc., in order to make people sure of the supernatural qualities of the stone.

Strokes of lightning are of such common occurrence in this district, that any stone implement found may easily be connected with

1901.] P. O. Bodding—*Stone implements in the Santāl Parganas.* 19

such an accident, the more so as they have often been found near places where lightning is known to have fallen.

As mentioned, the Santāls attribute great virtues to these stone implements, and therefore price them highly; I have heard of one which the owner would not part with for less than fifteen rupees, which is as much as it would take him four or five months to earn. They believe that a house where such a "thunderbolt" is kept is proof against lightning. The idea underlying this belief is not quite clear to the Santāls; some say it is so because the lightning (*i.e.*, the deity)\* considers its work done where such a bolt is found; others think, that such a bolt has in itself a power sufficiently strong to avert any new stroke of lightning.† This last would be in harmony with the idea underlying the medicinal properties ascribed to the "thunderbolts." It is on account of these properties that they are most prized, and their supposed medicinal value is astonishing.

The "thunderbolt" is specially brought into use, when a woman is in labour. As a rule childbirth is easy with these children of the forest; I have thus not unfrequently seen women walking about some two hours after having brought a child into the world; but sometimes the labour may be hard and prolonged. In such cases, when the woman, who does the work of the midwife, does not see her endeavours have immediate success, she will frequently call upon the husband to fetch an *qjha* with a "thunderbolt," or the "thunderbolt" itself. It may be made use of in three ways, which, however, may be combined.

\* Although the Santāls have got the idea from the Hindus that lightning, especially the thunderbolt, is the effect of Rāma shooting with his bow, this must be said to be only a poetical fancy with them; God is considered the giver of rain and the originator of all natural phenomena.

† Other means used by the Santāls to insure protection against lightning are to wear toe-, ankle-, and finger-rings, bracelets and other ornaments of metal, mostly iron, which have been made or generally only commenced (for it is sufficient if the material has been hammered a little) under incantations during an eclipse of the moon; these are believed to protect the wearer. During a thunderstorm many are in the habit of putting an arrow with an iron head up into the roof, or of throwing an axe out through the door, at the same time holding the breath (this is most essential). If a thunderstorm is accompanied by hail, they strew cottonseed in the court-yard in addition to throwing the axe out. If any body happens to be out of doors during hail- and thunder-storms, he is believed to be secure, if he keeps an arrow aslant pointed upwards against the clouds from which the thunderbolt or hail may be expected.

The Santāls have, of course, no idea what lightning really is, and believe all the measures mentioned to be most effective safeguards; but, although frightened by lightning or rather by thunder, they do not as a rule think much of using their "protectors."



20 P. O. Bodding—*Stone implements in the Santāl Parganas.* [No. 1,

One is to rub the thunderbolt against a stone, generally that on which they grind their spices, having first poured water on this. The water, which will contain some small part of the "bolt," is then given to the woman to drink. Another way is to keep the "bolt" above the head of the woman and pour water over it in such a manner that it flows down on her forehead and face. The third way is to put the stone into the eaves just outside the door; and care must be taken that the person performing this operation holds his breath.\* They have a strong belief that this performance will secure immediate delivery.

Water in which a "thunderbolt" has been rubbed or placed—it seems to be sufficient if it has only been in contact with this kind of stone,—is used also in other cases, both externally and internally, *e.g.*, in cramps, against boils and carbuncles and against a certain pain in the back which the Santāls believe is caused by witches. The idea underlying these cases is clear enough: the irresistible power of lightning to split objects and drive away all resistance is supposed to have been imparted to and to be latent in the thunderbolt. As a curious analogy it may be mentioned that shot or balls, fired from a gun and afterwards found, are believed to possess the same virtues and are employed in the same manner.

A more practical use, to which these stone implements are put now-a-days, is to sharpen the country-made razors on them. Many of the stones I have got bear very visible marks of having been used both for medicine and as hones.

Stone implements are, of course, not used by the Santāls of the present day, and have not been used within the recollection of their traditions. It may, however, be mentioned that they and other jungle tribes, when wishing to procure a stick or when stealing trees from the forest—a thing which they think is their absolute right,—occasionally beat some hard kind of stone, *e.g.*, quartz, into the form of a wedge and with it manage to fell small trees. The sound of a blow with such an implement on a tree is naturally not heard so far as the blow of an axe, and, if anybody should come across them in the act, there is no axe to testify against them. That, however, regular stone implements have been unknown to them for ages, is sufficiently shown by the name they have given and the origin they have ascribed to the stone implements that they have found.

\* This last precaution is absolutely necessary for the desired effect of the application of this kind of "medicine." When a thunderbolt is not procurable, twigs of certain trees may be used for the same purpose and in the same manner. I suppose this holding of the breath is meant to secure the efficacy of the remedy by keeping it free from any defilement from extraneous influences.

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The number of stone implements that I have been able to get amounts to a little more than fifty; if a regular investigation were made, probably a much greater number might be procured. I have bought them from people living round here, and they have mostly been found in this vicinity, partly by occasional digging or ploughing, and partly on the surface, one in a river bed, another somewhere in the forest, others in cleft rocks, etc.; some have been found within the last two years, others some time ago by people still living or known. A few of them are "heir looms" which have been brought away from their earlier home (in Mānbhūm, Singbhūm and Hazāribāgh), and about the finding places of which nothing is known.

The localities where the stone implements have been found, so far as I have been able to ascertain, have no peculiarity which could suggest anything like ancient burial grounds or the like. This will not, however, say much, as the tropical rains, especially in a hilly country, soon efface all marks of mounds. I have seen one mound which in form curiously resembles the tunnels I have seen in Norway; but yet it is only a common mound. Some of the stone implements are, however, of such a form or material, that they may possibly have been votive-stones, and this would presuppose burial places. I have not had the opportunity of making any further investigations in this respect. I ought in this connexion to mention that I have not been able to find anything like memorial stones or cromlechs. Some days ago I went to look at a place called Rāmgar where the Santāls say remnants are to be found of a fortress built by Rām and Lakṣman (*i.e.*, the heroes of the Rāmāyaṇa). What they consider remnants of a wall I found to be a common geological formation, with which man had nothing to do.

The implements are made of different kinds of stone, such as flint, porphyry, basalt and other hard kinds, mostly abundant in this district; many of them have been so impregnated with smoke and oil combined, that, in spite of all rubbing and washing, it is impossible without breaking them to make out the material that they are composed of.

In size they vary very much; some of them are so small, that it is difficult to understand how they could have been put to any practical use, and they appear on account of their sharp edges never to have been used; these I take to have been votive-stones. Others are of the size of a hatchet, two or three are rather big, specially one (No. 2) which weighs about 2·5 kilogr., and measures 26·5 centimetres in length. This last one was found some ten years ago and, on account of its form and some black rings in the stone, had been worshipped as Mahādeb. Some of them have a beautiful form and polish (so has this

22 P. O. Bodding—*Stone implements in the Santāl Parganas.* [No. 1, big one), others have only the edge polished. I have not been able to find any perforated stone.

Most of them must have been weapons or tools of some kind or other, axes, hammers, arrowheads, etc. The one mentioned above as found by an *ojha* may have been a dagger (No. 10); it is reported to have been double the length of what it is now; constant use for medicinal purposes has diminished it. A few seem to have been agricultural implements; these have their edge, not in the middle, but oblique like that of a chisel (as are the shoulder-headed celts, compare Mr. Peal's paper, on Eastern Nagas, *Journal A.S.B.*, Vol. LXV, Part III, No. 1, 1896, with Plate No. II). This is the case in Nos. 22, 41 and 42 in the plates. A few have their thin sides made flat, one with a small notch (No. 53) on both sides, hence something similar to the shoulder-headed celts. Of these I have not been able to procure any, so they may possibly not be found in this district; it was, however, remarkable that the Santāl, as mentioned above, recognized a picture of such a stone as a *cefer dhiri*.

If the people were questioned about "thunderbolts," I suppose such stones would be procurable from many places in India.

The plates, of which there are four, are made from photographs, and the objects are about half their natural size (exact proportion, 12 to 26.5).

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THE STONE IMPLEMENTS COLLECTED BY REV. P. O.  
BODDING AND DEPOSITED AT THE ETHNOLOGY  
MUSEUM IN OSLO BETWEEN 1901 AND 1934.

RANJANA RAY

**Introduction**

Reverend Paul Olaf Bodding came to India in 1889 as a Norwegian missionary. He was 24 years old at that time. He had already proved his scholastic ability as a brilliant scholar in the University of Oslo and was a well-known scientist of his time. In India his headquarter was the town of Dumka in the district of Santal Parganas of the then state of Bihar. Most of Santal Pargana is now in the newly formed Jharkhand state. Rev. Bodding lived in India for 44 years. He is famous as a linguist, ethnographer and a folklorist. Bodding created the first alphabet for the Santali language and wrote the first grammar for the Santali-speaking people of eastern India. Most of Bodding's discourses were presented at the Asiatic Society and published by the Asiatic Society.

From the beginning of his stay in India, Bodding with help of his Indian associates started to collect and analyze material objects of everyday life and those of ritual significance for the Santals. He also compiled the Santali oral heritage in the form of texts. The Ethnographic Museum at University of Oslo was given custodianship of a huge collection of prehistoric and ethnographic objects and manuscripts donated by him between 1901 and 1935. Bodding's collection of Santal material is the most comprehensive of its kind anywhere in the world. In the later years of his life, from the year 1922 to 1934 in India, and during his retirement in Norway and Denmark until his death in 1938, he became a full time literary scholar. Bodding completed and published a number of monumental linguistic and ethnographic works. These are still considered as standard references both in India and abroad. They still continue to inspire new research



and act as a guide to education in Santali and for creative writing. His writings also give proper recognition to the Santal people in much of the Santal-inhabited territories in Central and Eastern India, North-Western Bangladesh and Jhapa and Morang Districts on the Indo-Nepal border.

Asiatic Society published his famous work *Studies in Santal Medicine and Connected Folklore* in 1925-40, *Memoirs of The Asiatic Society*, Vol. X. Subsequently it was reprinted several times in the year 1986, 2001, 2011 and in 2016. As of now only a few copies are left and Asiatic Society may soon print the book again. The book is divided into three parts: part I – The Santals and Disease, part II- Santal Medicine and part III – How the Santals live. Rev. Bodding treated the concept of medicine of the tribe in view of the general attitude of the tribe in respect to life and death, God and spirit. Bodding had taken a holistic view in understanding disease among the Santals.

#### **Study of the Stone tools collected by Bodding**

Present report is on the huge collection of stone tools made by Rev. Bodding around the years between 1900 and 1930, while he was working for the Norwegian Mission at Santal Pargana. The collections were deposited in the University Ethnographic Museum in Oslo in different lots between the years 1901 and 1934. At present a total of 4,749 (Four thousand seven hundred and forty nine) stone tools of Bodding collection is housed at the Culture History Museum of Oslo, Norway. These are stored very carefully in sixteen deep plastic tubs. Tools are placed in rows on spongy papers with several intervening layers. Heavier tools are placed at the bottom and lighter ones on top. It is done in a way that no tool is damaged by friction with the other (fig.4).

Bodding published two articles on some of the collections in the *Journal of the Asiatic Society*, one in 1901 and the other in 1904. Bodding has not given any account of the site or geological context of occurrence of the tools. Most of them were procured from the peoples' possessions. According to Bodding's own statement these were often purchased from the Santals.

Soon after deposition of the last installment at Oslo museum Hr. Arne Beng Andersen had done extensive study of the materials for his

Ph. D. research under the guidance of Professor Solberg in Oslo University in 1938. The thesis is not published, though Professor Raymond Allchin had seen the thesis (Allchin, 1962). Professor F. R. Allchin from Cambridge University had analyzed some of the collections housed in the museum at Oslo and had published the work in 1962 in the Journal of SOAS. Though he informed that he could work in the museum for less than a week, however, within such a short time he had done substantive analysis and classification of the tools. It appears that after 24 years of Dr. Andersen's work Allchin had worked with the collection. Present author has gone through the collection after 56 years of Allchin's study, that too only for four days. Total collection classified by Allchin is 2,620 and as mentioned, the present author has gone through a total of 4,749 tools in the Museum of Culture History, Oslo, Norway.

#### **Bodding's information regarding the Stone tools**

Two articles of Bodding were published by The Asiatic Society in its Journal on the stone tools collected. The first article, "Ancient stone implements in the Santal Parganas" was published in 1901. This is reprinted in this volume. Bodding narrates the incident of his first encounter with a Santal's concept on celts. He was reading an article on Burma, which had a picture of a shouldered celt. He showed the picture to a Santal person, who immediately said that the picture was of a "*ceter dhiri*" meaning a thunder bolt. Earlier Bodding came to know "that the Santals say that the destruction wrought by lightening was caused by means of stones hurled down from the sky, and that such stones had various forms, especially axe shaped;" (Bodding, 1901:17). This sparked curiosity and Bodding set to collect the so called "thunder bolts" but it was not an easy task because to the Santal people it had a great medicinal value and would hardly want to part with one. Bodding had conceded in his paper that he did not go into archaeological perspective of the tools but rather restricted his discussion with the belief system of the Santals of his time associated with the stone implements. His article contains four plates of his collection of the celts (Bodding, 1901: 154-157).

It appears that quite a few of his collections had to be purchased for some price because the Santals, whoever owned such stone would not

easily part with that. This is because of several facts. It was believed at that time that if such a "thunder bolt" is kept in a house, it will be protected against lightning strike. He had discussed at length the belief of the Santals in the medicinal property of the celts; cases like easing of difficult pregnancy and subsequent delivery, healing cramps, against boils and carbuncles and for certain pains in the back. The water in which the "thunder bolt" was soaked or water with which the stone was rubbed against a mortar and contained parts of the celt was taken either internally or applied externally. This was considered to have great healing property. He also had noticed that the celts were also used as hones to sharpen country made razors. Bodding did not encounter any other use of the celts. He mentioned that often people would use wedge shaped pieces of hard stones like quartzite to fell small trees.

The tools were procured from Dumka area, mostly around Mahulpahari. Bodding informed that during his time people found them at various places, such as, in the fields while digging or ploughing, from the riverbed, from the earth's surface, from the forest or from the clefts in the rocks. There were some people who inherited celts as heirloom from their fore fathers. Bodding had made some functional analysis of the tools. A big celt found from an "Ojha" probably was a dagger. He wrote that many of the celts were reduced in size due to occasional rubbing. Some of the celts were considered as votive stones or worshipped as Mahadev because it had dark rings on it (fig. 1). It is illustrated by Bodding in his article and by present author in this paper. Bodding found that many of them were smeared with oil and vermilion as a result of worship.

Second paper entitled, "Shoulder headed and other forms of stone implements in the Santal Parganas" was published in the *Journal of the Asiatic Society* in 1904. In his paper Rev. Bodding had given much more detailed account of the celts from the archaeological point of view. He wrote that the collections were similar to the ones that he had reported in his earlier paper excepting for five new forms. He described them as follows. Some forms were with more curved edges; some with square and parallel sided edges; others were small oblong pieces of stones with notches along one of the long edges, which might have been used



as saw to cut wood. There were chips and flakes of flint and chert etc. found in many places. Perforated circular pieces better known as ring stone by the archaeologists were found by Bodding and had considered them as mace heads (fig. 2). He mentioned four shouldered celts found from Dumka. Largest of the shouldered celts measured 4"x2.5" (fig. 3) and smallest one as 2.5"x1.5". The Reverend had mentioned of Peal's letter to the Asiatic Society of Bengal in 1896 about Naga hoes and resemblance of the shouldered celt with those of his finds. Bodding had farther made a comparative study of the iron made Santal axe and adze of the present day with those of the stone made ones but he could not derive at a conclusion. Farther an attempt was made to solve the problem of the celts and Santal racial affiliation. Bodding did not find a satisfactory answer. However, Allchin (1962) with his experience of working with Neolithic tools in India could find abrasive marks on the stone celts, which according to him were formed due to hafting of the celts to a shaft, so as to use them as axe, adze or hammers.

However, Bodding was ahead of his time and had tackled the problem of the stone implements collected from Santal Pargana in two ways; one, from the view point of the belief system of the Santals and the other, from the archaeological point of view. There were limitations and gaps in knowledge in those days.

#### **F. R. Allchin's study of the collection from the Ethnology Museum of Oslo University (Allchin, 1962)**

Allchin had studied a total collection of 2,620 stone implements deposited by Bodding at the museum in Oslo. Earlier he had gone through the small collection donated by Bodding to the British Museum. According to him three fourth of this collection were tools and one fourth were waste materials. Allchin had sufficient experience in working with Indian Neolithic implements both surface finds and excavated materials. Allchin found remarkable homogeneity in the implement types and concluded that the collection came from a single well defined area. He referred to Bodding's letters accompanying the collections. In a letter written in 1902 Bodding referred that those were found within 50 km. around Mahulpahari. It is certain that there was no excavation and the collections were surface finds, though some is referred to as coming out of the ground at the time of tilling of the soil. The area of

collection as defined by Allchin is in the southern part of Santal Parganas district, lying between the Rivers Bansloi and Ajay. The area is on a long ridge on the southern part of Rajmahal hills. Basal part of the landmass is gneiss. In order to postulate the makers of the stone tools he tried to explain that the Austro Asiatic group of people residing in the area probably was the makers and users of the stone tools. To prove his point he also has given an account of the affinity of Santals with Mundas on the basis of linguistic evidence, stating that Santal dialect belongs to Kherwari group of Munda family. He quoted Bodding (1942, 3-22). Out of the total collection a small portion consists of pieces of pottery, one copper axe, very similar to those of copper hoard culture of eastern Ganga valley. Allchin also mentioned a letter of Bodding where the Reverend mentioned of finding of a bronze brooch, iron tools and a brass ring with gold plating. These were found from a grave site near Mahulpahari. Since there is no account of any other particular site for the occurrence of the tools, nothing can be said about the chronology of those materials. It appears that the area may show continuous association of celts with the cultural remains from Neolithic up to early historic times.

Allchin classified the collection on the basis of probable function of the tools deposited at the museum in Oslo. It may be mentioned that he has not mentioned whether he had taken up the celts only deliberately for analysis because the actual collection at Oslo is almost double the number of tools analysed by Allchin.

Summary of the classification made by Allchin is given below (Allchin, 1962:323):

Type I. The Indian axes: 720 tools

Type IA. The Indian axes

Type II. Small celt: 909 tools

Type II A. small celt hammers

Type III. Chisels and rectangular celts: 186 tools

Type IIIA. Rectangular celt hammers

Type IV. Shouldered celts: 12 tools

Type V. Rubbing stones: 82 specimens

Type VI. Hammers: 17 tools

Allchin's analysis is mainly of celts. On the whole there were celts

in the forms of axes, hammers, chisels, shouldered celts and rubbing stones. The axe, adze, hammer and chisel are mostly heads, which were hafted in shafts for working. There are a miscellaneous variety of blades, flakes and chips, which Allchin considered as debitage.

### **Neolithic cultures in Eastern India**

Studies in prehistory of India have a long history. Discovery of first hand axe from Pallavaram, Madras by Robert Bruce Foote in 1863 is one of the land marks for the beginning of the study, just four years after the status of prehistory as a discipline was ratified by the Royal Society in London. Foote found in 1864 a broken ring-stone at Roshanvaram and a well-made stone celt or axe near Araconam railway station in South India. He made a reference to these findings in his first published paper (Foote, 1866: 10-11).

In the perspective of study of Bodding's collection of stone implements collected from Santal Pargana and deposited at the Oslo Museum, main focus is given in this paper on Eastern India. By eastern India the states of Bengal, Bihar, Jharkhand and Orissa are implied. The state of Jharkhand had been of recent formation out of the state of Bihar. A number of tribal communities live in the state of Jharkhand. Jharkhand is a hilly region which is covered with a dense growth of forests. Geographically Jharkhand occupies a forest track in the Santal Parganas and the Chhotanagpur plateau. For the present the focus is on Santal Pargana. Presently, this administrative division comprises six districts, namely, Godda, Deoghar, Dumka, Jamtara, Sahibganj and Pakur. The district head quarter is at Dumka.

Good amount of work had been done in eastern India stretching from central highlands to greater Assam (Dani, 1960). Large number of Neolithic sites had been discovered in this region. Many of them had been intensively explored and some were systematically excavated. Some of the sites had given radio carbon dates. Many of the scholars working in the area were trained geologists, namely, N. K. Bose and D. Sen of Calcutta University. The scholars had provided relative dates based on geology. Both Anderson (1917) and Sen (1950) had carried out intensive work in Chotanagpur region on the Sanjay river valley, a tributary of the river Kharkai, which had joined the River Subarnarekha in the state of Jharkhand. Earliest stratum yielding Neolithic celts was identified as

the older alluvium lying over upper gravel bed by Anderson (1917), Sen (1950) and other scholars. The bed was located 18' to 20' above the river bed. Present author had taken part in intensive exploration of Sanjay River Valley and had worked on Prehistoric sites (Ghosh et al, 1984a and 1984b). She had taken part in the excavation of the Neolithic sites at Barudih and Dugni on the River Sona, a tributary of River Sanjay in Jharkhand state (Das, 1964; Sen, 1969; Ghosh et.al. 1984a). The summary of observation at Barudih and other sites in Eastern India shows that Neolithic culture started in the Holocene period but the secondary traits of Neolithic such as celts, pottery and some other stone tools like flakes, blades, microliths and grinding stones continued throughout the Holocene period into Historic times.

Barudih excavation has given evidence of *in situ* celts occurring in the lowest horizon of older alluvium but it continued with the advent of iron technology. In fact 5'5" of cultural deposit of Neolithic horizon is divided into two phases. The earlier is phase I. It is a purely Neolithic deposit, which yielded Neolithic axe, adze, chisel and some other flake blade tools as well as handmade potteries. The phase II horizon yielded Neolithic tools like axe, adze, ring stones and pottery. There were both handmade and wheel made potteries. One iron sickle was found together with some charred rice. The charred rice and charcoal was dated by C14 method, which gave an average date around 1000 B. C. (Sen, 1969). It is evident from this that the phase II cannot be considered as purely Neolithic. It is better known as Chalco-Neolithic phase (Chakrabarti, 1993). Such situation of continuity of stone celts is found together with brass objects from the site Kuanr in Keonjhar in Orissa. The site had yielded chipped and ground Neolithic celts, lots of flake and blade tools, microliths, pottery, evidences of wattle and daub structures and brass bangles, rings and other ornaments. Associated crucibles and brass objects showed indigenous technology of brass making by lost wax process (Ray, 1993, Ray, et al. 2000, Ray and Mondal, 2013). It is to be noted that in eastern India instead of bronze brass was the first metal to be alloyed. Iron technology appeared almost simultaneously.

Neolithic is defined as a culture where food production began (Burkitt, 1929). Primary trait for Neolithic is cultivation of plants and domestication of animals. Associated with these came celts, namely,

axe, adze and chisel of various types. Chipping, pecking, grinding and polishing techniques were applied for manufacture of the celts. Pottery also emerged in its full-fledged form at this time. However, the tools and pottery are secondary traits. In many places of the Old World celts are found from Holocene deposits dating prior to beginning of food production.

### **Chronology of Neolithic- Chalcolithic culture in Eastern India**

A number of Neolithic sites from Eastern India, such as, Koldihwa and Mahagara in the Vindhya and several other sites like Sohagaura, Khairadih, Narhan, Chirand and Senuar in the middle Ganga plain have revealed evidence of early domestication of plants and animals, microliths, bone and antler tools and terracotta objects besides ground stone tools, the celts.

C14 and or thermo-luminescent dates for Neolithic from Eastern India are as follows (Dikshit, 2013).

The dates are divided region wise, namely, those found from (a) Middle Ganga Plain and those from (b) Vindhyan hills and Plateau regions. Both the regions are important for throwing light on the probable dates of Bodding collection.

(a) Dates from Middle Ganga Plains are as follows:

Jhusi, (8140 ± 220 B.P., 6760 ± 190 B.P. and 7110 ± 170 B.P.); Lahuradeva (5320 ± 90 B.P. and 6290 ± 160 B.P.);

Chirand (1760 ± 150 B.C. and 1680 ± 135 B.C.E).

(b) Dates from Vindhyan and Plateau region are as follows:

Tokwa (ca. 6591 B.C., 5976 B.C. and 4797 B.C.E),

Koldihwa (4530 ± 185 B.C.E, 5440 ± 240 B.C.E and 6570 ± 210 B.C.E.),

Mahagara (2265 B.C.E and 1616 B.C.E, 1400 ± 150 B.C.E, 1330 ± 120 B.C.E, 1440 ± 100 B.C.E and 1480 ± 110 B.C.E),

Kunjhun (1565-1265 B.C. and 3530-3335 B.C.);

Barudih from Sanjay valley average of average of 810 ± 55 B.C.E

Golbai Sasan and Sankarjang suggest duration of 2200 to 700 B.C.E

All of the above mentioned dates place back Neolithic culture to more than c. 7000 B.C.E or to c. 9000 B. P. Evidences show that rice was the cereal cultivated in the area. Both wild (*Oryza rufiprogan*) and domesticated (*Oryza sativa*) varieties of rice are found from excavation

of the sites. The Neolithic people were producing both rainy crops and winter crops. Rice was the staple food. Fishing and hunting still continued. Cereals were supplemented by fish and games. Bovidae and goat were domesticated by Neolithic people of eastern India (Dikshit, 2013).

#### **The present author's observation of the Bodding collection at the Ethnology and Culture History Museum of Oslo, Norway**

It would be convenient to give a little definition of the different types of celts described by Allchin (1962). A celt is generally considered as a prehistoric stone tool with a beveled cutting edge. According to the nature of the beveling it can farther be divided into axe or adze. A celt is an axe when the beveling of the cutting edge is symmetrical. Usually these are hafted on a shaft with the working edge parallel to the shaft. On the other hand, adze is with an asymmetrical beveling at the working edge and is hafted with the edge at right angle to the shaft. Stone axe, adze and the chisel are heads, which are hafted and used as wood working tools. However an axe can also be used as a weapon. Allchin (1962) classified some celts as hammers. These look the same in general shape as the axe or the adze but has got a thick broad, blunt working edge meant for hammering and not for cutting. Stone celts are usually found with Neolithic culture. These are made on hard rock types by chipping, pecking and grinding techniques.

I would like to state that the stone objects, which Allchin considered as waste material were not so. In my opinion the flakes, blades and debitage are not to be neglected because these are also elements which were not confined to earlier cultures like Palaeolithic, Mesolithic and Neolithic. In India these continued to be manufactured and used through chalcolithic and even into historic times (Ray et al. 2013). These were needed for finer cutting, scraping and piercing activities.

A total of 4,749 stone implements are deposited in the Museum of Culture History, University of Oslo. These are arranged in 16 tubs (fig. 4).

#### **A brief note on the collection**

All the tools are numbered excepting for 53 unnumbered pieces. These consist of miscellaneous collections of Bodding. The specimens

all bearing same museum nos. As 34319 are marked by the museum cataloguer as *bestainde*. On examination appeared to be of the three types; the scrapers, knives, arrowheads and celts. Scrapers and knives are made on cherty materials and are finely retouched along the working edges (fig. 5). Though these types are considered to belong to earlier cultural stage but in eastern India these types continued well into early historic times. Two types of arrowheads are found in the collection; pointed and blunt. One numbered 35780 is a well-made pointed arrowhead. Tribals in Chhotanagpur plateau area use a bolt type of arrowhead, meant for stunning the prey without bloodshed. These are locally known as *tutti*. Such arrowheads made on stone are found in Bodding collection (Fig. 5). Out of the unnumbered specimens there are two quartz crystals, three quartz beads, some haematite nodules and similar pieces of rocks. Haematite nodules are important for local people for getting red colour. A few chipped celts with traces of red colour smeared on them are there. Four pieces of naturally smoothed elongated smooth pieces are of special interest. Bodding wrote that many of the collections had been smeared with oil and vermilion. These stones might had been worshipped as phallic symbol of Mahadeva and collected by Bodding.

There is a box containing finely made microliths. All are made of fine grained cherty material. There are blades, crescents and points (fig. 6). Two complete and three broken ring stones are there. Bodding mentioned that Santals used stone wedges for cutting down small branches of trees (1904). Such wedges are also used for tying down the domestic animals (fig. 7).

Large number of stones used as pestle of various kinds are in the collection (fig.8), such pestles are still used for processing herbs as medicine, spices and food. Bodding found grind stones of various kinds, which were meant for grinding both stones and country made iron razors.

Most of the collection consists of what Allchin (1962) called as Indian axe, adze and hammer (fig. 9). There are a number of chisels (fig. 10) and very small celts, varying in length between 4 to 2.5 cm. Bodding considered them as reduced due to subsequent rubbing for medicinal purposes. Allchin considered them as toys. On closer examination at



the museum they appeared to be finer wood working tools. The Santals are adept at wood working and would need various types of tools. Basically the total collection appears to be of different time period starting from Neolithic culture.

### **Bodding Collection of stone tools and the Santals**

Santals are one of the largest tribes in the Indian subcontinent. According to 2011 census there are 7.4 millions of Santals in India and Bangladesh. Racially Guha (1944) classified them as Proto-Australoid. Linguistically they belong to Austro-Asiatic language family, closely affiliated to the Kolarians, the Mundas. Their dialect is Kherwari group of Munda family (Grierson, 1927) related to Mon-Khmer group. Santals are patriarchal and patrilineal by social organization.

Santals had been migrating over a long distance from their place of origin in Dumka (Mitra, 1951) to different parts of India, Nepal and Bangladesh. Prior to nineteenth century basic subsistence pattern of the Santals was hunting-gathering. With population increase and depletion of forest resources and games Santals engaged themselves in agriculture (Chakrabarty, 2012). Rice is the main crop. At present they also cultivate millet, sorghum, maize and some vegetable. They keep cattle, goat, pig and fowl. Fishing and gathering are still important to them. With the development of industries many have joined into the workforce of factories and tea gardens. Large number of Santals has taken formal education and is highly placed. Basic religion is *Sarna* but a number of them are converted to Christianity. Though hunting is prohibited the Santal male members enjoy hunting. They observe ritual hunting annually. As mentioned forest was the mainstay of the people until forests were reserved under British regime. There is no doubt that the Santals had lived for thousands of years in the eastern plateau area in the hilly undulated land covered with forest.

Indian subcontinent produced evidence of human occupation from as early in time as 1.75 million years back (Pappu, 1996; Dennel, 1998). Human kind has evolved in the species level and in India evidence of most modern man, the *Homo sapiens* emerged around 40kys back. There had been attempts at classifying mankind into morphological races in the colonial and pre-World War II times. India was of no



exception. Post world war and post-colonial times have seen exclusion of the term race based on morphological features for ethnic group. Classification still prevailed but in molecular level.

India is a land of geographical diversity. This has given rise to cultural diversity. Development of culture through prehistoric to historic times never was unilineal. Neolithic and subsequent urban cultures did not grow all over India synchronically. Holocene time has seen people continuing with hunting gathering way of life in hilly, sandy rocky and forested areas. This mode of livelihood continued even into the modern times. Agriculture developed in the alluvial plains of river valleys and ultimately gave rise to cities and urban centres. Rest of India continued with a rural way of life.

At one time much of the understanding of diverse ethnic communities was guided by the concept of Aryan invasion. However, evidences are there to disprove the so called Aryan non-Aryan racial boundary. Work had been done by scholars in the DNA level of the people of India by the Centre for Cell and Molecular Biology (CCMB), Hyderabad (Lalji Singh, 2010). DNA level analysis was done on several people of different ethnic groups in India, namely, Andamanese, Austro-Asiatic, Dravidian, Indo-European and Tibeto-Burman. Ethnic population were chosen from areas covering Jammu-Kashmir in the North to Kerala and Tamilnadu in the south and Gujarat and Rajasthan in the west to Arunachal and Nagaland in the east. Groups of people selected were *Bhil* from Gujrat, *Meghawal* from Rajasthan, *Pandit* from Jammu and Kashmir, *Tharu* from Haryana, *Lodi*, *Sahariya*, *Srivastava* and *Vaish* from Uttar Pradesh, *Kharia* and *Sarnami* from Madhya Pradesh, *Santal* from Jharkhand, *Nyshi* from Arunachal; *Ao Naga* from Nagaland, *Great andamanese* and *Onge* from Andaman Islands, *Chenchu*, *Kamsali*, *Madiga*, *Naidu*, *Velama* and *Vysya* from Andhra Pradesh, *Kurumba* from Kerala and Tamil Nadu, *Siddi* and *Hallaki* from Karnatak. Ultimately it came out that in the mitochondrial level the difference is 0.01%. The study shows that in the base level there exists a common ancestral trait for the people of India. However, I personally am not in favour of the term 'tribe' or any other similar term. Due to long geographical isolation

and formation of gene pool population vary. Socio-cultural barrier is another dimension for giving rise to variation.

The Bodding's collection no doubt at one time belonged to the ancestors of the people living continuously in the Eastern plateau area. Stone tools were collected by the Santals and handed over to Reverend Bodding. He wrote that one Santal Ojha did not want to part with his celt unless he was paid Rs. 15 for it. The amount was very high in the early part of twentieth century. Bodding wrote that it could have been his income for the whole year.

However, though the Santals of Bodding's time had no memory of the use of the celts, but axe and adze play a vital role in the life of the Santals, especially those who live away from the Metropolitan city. Their life cycle rituals, folklores, folk songs revolve around forest. Axe and adze are very important tools for them. Many Neolithic axe, adze and chisels of Bodding collection show marks of hafting though these are without sockets like those of modern iron axes. Allchin (1962) identified such evidence of hafting from his study of the Bodding's collection of celts in the Ethnology Museum at Oslo. The present author had a chance of a hurried examination of the collection at the Museum of Oslo and with her long experience with Neolithic collection in the eastern plateau area could discern use marks. No doubt these implements were much useful both in woodwork and agriculture. The stone axes and adzes continued for a long time because firstly, metal was costly and it needed expertise of the smith. Secondly, stones were easily available to the mass, therefore cheap.

Language, especially some words provide clue to prehistoric puzzles. Dr. Phani Hansda, (1980) has given some example in his thesis, entitled, "Differential transformation of culture and language among the Santals" (unpublished ph. D. Thesis of Calcutta University). Recently Dr. Boro Baski of Ghosaldanga-Bishnubhati Adibasi Sangha, Birbhum, West Bengal, informed me that there are various kinds of axes and adzes, of course with metal iron heads, still in use among the Santals. There is a common term for them as *Tangoych*. The *tangoych* used for scraping wood (adze) is known as *Bosle* or *Tirchhu tangoych*. The spade and hoe used for digging the soil is known *Tamni*. The *Tangoych* used for sacrifice

of animals is *kappi* (fig. 11). There exists morphological and functional difference between a *Tangoych* (Axe) and *Tangoch Kappi* (the sacrificial axe). A Santal is portrayed carrying axe, and bow and arrow, especially those depicting Santal *Hul*. The arrow heads could have been of a pointed one or a blunt one (bolt). Replicas of both types of possible arrow heads are found in Bodding collection. The total collection tells a long story of Santal heritage going back to several thousand years.

Both Professor Raymond Allchin and I had a very limited time to go through the collection. I was benefitted from Allchin's study and Bodding's own deliberation in the papers presented at the Asiatic Society. I hope that in future some scholars will have more time to devote in the analysis of the stone implements collected by Bodding, lying in the Museum at Oslo.

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Some Illustrations of Bodding's Collection

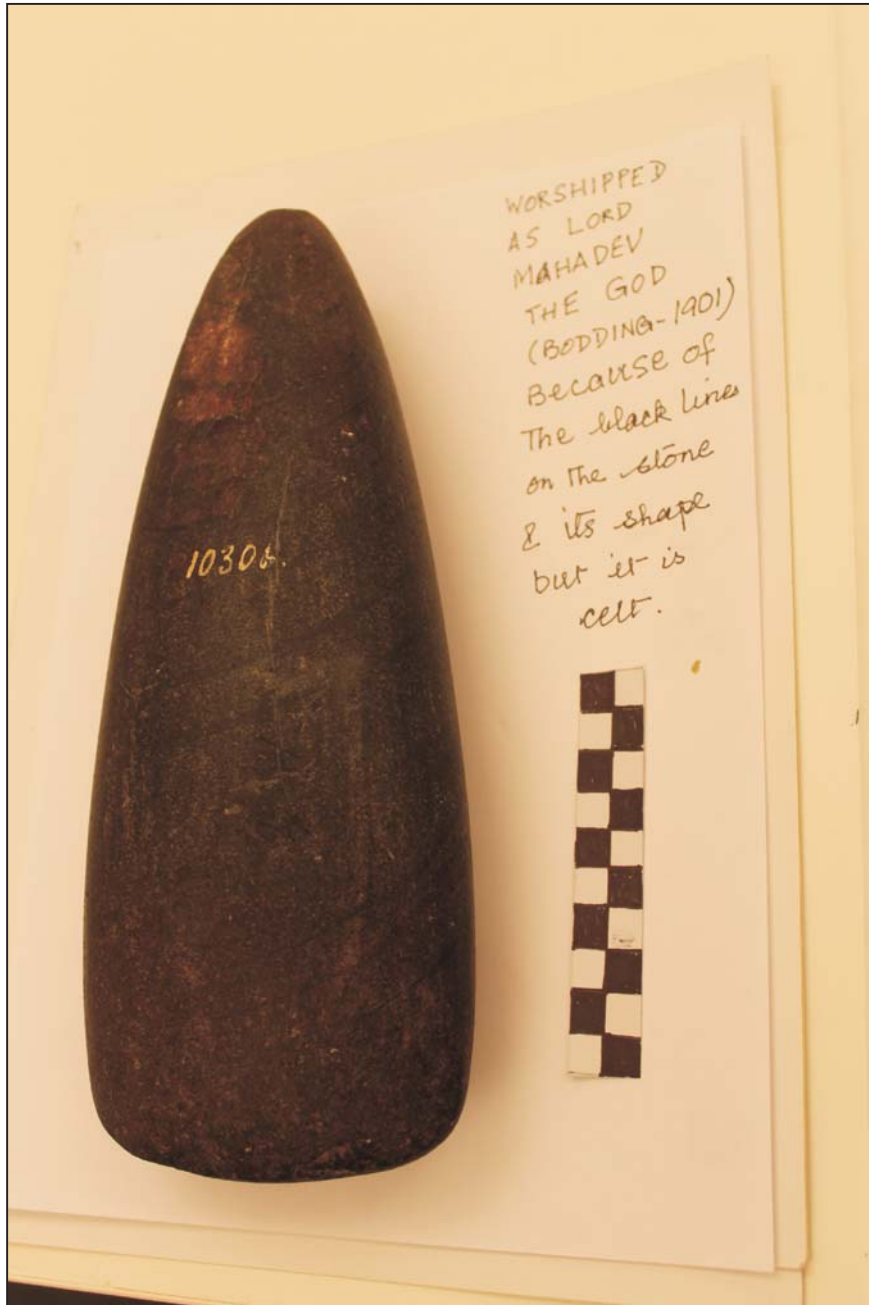


Fig. 1. Worshipped as Mahadeva



Fig. 2. Ring stone (Bodding's mace head)



Fig. 3. Large shouldered celt





Fig. 4. Tub with some of Bodding collection



Fig. 5. Arrowheads: pointed and bolt (*tutti*) types



Fig. 6. Microliths

Fig. 7. wedge (*Khonta*)





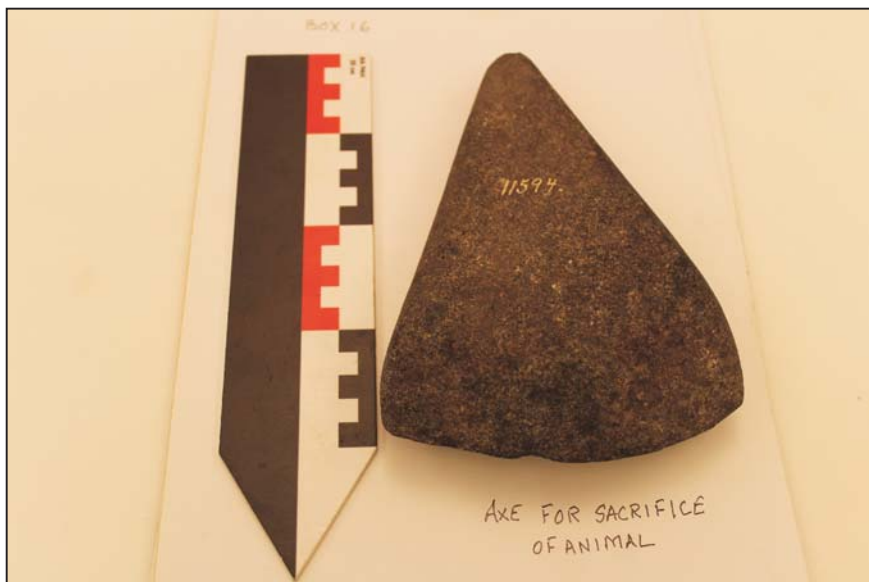
Fig. 8. Pestles



Fig. 9. axe and adze



Fig. 10. chisels

Fig. 11. Splayed axe, probably for animal sacrifice (*Kappi*)

## BOOK REVIEW

Achintya Kumar Dutta, *Trauma in Public Health : Tuberculosis in Twentieth-century India*, K P Bagchi & Company, Kolkata, 2018. Pages xxi+210, Price Rs. 795.

What a dichotomy! The poor man's disease is known as the king's disease! We are talking about *rajjakshma* or tuberculosis, popularly known as TB. How a person gets knowledge about TB? Let's share my experience. I am brought up in an educated middle class family of south Kolkata. In my childhood, I have heard the name of the disease in three references. First, poet Sukanta Bhattacharya died because of this deadly disease in his adolescence. Secondly, as we lived in a place near to Jadavpur which is known for the university as well as for the TB hospital. And the third is every year we used to participate in TB seal sale campaign that was being organized by the Bengal Tuberculosis Association, which was established in 1929 and started its TB Seal Sale Campaign since 1950.

In 1980s and 1990s a number of books had been published on the history of tuberculosis in different area specificities. Linda Bryder investigated the disease in the twentieth century Britain in the book *Below the Magic Mountain: A Social History of Tuberculosis in Twentieth-century Britain* (1988). That was followed by the publication of Randall M. Packard's book *White Plague, Black Labor: Tuberculosis and the Political Economy of Health and Disease in South Africa* (1989). Barbara Bates described the history of tuberculosis in Philadelphia of the United States of America in the book *Bargaining for Life: A Social History of Tuberculosis, 1876-1938* (1992). William Johnston narrated the history of the disease in Japan in his book *The Modern Epidemic: A History of Tuberculosis in Japan* (1995). David Barenness focused on France in his study entitled *The Making of a Social Disease: Tuberculosis in Nineteenth-Century France* (1995). Katherine Ott explored TB in American culture in her book *Fevered Lives: Tuberculosis in American Culture since 1870* (1996).

Previously, we don't have the study material to know the history of the disease in the Indian context. But thanks to the historians, for their sincere efforts now we get the opportunity to be acquainted with the history of tuberculosis in India. The book under review is

one of the examples of such initiative. Following the research works of Bikramaditya Choudhary (*Tuberculosis in India: A Political Ecology Approach*, 2008) and Niels Brimnes (*Languished Hopes: Tuberculosis, the State and International Assistance in Twentieth-century India*, 2016), Achintya Kumar Dutta has written *Trauma in Public Health: Tuberculosis in Twentieth-century India* (2018). In the foreword, Suranjan Das, Vice-Chancellor of Jadavpur University, introduced the book, which is an outcome of a research on the history of tuberculosis in twentieth century India under the auspices of the Wellcome Trust funded Documentation Project on the history of medicine in colonial eastern India; he himself was the principal coordinator of that project. Das commented that the book 'effectively addressed the link between poverty and the spread of TB and underlined why modern medical technology could not effectively contain the disease in colonial India and its aftermath'. The author Achintya Kumar Dutta himself echoed the same voice when he has written that 'tuberculosis had instantly become a disease of the poor and continues to be so to this day. In fact, there is still a raging debate on whether poverty is the root cause of this disease and if nutrition and improved standard of living had any bearing on reducing its occurrence and death due to it.' Long before, in 1952, René and Jean Dubos in *The White Plague: Tuberculosis, Man and Society* argue that the great increase of tuberculosis was intimately connected with the rise of an industrial, urbanized society and the progress of medical science had very little to do with the marked decline in tuberculosis in the twentieth century.

Dutta has elaborated his arguments in four chapters of the book that have been prefixed and suffixed with introduction and conclusion. In the introductory note the author has tried to situate his study both in the global studies on the theme and in the colonial context. In first chapter, he has termed tuberculosis as a terrible scourge in colonial India. He has shown that tuberculosis, an old disease of India, turned to be a serious public health problem during the colonial rule, causing huge mortality and morbidity. The disease had a very high incidence across the country and was very serious in Bengal, Bihar, Orissa, Madras and Punjab. Dutta has revealed that tuberculosis was not a

serious threat to the British army and the civilians as was malaria, cholera and smallpox. Here lies the cause of official negligence to TB.

In the second chapter the author has provided an account of the aetiology of TB with a brief note on the disease theory. Touching the ongoing debate on the cause of the disease the author has identified the socio-economic factors as the foremost cause. He has commented 'it was found that most of the tuberculosis cases occurred among the underfed and distressed poor. Poverty and undernourishment seemed to have been two main factors responsible for the survival of tuberculosis among the ordinary people in the society'. Along with these most two predominant causes, the other factors were unsanitary condition of living, overcrowding, mixing of infected with the non-infected people, lack of surveillance and adequate treatment. Thus, the British health policy had its responsibility for the spread of the disease that has been discussed in the third chapter. Though TB is a preventable and curable disease, it could not be checked and was on the rise in colonial India. The colonial government was reluctant to take positive initiative in this matter. Various anti-tuberculosis programmes, such as emphasis on TB clinics, institutional treatment, care and after-care for the TB patients, surveys on TB, elimination of poverty, improved nutrition, research and consorted scheme that helped European continent to control TB might have been successful in India also but the colonial administration did not consider this type of scheme. The responsibility had been taken up by the volunteer organizations like Bengal Tuberculosis Association (1929, known as Tuberculosis Association of Bengal for the first decade of its inception). But there was limitation of resources.

In the fourth chapter the author has investigated whether any change did occur after independence of the country or not. He has shown that independent India inherited the burden of tuberculosis from colonial rule. The Indian government tried to control the disease. Anti-tuberculosis programmes were adopted. As recommended by the World Health Organisation (WHO), National Tuberculosis Programme (NTP) was adopted in 1962. That was replaced by Revised National Tuberculosis Control Programme (RNTCP), which applied globally accepted WHO-recommended Directly Observed Treatment

Short-course (DOTS) strategy. However, the author is of the opinion that 'India perhaps depended heavily on the technological solution, which was cheaper and within the reach, bypassing socio-economic measures which were found to be expensive.' He has concluded that TB is not only a health problem only, it has social dimension. Thus 'the medical measures would be meaningful only when it is combined with social measures.' This conclusion reminds us the importance of doing more and more research on the social history of medicine.

On the whole, the book is a serious attempt to give an overview about the burden of tuberculosis in India in the twentieth century, focusing the reasons for its diffusion, success and limitations of the policy adopted for its containment, and the social stigma of the disease. Meanwhile, Christian W. McMillen wrote the monograph titled *Discovering Tuberculosis: A Global History, 1900 to the Present* (2015). Along with these types of overview, we need some time and space-specific micro-study on the history of the disease. It gives me pleasure to put on record that such type of research is going on in the eastern part of India; a young researcher of Jadavpur University Suvankar Dey has done his M.Phil thesis titled *The King's Disease: Situating History of Tuberculosis in Colonial Calcutta* (2015). Hope this kind of research will be multiplied in future and the book, written by Achintya Kumar Dutta will be regarded as a significant one in the list of those studies. The significance of this book also lies in the combination of rich empirical data and meticulous research. The author has used some important archival materials. Scanned pages of some relevant documents related to the disease have appeared in the appendix of the book (pp 129-193). That may enhance the love for primary documents for the future generation of researchers.

Sabyasachi Chatterjee

## BOOK REVIEW

*The People and Culture of Bengal — A Study in Origins* : Vol-I (Part 1 and 2) and Vol-2 (Part 1 and 2) by Annapurna Chattopadhyay, Firma KLM Private Ltd. Price : Vol 1 part 1 : Rs. 600/-, Vol 1 part 2 : Rs. 600/-, Vol 2 part 1 : Rs. 800/-, Vol 2 part 2 : Rs. 1000/-.

It is no doubt that this aforesaid title is a highly ambitious project entailing multi-disciplinary treatment of geographical, sociological, anthropological and related issues. The subject matter itself is a complex and vast one. This is an ethno-historical study of the Bengali people and their culture. Prior to this, no comprehensive attempt has been made to trace the ethno-historical origins of the people of Bengal (undivided) including their cultural traits. Author has made a serious attempt to find out the autochthons of Bengal and obviously the cultural base of the Bengali People.

The main objective of this research is to trace the origins or in other words the very base and the roots of the Bengali people and their culture. An effort has been made to correlate historical data with ethnological ones. The people of Bengal (undivided) belonged to various tribal groups such as aborigines, indigines, ancient people, extra-Indian and Intra-Indian etc possessing divergent ethnic and cultural characteristics.

Author incorporated innumerable tribal peoples namely the Bhotias, Gurungs, Lepchas, Newars, Damais, Kamis, Khas, Tipras, Lushais, Mrus, Kھیang, Khami, Chakmas, Kukis, Caros, Kachadis, Hadis, Dalus, Doyais, Hajangs, Mech, Santals, Oraons, Mundas, Khandas, Malpaharis, Nishadas, Savars, Pulindas, etc. Among ancient peoples of Bengal such as the Vangas, Pundras, Sumhas, Radhas, Gandas have been discussed. Among extra Indian tribal communities, author included the Kiratas, Kambojas, Koch, Rajvamsis, Yavas, Sakas, Khasas, Hunas, Chinas, Abhiras, Turushkas, etc. Among Intra-Indian tribal communities the Dravidas, Karnatas, Kulikas, Malavas, Ambashthas, Vaidyas, Cholas, Chodas, Latas, Andhras, Kalingas, Utkala, Odras, Magadhas, Kikatas, Angas, Pragjyotishas, Medas, Chatas, Bhatas, Chandalas.

Through the ages all these aforesaid tribal peoples have been mingled with each other to form a composite culture. The author discussed about the Aryan Language speaking people, how they had



intruded in to the geographical space of so called Bengal (undivided) and how the non-Aryan tribal peoples had been incorporated within the Indo-Aryan social hierarchy. It is rightly pointed out that how the different tribes, castes and communities were brought under the banner of the so called Bengali culture. The process of amalgamation is not very distinct and seems to be complicated. It has been rightly opined about the grand ethnic and cultural synthesis.

Diverse ethnic features like Austro-Dravidian, Mongoloid and Indo-Aryan people were slowly amalgamated to shape the so called Bengali culture. All got merged together and produced a grand milieu in which each exchanged his possessions, ethnic and cultural for the formation of a composite people and culture. The author of this research work has presented how through long periods of time, a unique culture had been created by the process of adaptations and assimilations. The history of Bengal has exhibited a wonderful vitality and capability to integrate and assimilate. No body could retain his or her own distinct ethnic and cultural identity or individuality or separateness. During the Muslim rule in Bengal there began a synthesis in Language, thought and religion. However the Islamic impact could not bring about any fundamental change in Bengali culture. Later on during the British rule the culture of Bengal faced a period of clash between traditionalism and modernism. Again due to globalization the Bengali culture imbibed many new elements. But all are united and the result was the grand ethnic and cultural synthesis and amalgamation.

The book is a voluminous work of nearly 1800 pages. Apart from the text in four volumes it contains 12 maps, 6 tables and enriched bibliography, index with notes. In this nature of study some omissions and lapses are inevitable. But as a whole the presentation of the subject matter is splendid. The author treated the subject with a comprehensive account of environment and climatic condition of Bengal undivided with special emphasis on the role of rivers. It has been highlighted that how heterogeneous elements had been mingled into the making of the Bengali cultural fabric. This work can be treated as an 'encyclopaedia of ethnic and tribal groups living in Bengal.'

Rangan Kanti Jana



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Rhys Davids, *Buddhist India*, London, 1933, 7.

**Articles in Books :**

H.V. Trivedi, "The Geography of Kautilya", *Indian Culture*, Vol. 1, 202ff.

**Edited Volumes :**

C.W. Troll, ed. *Muslim Shrines in India : Their Character, History and Significance*, Delhi, 1989.

**Articles in Journals :**

G. Hambly, "A Note on the Trade in Eunuchs in Mughal Bengal", *Journal of the American Oriental Society* (hereafter *JAOS*), Vol. 94(1), 1974, 125-29.

**Articles in Edited Volumes**

P. Gaeffke, "Alexander and the Bengal Sufis", in Alan W. Entwistle and Francoise Mallison, eds, *Studies in South Asian Devotional Literature, Research Papers, 1988-1991*, New Delhi/Paris, 1994, 278-84.

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### SANSKRIT

आ = ā	ई = ī
ऊ = ū	ऋ = ṛ
ऌ = ṝ	च = ca
छ = cha	ज = ja
ट = ṭa	ठ = ṭha
ड = ḍa	ढ = ḍha
ण = ṇa	श = śa
ष = ṣa	' = m̄

### TIBETAN

ཀ = ka	ཁ = kha	ག = ga	ང = ṅa/nga
ཅ = ca	ཆ = cha	ཇ = ja	ཉ = ṅa/nya
ཏ = ta	ཐ = tha	ད = da	ན = na
པ = pa	ཕ = pha	བ = ba	མ = ma
ཅ = tsa	ཆ = tsha	ང = dza	ཤ = wa
ཇ = zha	ཉ = za	འ = 'a	ཡ = ya
ར = ra	ལ = la	ས = sa/sha	ས = sa
ཏ = ha	ཨ = a		

ARABIC (both Cap & Small)						
ا	-	A	a	آ	-	D
ا (long)	-	Ā	ā	ا	-	T
ب	-	B	b	ب	-	Z
ت	-	T	t	ت	-	h
ث	-	Th	th	ث	-	h
ج	-	J	j	ج	-	h
ح	-	H	h	ح	-	K
خ	-	Kh	kh	خ	-	K
د	-	D		د	-	L
ذ	-	Dh		ذ	-	E
ر	-	R		ر (long)	-	C
ز	-	Z		ز	-	E
س	-	S		س	-	H
ش	-	Sh		ش	-	Y
ص	-	S		ص (long)	-	h
PERSIAN						
ا	-	A		آ	-	D
ا (long)	-	Ā		ا	-	T
ب	-	B		ب	-	Z
پ	-	P		پ	-	h
ت	-	T		ت	-	h
ث	-	Th		ث	-	K
ج	-	J		ج	-	K
چ	-	Ch		چ	-	C
ح	-	H		ح	-	L
خ	-	Kh		خ	-	E
د	-	D		د	-	Z
ذ	-	Dh		ذ (long)	-	C
ر	-	R		ر	-	H
ز	-	Z		ز	-	H
س	-	S		س (long)	-	h
ش	-	Sh		ش	-	Y
ص	-	S		ص	-	h



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It will flourish, if naturalists, chemists, antiquaries, philologers and men of science, in different parts of Asia, will commit their observations to writing, and send them to the Asiatick Society at Calcutta; it will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease.

Sir William Jones  
on the publication of the Asiatic Society