Role of Calcutta Journal of Natural History in nurturing Geology in Colonial India

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Abstract : *In spreading ideas of geological theories and observations, the press played an important role during early colonial rule. During 1840's, a vast number of geological articles were published in different periodicals and journals throughout India. In the volumes of Calcutta Journal of Natural History, during 1840 to 1848, various voluminous and informative articles were published. It brought into light the multifaceted geological articles all over the country along with necessary observations and analysis and constraints. Calcutta Journal of Natural History tried to raise the consciousness and awareness of the then Indian intelligentsia. Thus played a significant role in the development of Geology as an academic discipline and thereby production of Indian geologists. In this initiative, main stimulating personality was John McClelland. This paper will discuss about this unique venture.*

Key Words: *Scientific activity, Geology, Natural History, Calcutta Journal of Natural History, John McClelland, Colonial India.*

In recent years there has been a continuing effort to enumerate the history of scientific activity in colonial India. A widely accepted view is that India's wealth was repeatedly tapped by using of the scientific knowledge and techniques. In fact, applied science and technology became indispensable tools in the creation and consolidation of Britain's economic hegemony.[1]

The British rule of India is also considered by historians as 'an instrument of new knowledge'.[2] The emergence of geological science in India in the second half of the 18th century marked a new phase of 'Colonial Science' and British colonial exploitation in India. During colonial period, geology was treated by the British authority primarily as a tool of their economic exploitation in India.[3] But simultaneously, publications of detailed geology-based articles in various periodicals and journals through print media created an academic interest among the educated people in the metropolis areas. The importance of studying print and literature as a medium through which significant developmental ideas took place among educated classes is now drawing a great attention.

In spreading ideas of geological theories and observations, the press played an important role during early colonial rule. Throughout India there were many types of initiatives. Calcutta rapidly developed as the largest center of printing, in the sub-continent, during the last two decades of the eighteenth century and acquired its paramount importance to the British as an administrative, commercial and educational base.[4] Madras and Bombay also became the centers of printing press at that time. A large portion of Indian imprints was designed predictably enough to meet the practical needs of the community, who were engaged in spreading modern views to the public. In that age of printing presses, the printing-shops and journal-offices assumed an indispensable role in the dissemination of scientific ideas. It is a very difficult task to give an exhaustive account of the scientific publications, which came out in India during that period. But, it is true that the scientific publications could be treated as reliable index to the nature and structure of the scientific activities in progress. Specially journals tried in various ways to nurture science and also geological science in India since the last half of the eighteenth century. It got a prominent place from the first half of the nineteenth century.

Many articles based on geological science were published in the journals of the Asiatic Society of Bengal, specially in Asiatick Researches and the Journal of the Asiatic Society of Bengal since the last half of eighteenth

century. Same is the case noticed in the opening numbers of the Madras Journal of Literature and Science since 1836.

During 1840's, a vast number of geological articles were published in different periodicals and journals throughout India, specially in the volumes of Calcutta Journal of Natural History, Calcutta Review, India Review and Journal of Foreign Science and Arts along with the above mentioned periodicals.. Not only did they emulate the practice of learned societies in Europe, they also helped to maintain a contact between educated Europeans scattered across India and adjacent territories. They served as means by which scientific observation and speculation could be relayed to and from India.[5] Though the Asiatic Society played the most vital role in the academic study of geology as one of the most significant scientific discipline, 'Calcutta Journal of Natural History and Miscellany of the Arts and Sciences in India', along with some other journals also played a very significant role in this perspective. The volumes of this journal were enriched with various and multifaceted geology based articles, collected from different parts of Indian territory and abroad.

II

Calcutta Journal of Natural History's main commanding figure was John McClelland. He was an enthusiastic and learned person. By profession he was a British doctor with interests in geology and biology and worked for East India Company. He was the member of Royal Ratisbon Society, Natural History Society of Belfast, Boston Society of Natural History (United States), member of the Asiatic Society of Bengal and by profession he was in Bengal Medical Service. During that time, the searching for flora and fauna, cultivating for mines and minerals, observing geographic characters or climatic conditions attracted the attention of the British people. These were collectively coined as 'natural history'. Actually it is the study of organisms including plants or animals in their environment, leaning more towards observational rather than experimental methods of study.[6] In fact the term has grown as an umbrella term for what are later considered as several distinct scientific disciplines, in which geology was one of the most

prominent. Natural history had been encouraged by practical motives, such as the Industrial Revolution prompted the development of the science of geology through the need to analyse rock strata in order to find mineral deposits.[7] As 'natural history' was a buzzing word during that period throughout the globe, perhaps for this reason this journal's name was chosen after it. McClelland was the junior member and Secretary of 'A Committee for the Investigation of the Coal and Mineral Resources of India', which was working under the direct control of the East India Company. Its main aim was to investigate the hidden underground resources throughout India and prepare plan for utilizing it. This committee was popularly known as 'Coal Committee'. John McClelland was the first to propose hiring of professional geologists from England for bringing perfection in the task of 'Coal Committee' as much as possible. Different types of guidelines were prepared under his supervision. He intended to spread the views of different personalities to broader sections of academic society, including the proceedings of the Committee, such that people became aware about the real scenario. So, it is obvious that his primary attention was on the geological and mineralogical studies.

The first volume of the journal was published in 1840 from Calcutta, printed at Bishop's College Press and was continued till 1848. The 2nd and 7th volumes expressed its respectfulness to the Government of Bengal, the 3rd volume showed its dedication to the Mercantile Community of Calcutta and the 5th volume showed its dedication to 'The Honorable The Court of Directors of the East India Company'. At around the time of publication of the 1st volume, James Prinsep, Secretary to the Asiatic Society of Bengal, left India for his sudden and melancholy illness. The journal expressed as,'…felt as a public loss by all classes interested in the advancement of Science.'[8] The journal played a vital role in the fulfillment of the study on geology in India since 1840.

Different types of informative articles were published, some were on practical observation and some were on theoretical analysis. Its one of the important feature was that it highlighted governmental policies in the

writings. The first volume of the Calcutta Journal of Natural History was started with the words of Johann Wolfgang von Goethe, in which its main motto was included. Goethe's remarks as quoted in his original dialect appeared, 'warum ich zuletzt am Liebsten mit der Natur verkehre, ist, weil sie immer Recht hat und der Irrthum bloss auf meiner Seite seyn kann Verhandle ich hingegen mit Menschen, so irren sie, dann ich, auch sie wieder, und immer so fort, da kommt nichts aufs Reine; weiss ich mich erst aber in die Natur zu schicken, so ist alles gethan' - Goethe.

Below this, the English version was also cited - 'Why I after all prefer dealing with nature, is, because she is invariably in the right, and the wrong must needs be on my side. When I on the contrary deal with men, they again, and so on continually, and it comes to nothing after all, have I however once found out the ways of nature, then all is right.'[9]

John McClelland himself wrote many of the early articles. In the introduction of its 1st volume, the journal expressed apology for being without a periodical in the metropolis of British India exclusively focused to the objects of science. It was written, 'The usual apology for being without a periodical in the metropolis of British India exclusively devoted to objects of science is, that it would not pay. This may be the reason, the only reason, why we have not long since had several philosophical publications in Calcutta, eclipsing those of Edinburgh, London, and other European Capitals. Without insinuating the existence of any more immediate cause for the above defect in our periodical literature, we must be permitted for the honor of the City of Palaces to doubt the accuracy of the one assigned, as nowhere are persons more liberal with their money on all public occasions, when interests of far less moment are at stake than those of science'.[10] In McClelland's own words, the preparation of publication of such a journal was demonstrated as '…. without however having any serious design on the pockets of the public, we are disposed to put its taste to the test; and although the task could hardly have developed on worse hands, we are determined to devote our pages solely to several departments of science, which at present only meet with a casual place in the Journals of this

Presidency.'[11] The main motto of the journal was stated as '….. our journal will be devoted exclusively to scientific objects and particularly to the various branches of Natural History. …… The great object of the publication will be less to afford amusement than instruction; and above all, it will be our ambition to make know the researches of naturalists in subjects connected with Indian productions with this view we shall bring together such facts as may be collected from time to time, and endeavour to keep before the public the exact state of the several subjects of inquiry, and the claims of those who are employed in them having ourselves experienced the disadvantages of many who labour in the cause of science in the recesses of an Indian Jungle, we shall therefore be the better able, both as naturalist and men, to appreciate results attained under disadvantages which can only be understood by those who have been exposed to them.'[12] About Geology and Geologists, the journal mentioned, 'Geology is so connected with Natural History as to be almost identified with it, since a knowledge of living forms cannot be accurately appreciated without reference to those that have become extinct, nor these last, which we owe to the observations of geologists, without reference to existing species. Geological descriptions of districts will therefore form a much desired object of our journal.'[13]

Scientific articles were then published in some other scientific journals also. So, the Calcutta Journal of Natural History expressed, 'perhaps a word or two on our appearance may be necessary.'[14] According to it the object of 'India Review' was chiefly the diffusion of popular science as the 'Journal of the Asiatic Society of Bengal' was too closely identified with that institution.[15] The newer journal's plan was far-reaching. It was reflected as - 'our field is altogether distinct, and although a new one, we doubt not that the labours of naturalists are sufficiently important to entitle them to a separate and independent organ, indeed it has often been to us matter of surprise, that departments of science so important as those of Geology, Zoology and Botany should have been so long without a journal of their own in India. The consequence is, that neither the importance of those pursuits, nor that of the persons devoted to them, is at all understood; and

naturalists at length find themselves without any individual connected with the periodical press, or with the learned societies on this side of India, at all competent to meet there wishes or their views, far less to promote the object of their pursuits. Under these circumstances we have reluctantly deviated from the less obtrusive occupation we had prescribed to ourselves, and are prepared to use our best endeavours to secure for Natural History the advantages of a journal hitherto much required in India.'[16]

The journal presumed that under its aegis in future the geologists and other scientists might find that their interests would be better attended to in these types of separate institutions, and then declared their independence as the first Society of Naturalists ever formed in India. The journal mentioned, 'just for those reasons we now quit the Asiatic and other Societies in Calcutta. Instead of regarding such movements or dissentions with jealousy or opposition, they are always to be hailed as favourable signs of the progress of the knowledge, and of the advancement of the Society to that elevated state of civilization, in which the human mind is brought to bear independently on distinct objects of research.'[17] John McClelland also expressed his hope that such a journal would become the focus for an Indian branch of the British Association for the Advancement of Science. He was of the belief that a periodical was especially necessary for such purposes in India, where 'the cultivators of science are so few, and the nature of their various duties are such as to prevent their assembling at any one place'.[18]

Based on both academic and practical knowledge, various discussions were published in every volume of the journal. They drew warm public attention. The Editors wrote in the 4th volume, 'In fact, there is no great object of internal improvement that can be undertaken, either by public or private enterprise in India, to which a scientific knowledge of the productions of the country is not more or less essential; and many lacs of rupees have been from time to time thrown away in fruitless experiments, which have failed only for want of that description of information, which it is the object of the Calcutta Journal of Natural History to elicit. .... In future, it will be

the aim of the Editors to the almost of their power, to render the work as generally interesting as possible, consisted with its object'.[19]

III

In the first volume, various academic discussions were published along with the detail discussion of the ninth meeting of the British Associations for the advancement of science.[20] Roderick Impey Murchison's writing on 'Silurian System' was published in this volume. Murchison was a renowned figure in British geological studies. He was considered as one of the first geologists to appreciate the value of fossils in stratigraphical research. His study of fossilliferous rocks in Wales and Welsh Borderland, illustrated as 'Silurian System', in 1835 as a new geological system. This was the system under which were grouped, for the first time, a remarkable series of formations, each replete with distinctive organic remains other than and very different from those of the other rocks of England. These researches, together with description of the coal fields and overlaying formations in South Wales and the English border countries, were embodied in the 'Silurian System'. This article was purely based on academic study.[21] Besides this, in the same volume Lieut R. Baird wrote an article on geology of Southern India[22] where geological information of different rocks was mentioned. William Jameson wrote an article entitled 'On the Method to be adapted in conducting Mineralogical Surveys'.[23] This article was interesting because of its approach, style of writing and informative analysis. It should have to be mentioned here that it was written at a time just after the establishment of the Committee, searching for Coal and Minerals in India. At the beginning, the author wrote about the splendid progress in geology in India and said that - 'of all the departments of Natural History, there is probably not one which has made more rapid advancement within these few years than that of geology'.[24] In analyzing the role of geologists, Jameson made a comparative assessment - '….the geologist can now tell with as much certainty the relative position which mineralogical specimens when presented to his view ought to hold in the geological system, as the zoologist or botanist can with regard to animals or plants. Moreover, the experienced geologists from an examination of a few specimens, can, with great precision,

not only determine the relative age of the country in which they have been found, but also point out whether that country is likely to afford minerals of value in an economical point of view.'[25]

The article also explained about the minerals and their determining arrangement, which was very much helpful in searching the actual geological and mineralogical resources. Such as, the writer wrote, 'for example, bituminous coal is always found to be associated with several, or all, of the following rocks, viz. sandstone, bituminous shale, slate-clay, fireclay and clay ironstone, which occur in greater or lesser quantity, and in extensive coal fields are found to exist. The same is the case with metals; and if the minerals which are well known to be associated with particular metals are found to occur in quantity in any district, then we are entitled, even if the metal is not at first presented to our view, to infer, that it exists there, and that upon proper search being made it will be found'.[26] Author's main intention was to make the observers and researchers engaged in the vast field throughout the country India, more conscious. So, he added, 'We make this statement in order to point out the value of mineralogical characters, which have been much neglected, and in no country more than in India.'[27] Regarding geological mapping, Jameson made a comparative study between India and the western countries. He wrote that in regard to Europe 'there scarcely remains a tract which has not been more or less examined, and authorized geological maps have been published by the respective governments.'[28] He cited some examples, such as publication of a magnificent map by the French government, which was coloured geologically under the guidance of Beaumont and Dufrenoy; the Austrian and Prussian governments have also published splendid geological maps, in England, Ireland and Scotland similar type of works were also done. Individual attempts were also taken simultaneously.

In the second volume, Lieut. R. Baird published an important article on 'Economic Geology'.[29] According to him, the claims of geology with economical importance were in a doubt for a long time perhaps because of the non-philosophical spirit and perverted views with which its study was

originally pursued. He stated, 'The consequence naturally was, that amid the bitterness of controversial discussion, observers viewing the limited range of facts they possessed through a distorted medium, drew only such conclusions as were agreeable to their own opinions, while a spirit of wide and unwarranted generalization took the place of close and rigid induction from carefully observed phenomena.'[30] Baird also opined that geology then appeared to people as a mass of fanciful and fantastic cosmological doctrines. Men involved in the work came across endless series of theories rendering useless, mischievous speculations, which was often prejudiced against the original science. Such controversial situation dragged them to form correct notions of the original state of the earth. To obtain accurate ideas of the actual conditions, they devoted themselves to careful observations. The geologists thus succeeded in establishing the solidity, beauty and importance of geology. Within the whole range of physical science, the high economical value of geology was established by highlighting enumerable instances of its benefits to the mankind. Their discoveries then, were also believed to be gifts of god, and were projected as 'doubt, absurd, and atheism ridiculous'. Economic geology then became considered as valuable like economic astronomy, chemistry or botany. The principles were assessed to be valuable and engineer, architect, coal worker and miner were respectively engaged to execute the works to yield utility, ornament or profit.[31]

According to Baird, 'The importance of disseminating information on this subject is therefore unquestionable, and were a proper system to be pursued, the mineral wealth and resources of this country might be investigated and developed to an extent hitherto unknown.'[32] He made a clear view regarding the progress of economic geology in England, with special mention of the contribution of Mr. Henry De la Beche, the first Director of the Geological Survey of Great Britain as well as of the National Museum of Economic Geology. He mentioned, the object of formation of 'National Museum of Economic Geology is to exhibit at one view the known mineral wealth and resources of Great Britain, so arranged as to furnish every information to those required to direct, or anxious to promote, any

public or private undertaking, as to the extent to which such wealth and resources might be available for their purposes'.[33] Simultaneously, the progress and pattern of geological investigation in colonial India was also thoroughly discussed, such as, 'Indications have recently been given of an intention on the part of the Court of Directors to encourage the formation of a similar institution in this country, and should the system which has received the sanction of the British Government be fully adopted here, its influence on the progress of our acquaintance with the economic geology of India will, it can scarcely be doubted, prove most decisive. Much consideration will however be requisite in arranging the details of the plan, so as to make it productive of the greatest possible amount of general benefit, and many difficulties arising out of the peculiar circumstances in which those who might be inclined to avail themselves of its establishment are placed, will require to be overcome before all that it is capable of effecting be actually realized.'[34] There after he discussed in detail about the governmental policy.

While discussing 'On the Geological Relations of Artesian Wells', which was basically treated as one example of practical geology, he began the discussion in such way, 'The dependence of the welfare and prosperity of the inhabitants of tropical countries, generally on their possessing abundant supplies of good water, gives a natural prominence to the means usually resorted to for obtaining these, and as method of boring, when employed in subservience to certain general principles included within the province of economic geology, offers peculiar facilities and advantages, the development of these principles may prove at once interesting and useful. It too frequently happens that they are unknown, or if known are neglected, since had the case been otherwise it is certain that the records of our Indian boring operations, varied and extensive as they have been, would have exhibited results of a more satisfactory character than they have hitherto done.'[35] In this article a detail analysis regarding the formation of artesian well was studied and he referred to the context that 'The geology of India, like its history, carries us back to the earliest epochs, and primary rocks constitute a large portion of its frame work. This is especially the case in southern

India, where granitic rocks are almost universal.'[36]

In this issue, Captain J. Campbell wrote some important articles. One article was named as 'On the Red Marl Formation of Mysore'.[37] It was almost a new approach in the field of theoretical and practical geology. The editor of the journal commented - 'As this term is applied in England to certain beds of new red sandstone containing calcareous conglomerate and nodules of limestone, it is necessary to remark that the author uses it in a peculiar sense, as explained in the sequel.'[38] At first, the writer claimed to raise publicly his opinion regarding one of the drawbacks of that time's academic study. He wrote that writers on primary geology have been too hasty in framing their theories of the operations of nature. And he also said that in this view he got the able support of Dr. Boase of Cornwall, and apparently of most of his associates in the Royal Geological Society of that country. In this context he referred Boase's Treatise on Primary Geology, written in 1834. In this discussion, he also referred Prof. Philips' remarks that 'a full examination of the whole series of granites, porphyries, serpentines, and killas, and of the disseminated and venigenous minerals in them, will kindle a brilliant light in the most secret laboratory of nature; but one thing is wanting, an exact description of all the characteristic facts observable in each particular case, without the adornment of theory or the disarray of new nomenclature'.[39] Campbell fully agreed with such view and wrote, 'this candid acknowledgement from one of the first professors of the science is, I consider, as great a concession as could be expected from a professed theorist, and would seem to confess that geologists in describing primary formations have thought too much about theories, and too little of giving exact descriptions.'[40] It is one of his characteristic features that he acknowledged European geologists' opinion in analyzing Indian petrology. Campbell wrote about the contributions of Abraham Gottlob Werner, James Hutton, John Playfair, Thomson and John Macculloch among those who worked in the field of geology in Europe. Among them, who worked in India, he mentioned the names of P. M. Benza and John Clark.

The editor acknowledged Campbell's writings because of the merit of

those and for their uniqueness. In the footnote it was written, 'as the improvement of Pottery in India is now becoming an object of public interest, Capt. Campbell, in the course of his valuable researches may be able to point out the best variety of the clay in question, for this important purpose.'[41] Though the journal expressed a hint of doubt in accepting Campbell's new discovery of 'Red marl', the editor wrote, 'To establish an identity between this formation and the red marl of English geologists, everything is required. The red marl rests on the coal formation, and supports the oolitic and cretaceous groups. In order to make out the identity, it would be necessary to suppose the whole of these formations to be absent, with the exception of this isolated bed alone, which would require to present very unequivocal proofs. Indeed of identity with the red marl, before we could regard that fact to be established, or even probable.'[42] In this volume, Campbell wrote another article named 'On the Granite formation of the Salem and Barramahal District'.[43] In this article, he discussed about Dr. Boase's Primary Geology. He opined that this book, though very useful for understanding geology, but 'for many reasons, does not perfectly apply to India'.[44] In spite of such views, the contemporary European geological outlook influenced Campbell's attitude. He also remarked that the volumes of the geological society were 'costly' and so they 'are a sealed book to most persons in India'.[45] This article of Campbell was very important in the purview of academic discussion because he consulted most of the accessible works except the costly volumes of geological society and also because he used such geological and mineralogical terms, which at that time appeared least objectionable by most of the writers. Campbell's limitation was that, he did not discuss about the character of all the terms, their accurate definitions and considerations of the propriety of their use. According to him, 'if this had been done, the paper would have been a treatise on petrology, instead of a descriptive account'.[46]

Campbell's other contribution was the observation on the manufacture of Bar Iron in Southern India. He wrote it in two parts.[47] His main attempt was to help the formation of governmental policy in making bar iron, but

it was full of information and analysis. He referred some European authors and their views while discussing about the character of cast iron - what it is?, what its component parts are?, why it differs from steel?, etc. he supposed that those references would help in shaping conception about bar iron in India. He made comparative study between the manufacture of iron in India by Indian process and the other processes existed in the world.[48]

Campbell's another important contribution was on the mineralogy of Southern India. It is mention worthy that at first he wrote geology-based articles and then he turned into mineralogy-based analysis, which helped in the understanding of the geological process and progress in India. He correctly understood that petrology was a tough subject in India. So, he tried to make it easier to the readers. In the beginning he wrote, 'I fear that the subject of petrology in India will hardly be considered an interesting one, except to the man of professed scientific attainment, or to the tyro, who may be seeking information.'[49] In this article he focused on the science of 'Descriptive Petrology' and also tried to compare with the European scholars.[50]

Campbell's another noteworthy contribution was the review of the book 'A Treatise on Primary Geology, being an examination both practical and theoretical of the older formations', by Henry S. Boase, M. D. , Secretary of the Royal Geological Society of Cornwall, published in 1834'. In this discussion, the objects of the study of geology, the methodologies applied by the geological observers, the relation between geological and mineralogical specimens etc. were discussed in detail.[51] By writing this article, he wanted to make the geologists working in India aware about the true nature of geology as a useful discipline to mankind. Boase remarked about primary geology that 'Truth, not victory is the object contemplated: and if my conclusions have been legitimately deduced from the facts brought forward, their value cannot be diminished by an exposure to the fullest scrutiny.'[52] In India, it was equally important to the geological observers. Through this article, the readers could get the information that even in the Western World, geological studies were based on primary observation. From

Boase's writing it is clear that all the cultivators of geology had not carefully studied the granitic formations during the previous twenty years. The exceptions were the excellent works of Henry De La Beche and Charles Lyell.[53] In 1834, Boase wrote that the academic analysis was absent even in the western world. Campbell remarked that ' In most of the lately published geological accounts of countries we look in vain for details concerning primary rocks; we sometimes indeed learn, that such and such a district consists of granite; but cannot collect any information concerning its composition, or the associated together.'[54]

The reports of geological observers were often published in this journal, by which, readers became aware about the vast geological investigations of that period. One article written by Capt. N. Vickary on 'Geological Report on a portion of the Beloochistan Hills' was published in 1846 in the 6th volume. One mention worthy point is that it was communicated by Sir R. I. Murchison, and was published priorly in 'The Quarterly Journal of the Geological Society'. In this writing, N. Vickary confessed his limitations for not being able to survey thoroughly, his 'hasty examination' which created 'many defects in the details'. He wrote towards the end of his report, 'It happened more than once that I passed over most interesting ground during the night, and even in the day time other duties often required my undivided attention'. It is a known fact to us that during that time geological observers had to face various types of problems. It is one of these instances. Lastly he gave his sincere thanks to Sir Charles Napier for the assistance so liberally delivered in affording him carriage for his specimens, - '- an instance of regard for the interests of science rarely manifested in India'.[55]

IV

Several articles and letters were published, which highlighted the policy of the government. Such as, 'Extract of a report of Capt. Campbell, Assistant Surveyor General, Madras, addressed to the Coal and Mineral Committee'.[56] Here he specially mentioned about the 'magnesian clay' which, according to him was 'valuable' and could be successfully used in 'the manufacture of improved kinds of pottery'. He also wrote in detail about manufacture of

iron by smelting iron sand and obtaining gold by washing and separating it from the sand by native Indian people in that area. His report also consisted of coal searching. He opined in his report, 'I shall be able to forward shortly to the Committee more complete information'.[57] 'Mineralogical Report upon a portion of the districts of Nellore, Cuddapah and Guntoor by Lieut. Ouchterlony, F.G.S., Madras Engineers' was published in 2nd volume.[58] This report was prepared for a different purpose, 'This is a --- report on the causes of failure that have attended Mr. Ouchterlony's recent attempts to turn the Nellore Copper Mines to good account. We are always sorry to hear of unsuccessful attempts of this nature, although they are often more valuable than more flattering statements of the riches of mines'.[59] In the volume three, an article appeared on 'Notes on Rajmehal Coal', which was published from the proceedings of the Coal Committee.[60] Its main content was the government policy. Another article on 'Indian Coal', appeared in the same volume, spoke in favour of the steps taken or would be taken by the government. The editor of the journal wrote a letter to Charles Lyell, the distinguished Geologist, which was printed in this issue.[61] This was also forwarded to R. I. Murchison, who was then acting as the President of the Geological Section of the British Association, as well as of the Geological Society of London. Here John McClelland highlighted some specific problems related with coal investigation process. He wrote, 'For my own part, I consider any thing short of a thorough investigation of the Indian coal formations, by persons of the very highest qualification for such enquires, as time and money thrown away.' He mentioned some acute problems which observers at that time had to face, such as 'The places in which coal occurs in India are usually remote and unfrequented, and are scarcely even to be found on our best maps. The consequence is, that a person incapable of availing himself of the light which the study of organic characters of rocks has cast upon all such investigations, finds himself lost, literally, in a wilderness from which he is only anxious to withdraw as soon as possible. Perhaps he possesses himself of a few specimens of coal without attempting to make himself acquainted with the topography of the place; and without the power of communicating to others any distinct idea of the

characters of the rocks, or the extent of the beds, he is satisfied to return, and quit the field just at a time when the researches of a qualified person should commence.' He also added citing an example that, 'Or as it sometimes happens, recommends practical operations to commence on wrong data, as in the instance of Tenasserim coal, where 50,000 Rs. at least were thrown away in working a wrong bed'.[62] The progress of searching coal fields was very slow then. The journal brought this fact into notice of the great geologist of that time, Charles Lyell. Lyell informed that to Murchison. Murchison expressed his opinion regarding this matter as, '--- whilst very large sums have been spent upon enquires into the botanical productions of Hindustan, and eminent botanists have been liberally employed, no geologist has been engaged, regularly and systematically, to work out the relations of the rock masses, containing various mineral substances useful to man.'[63] Even he assured McClelland that, 'I will at all times afford you any support in my power in prosecuting the praiseworthy and truly national objects'.[64] Probably publication of such communications was done with a hope of making the readers of the journal aware of the attitude of them living in England. In volume four, an extract from the proceedings of the Coal Committee was published.[65] Various reports on geological surveys in India and outside were also published in different volumes.

A detail picture regarding discovery of coal in Assam was presented by quoting the letters of Major Jenkins, Commissioner of Dibrugarh and Capt. Vetch, Political agent. Jenkins concluded by saying, '... these great deposits will surely be of local use by and by'. Vetch also mentioned about the excellent quality of gold obtained by washing the gravel found in the river beds in Assam. According to his information, about nine hundred gold washers were located along the banks.[66]

An article titled as 'On a method of treating Mineral Sulphurets, especially those of Copper, for the manufacture of Sulphuric Acid, and the extraction of their Metallic Base' along with a drawing was published. It was written by Lieut. Thomas Latter, of 67th Regiment, Bengal Native Infantry. He started , 'The following method of treating mineral sulphurets,

especially those of copper, having been for some time employed with great success in France, and on account of its simplicity and cheapness, being peculiarly adapted for use among the natives of India, I take an early opportunity of publishing it through the medium of your Journal.' This is based on a vivid and analytical description.[67]

Dr. Rink, one geologist attached to the Danish Expedition, sent a letter to Dr. MClelland, describing the general geological structure of the Nicobars. '... the geological study of which, afforded me occupation as well as amusement during my stay on this wild and solitary place. ... I will send ... a small case with specimens of the rocks surrounding this harbor. A more complete collection of all those kinds of rocks which constitute the Nicobar Islands, I am arranging for you at the Little Nicobars, where I have established my museum and chemical laboratory in a hut. This I will have the honour of sending you from Penang, together with a more circumstantial description. But still I should be very glad, if you would honour some of the above observations with a corner in your Journal; and lastly, I desire you not to forget that this letter is written by a foreigner, who hitherto had only very little opportunity of practicing English correspondence.'[68] This appeared in the 7th volume.

A letter was published in this journal, which clearly showed the eagerness of the highest authority in British India towards geological investigation. The letter was written by Major General M. Cubban, Commissioner for the Government of the Territories of the Rajah of Mysore. It was addressed to the Secretary to the Government of India, Foreign Department, Fort William. He wrote, 'Sir, - With reference to a letter addressed to me on the 25th January 1841, at the desire of Lord Auckland, by Mr. Assistant Surgeon McClelland, Secretary to the Committee for the investigation of the Mineral Resources of India. I have the honor to acquaint you, for the information of the Right Honorable the Governor General in Council, that I have despatched to Calcutta, via Madras, a cabinet of mineral specimens, collected by Mr. Assistant Surgeon W. Gilchrist, attached to the

Public Cattle Department of the Madras Government, situated at Hoonsoor within this country.' He specially mentioned that he desired to obtain particular information regarding the chromate of iron.[69]

An article, 'On the Tin of the Province of Mergui' with a map was sent by Captain G. B. Tremenheere, which was communicated by the Coal and Mineral Committee.[70]

Some voluminous articles also appeared in various volumes of the journal. Captain Thomas Hutton wrote an article on 'Notes on the Geology and Mineralogy of Affghanistan'. It was of 49 pages, consisting of information and analysis.[71] In volume five, Capt. Thomas Hutton published an article on 'Apparent objections to the Glacial Theory'. It was based on contemporary theoretical geological analysis.[72] In this article, views of Charles Lyell, De La Beche, Buckland, Bakewell were analysed and discussed. Another article, written by an anonymous author was on 'Geology and Magnetism'. It is of 40 pages. In it, the globe was thought as a magnet and by the help of it, the mineral masses could be searched[73].

V

There were ego problems among the surveyors which lead to some severe criticism by fellow surveyors. Though such criticism sometimes caused grave situations but again they appeared to be helpful to the surveyors to become very much alert and cautious in their own observation. One such instance can be mentioned here. J. G. Malcolmson, surveyor of Bombay Establishment wrote a letter of about five pages to the editor of Calcutta Journal of Natural History regarding the writing capacities of Captain Campbell, such as, '--- although the occasion is unpleasant, my object is merely to solicit Captain Campbell to place less confidence in authority, and to employ his talents and his great opportunities in a course of careful research by which the science to which he is devoted may be advanced, instead of attempting, by somewhat hasty observations, to rebuild forgotten hypothesis, or to invent a science from the foundation, like the palace of air presented to Thor, by the giant Skirmis in Jholhim land, "things that dreams

are made of"[74] According to him, Campbell's analysis 'is too confused to be well understood'. Again he firmly commented, 'It was Captain Campbell's duty, either to have examined for himself, or to have said nothing of it'.[75] He again remarked, 'I therefore entreat Captain Campbell to describe with care and in common language, the districts he may have opportunities of examining; and not to imagine that one man can build up a science such as this, or that all that has been done by the many profound geologists, chemists, mineralogists, travelers, and naturalists in all countries, can be overlooked by anyone who himself aspires to contribute his share to the good work. He cannot have a better model than that furnished by Dr. Voysey or Dr. Benza, both of whom were intimately acquainted with the districts visited by Captain Campbell'.[76] Though it cannot be observed how did Capt. Campbell dealt with such comments but it can be mentioned that several articles written by Campbell were published in the journal even afterwards. However, in the next (5th) volume, it was written in the preface, 'We are indebted to Captain Campbell of the Madras service, for --- valuable communication on the important manufacture of wrought iron in India.' It was also written that the practical importance of this subject 'requires no comment'.[77]

VI

It can be said that in this journal varied range of articles were published. Reports of geological investigators as well as academic geology were treated with serious and sincere discussion and governmental policies were highlighted and analysed in great detail. The problems and prospects were also analyzed thoroughly. By these initiatives, the journal specially wanted to create awareness among educated classes.

This journal ventured to spread the contemporary ideas. From the fourth volume onwards, two sub sections were added. They were on Geology and Zoology. John McClelland conducted the first sub section. In 4th volume, it was written, 'The present volume will found to contain a greater number of original drawings than any Journal of the kind in India ever before attempted to furnish. This has been attended with considerable increase of

expense, but not more than the liberal support the work has met with seems to justify, and it is hoped, the future years will work still greater improvements, particularly in the style of the lithographs'.[78] In the preface of the 5th volume it was written, 'It becomes our duty again to return thanks to the supporters of this Journal. The present volume contains a larger proportion of original matter, devoted to the investigation of natural productions before undescribed, than any of its predecessors'.[79]

VII

Price for subscribers was mentioned as Rs. 16 per annum[80] and was published quarterly. In the 2nd volume a detail list of the names of the subscribers were enumerated. Most of the subscribers were of Calcutta. Persons from Dumdum, Hoogly, Serampore, Midnapore, Burdwan were also found in the list. The name of the persons from different parts of India and abroad, such as Madras, Meerut, Baireilly, Assam, Rajputana, Moradabad, Mirzapore, Tirhut, Goruckpoor, Agra, Quetta, Bombay, Almorah, Umbala, Monghyr, Singhbhoom, Kandahar, Singapore were also enlisted. Persons of different professions, such as of Military department, Medical services, Government General department, Educational Institution, Calcutta Public Library were found as these subscribers.[81]

The popularity of this journal has increased to a great extent, specially among the intelligentsia. In the 5th volume, it was written that the Court of Directors, who were 'always the munificent Patrons of Science, have become subscribers for 50 copies.'[82] In the 8th volume, it was also written that the journal will be continued 'quarterly' and communications and orders for the work to be sent under cover to the Editor. It was also written that in London, communications and orders will be received by Ostell and Co., Oriental Library, 83, Leadenhall Street. The Journal will be transmitted by dak (by post), bearing postage, or delivered to agents appointed to receive it in Calcutta.[83]

VIII

Fund posed a major point of worry then. Many of the journals found it

difficult to meet the expenses of printing and postage. Under such constraints, it was increasingly difficult for scientific journals to maintain their commitment to science. So many of them were bound to stop their journey.[84]

Postscript to the thirtieth number of the Calcutta Journal of Natural History expressed, 'However well a Journal may be supported as to the number and talent of its editorial staff, yet it is necessary, that some one resident at the place where it is published should take the trouble of superintending the details of printing and publication. Some uncertainty having existed during the past few months as to how far the present managing Editor might be enabled to continue the personal superintendence of the work, it has consequently been allowed to fall slightly into arrears. Under these circumstances it is thought necessary to bring the series to a close with the present number. Should circumstances allow of the renewal of another series, nothing would afford the managing Editor more pleasure than again lending his aid to the undertaking, and once more co-operating with his colleagues, to whom the credit and usefulness of the Journal has, of late, been entirely due.'[85]

IX

The voluminous and gigantic publications on geology in all the volumes of this journal demonstrated a fragment of a vast scenario in front of us during the dawn of a new scientific era. Through these initiatives, the educated and cultured people took interest in the subject of geology. As a result of this, intellectual and scientific curiosity on geology gained importance in the academic mind of the people. A large number of articles on geology, published in this journal along with the Journal of Asiatic Society and Asiatic Researches, Madras Journal of Literature and Science, Calcutta Review, India Review and Journal of Foreign Science and Arts bear the testimony of the increasing importance of the subject in the academic circle. Ultimately, the British Government had no other alternative but to introduce geology in the academic curriculum of the students at the end of the 19th century with the motive of producing Indian geologists for the purpose of geological explorations.

Notes and References:

Petrology - The study of rocks, their physical and chemical properties, and their modes of origin.

Economic Geology - Special branch of geology with special training for service in the mining of metals and non - metals, in discovering and producing petroleum and natural gas, and in engineering projects of many kinds.

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