THE PALAEONTOLOGICAL SOCIETY OF INDIA[1]

M. R. SAHNI
President

ABSTRACT.—The aims and objectives of the *Palaeontological Society of India* are outlined. The Society which has the active support of the Indian Universities and Institutions and of many distinguished foreign scientists, encompasses in its scope research in Palaeontology, Palaeobotany and Prehistory. Among its principal objectives are—(1) assisting in explorations for oil and coal (2) elucidation of important unsolved problems of Indian Palaeontology (*e.g.*, age of the Vindhyan and Krol systems), Palaeobotany (*e.g.*, Pre-Cambrian floras) Prehistory (particularly discovery of fossil man in India and bridging the Mesolithic and Neolithic lacunae), (3) preparation of palaeogeographic maps, index of animal and plant fossils and of lithic tools, (4) search for mammalian origins in Permo-Triassic rocks (5) assisting in world correlations of faunas, floras and lithic industries (6) preparation of monographs on Indian fossils or related faunas (7) initiation of studies in palaeontological statistics, rates of evolution and geological time determination, etc.

Among its other important objectives are (8) founding a Museum and a Library and disseminating popular knowledge among the lay public, and last but not least, (9) it aims at fostering goodwill among scientists of different countries as a means of promoting unity and tolerence, which is as important as science itself in the world of today.

The debt that Indian Palaeontology, Palaeobotany and Prehistory owe to the early scientists in these fields and to geologists, army surgeons, clergyman, meteorologists, engineers, surveyors and explorers who helped to lay the foundations of these sciences in India, is acknowledged.

INTRODUCTION

ALTHOUGH the idea of founding a centre for promoting coordinated palaeontological research in India has been in the author's mind for many years, it was only on the 26th of January, Independence Day 1950, a landmark in Indian chronicle and in the growth of science in this country, that it took concrete shape. The signatories to the Memorandum met in the city of Lucknow and founded the *Palaeontological Society of India*. The spontaneous support received at home and abroad became a source of great encouragement. This, the Inaugural Volume of its Journal is a monument to the cooperation and goodwill received from Palaeontologists, Palaeobotanists, Anthropologists and Archaeologists not only in India but the world over. Above all it is a tribute to the men of science who find in their individual and varying pursuits, a common platform, an emblem of the essential unity of the human race, forgetting differences which today divide neighbour from neighbour. It is a practical demonstration (in the field of science) of the principle and panacea of co-existence, signifying the triumph of science over political separatism of an antique era ; it signifies even more, as Prof. Chester Arnold, the distinguished American palaeobotanist writes in his message—"The Palaeontologist might succeed where politics fail"!

As Founder-President of the Society, and on its behalf, it is my privilege to extend cordial thanks to all those who have contributed scientific papers to this Journal and given moral and material support, so essential to success. This volume contains important research contributions from Australia, Ceylon, Denmark, France, Great Britain, Germany, India, Italy, South Africa, the United States of America, the U.S.S.R., and a very useful and informative note by Prof. J. A. Orlov, Director, Institute of Palaeontology, Academy of Sciences of the U.S. S.R., Moscow. Numerous messages of goodwill, fossil specimens and generous donations of publications for the Society's library

[1] Published by permission of the Director, Geological Survey of India

and museum have been received from all over the world, which link scientists of many lands with us. In particular, we are beholden to Mr. P. Evans through whom a handsome donation was received from the Assam Oil Company for the publication of this Journal ; likewise to the National Institute of Sciences of India and many others whose names are printed in the list of donors.

OBJECTIVES

OIL AND COAL EXPLORATION; PALAEOGEOGRAPHIC MAPS; INDEX FOSSILS OF INDIA.

The Palaeontological Society was started with several objectives in view. Firstly, for a country launching upon a career of independence, it is essential to mobilise its entire economic resources—oil, coal and other strategic minerals. For petroleum exploration no aspect of science is of greater importance than palaeontology whose essential function is to determine the ages of rocks, basic to any scheme for finding oil. Sound and detailed mapping of sedimentary formations, particularly the Tertiaries, and a minute study of their fossil content which has characterised the work of petroleum companies led to the discovery of oil in India, Pakistan, Burma and other parts of the world, even before the introduction of geophysical methods of prospecting. But what are the other requisites ? To achieve these objectives, it is essential to encourage palaeontological research in the Universities and geological Institutions, and to coordinate and canalise it so that in addition to their various academic facets, these institutions may contribute to the material prosperity of the country. For example, it should be of inestimable value if individual University and other centres in Rajasthan, the Punjab, Uttar Pradesh, Bengal, Assam, Orissa, Madras, etc., could devote special attention to their more important sedimentary deposits, map them in detail and elucidate basic structural and stratigraphic information for further exploration over wider areas, thus supplementing their other work. So far the mere fringe of the problem has been touched. We thus hope, ultimately, to develop a *Palaeontological Research Centre*, one of whose functions would be to work in the interests of oil and coal discovery in India. The Universities and other Institutions would then be able to play their rightful part in the country's economic development as they have done in the cultural field. This will also, we hope, relieve some of the burden which now rests upon Government institutions, and which is likely to increase in the near future.

To give a concrete instance. The author is of the view that the Cretaceous basins of S. India could be potential sources of oil. Had these basins been mapped in detail by the geologists of the southern States, much useful information would be available for actual detailed oil exploration today. The last detailed mapping of this region was carried out almost a century ago !

For aiding the correlation of world stratigraphy and prehistoric archaeology, upon which increasing emphasis is being laid by International Geological and Palaeontological Congresses, it is essential to prepare Palaeogeographic Maps, illustrations of Index Fossils and Stone Tools of India typifying our stratigraphy and various lithic cultures. It will be the function of the Society to set up Committees to carry out these objectives.

SPECIAL PROBLEMS IN STRATIGRAPHIC PALAEONTOLOGY : INTERNATIONAL COORDINATION IN REGIONAL PALAEONTOLOGICAL PROBLEMS

There are several important problems in Indian geology that need particular and urgent attention. Some of these are essentially local in scope while others call for cooperation in the international field. The former relate to Indian stratigraphy and have remained unsolved in spite of a century and more of field work—for example, the age of the Vindhyan system of rocks—a vast pile comprising limestones, slaty shales, sandstone, etc. Though unfossiliferous in the main, they contain some organic remains, *e.g.*, the genera *Fermoria* Chapman, *? Hyolithes* Eichwald, etc. The age of the formations encompassed within the Vindhyan system is still a matter of speculation in spite of recent determination of the algal nature of *Fermoria* by M. R. Sahni and R. N. Shrivastava, (vide *Current Science*, 1954). The find of traces of vascular plants in Cambrian and Pre-Cam-

brian rocks has added to the difficulties of the problem even though some have considered these announcements premature. One of the major problems of Indian palaeontology is, therefore, the need for a determined effort in the field and laboratory to establish beyond doubt the age of the Vindhyans. For this it is proposed to set up a "*Vindhyan Committee*".

Another similar problem concerns a much younger formation—the Krols—constisting of a vast thickness of dolomitic limestones and argillaceous strata with carbonaceous intercalations. No part of the Krol system has yielded authentic organic remains, though it appears to be (like the Vindhyans) admirably suited for their preservation, and one expects a fossil to walk out with every stroke of the hammer ! The dolomites look remarkably like the Devonian Plateau limestones of the Shan hinterland of Burma, but stratigraphically they appear to be younger. A "*Krol Committee*" would be formed to make a concerted effort to settle the long standing problem of their exact age. That this is possible is evident from the discovery of foraminifera and brachiopods in the (dolomitic) Plateau limestones by the author two decades ago, probably the only record of its kind. And this despite the fact that prior to this discovery several geologists had surveyed the area for decades, and declared the dolomites to be unfossiliferous.

One of the least studied subjects in India and one that is of the greatest importance not only to the palaeontologist and geologist but also to students of prehistory—is the Pleistocene—its fauna and flora, and the Siwaliks in general. It would be necessary to create a *Pleistocene-Siwalik Committee* to collate known data and elicit new information bearing upon many problems of geology, palaeontology and prehistory that await solution. It is proposed particularly to initiate and to encourage coordinated efforts between palaeontologists and workers in prehistory—coordination which has been almost entirely lacking so far.

FIELD EXPEDITIONS : SEARCH FOR HUMAN ORIGINS; EARLY MAN IN INDIA

Further, the crucial problem of early man in the Indian continent, Burma and Ceylon yet remains unsolved in spite of the magnificent work on stratigraphic and prehistoric problems by Indian and foreign geologists and archaeologists. Although literally cartloads of stone implements have been discovered representing various cultures, the *Sohan* of W. Pakistan, the Palaeolithic of Southern India, the *Anyathian* of Burma and the *Ratnapura* and *Balangoda* phases of Ceylon, not a single authentic fossil of early Man, more primitive than *Homo sapiens*, has yet been found in this vast continent or adjacent terrain. And this despite the fact that numerous discoveries have been made not far afield—in Palestine (Neanderthaloids), Java and China (Pithecanthropoids), Africa (Neanderthaloids and the Australopithecines and possibly also the Pithecanthropoids). Surely in India, Ceylon and Burma, too, Palaeolithic man must have left his naked bones behind somewhere.

The importance of this problem can be judged (if proof were necessary) from the number of expeditions sent to India by foreign countries to explore the Pleistocene Ice Age terraces and contemporary deposits for remains of early Man. It is hoped that the Palaeontological Society will be instrumental in exploring the ancient Narbada terraces and caves (*e.g.*, Karnool), the Karewas of Kashmir and other lake deposits and older alluvial regions. We propose to set up a *Permanent Field Survey* as suggested by that grand old French savant of Prehistory, Pierre Teilhard de Chardin, in his message to us, and to organise expeditions till the problem of early Man in India is solved. The all-round encouragement we have received from Indian and foreign scientists assures that we shall achieve these objectives, and there is little doubt that great discoveries relating to early Man await us.

ACADEMIC ASPECTS ; PREPARATION OF MONOGRAPHS

While economics and other similar activities play important roles, the purely academic aspects of palaeontological research should be equally kept in perspective. The magnificent contributions of the earlier savants, appearing mainly in serial publications of the Geological Survey of India, undoubtedly constitute great landmarks in Indian science, but we have yet to

investigate the broader problems of evolution, and determine the lines of descent and relationship of the varied forms described in these voluminous monographs; and the missing links between the reptiles and mammals surely await discovery in our Permo-Triassic rocks. We have to unfold the problems of polar shift, of many a palaeogeographic panorama, including the details of the Gondwana continent and seas and of the great land-bridges straddling the oceans which, according to some, served as highways for the migration of terrestrial faunas (particularly vertebrates) and floras e.g., *Glossopteris* and *Gigantopteris*. In the remoter geologic past we have to determine the lie of the island chains of the Lower Palaeozoic sea, evidenced by the suspected occurrence of land plants (*Psilophytales*) in Spiti, suggested by Birbal Sahni. And we have also to determine the evolution of the Indian continent itself and its links with Ceylon which, except for certain Miocene and Pleistocene eustatic changes are but imperfectly known. For all these, detailed palaeontological study on modern lines is essential which implies extensive revision of earlier work.

The publication of monographs on fossil groups or even individual genera is one of our aims, for many of these now call for revision. Indeed much of our palaeontological work outside the orbit of Government institutions needs to be reorganised and this will be done in due course.

ORGANISATION OF A MUSEUM AND LIBRARY

Of equal importance is the dissemination of geological and palaeontological information to the general public. An important medium for this is the museum, which may be aptly described as a "University for the Masses", it being far easier for the layman and the non-specialist to imbibe scientific knowledge from actual objective illustrations than by mere reading. Moreover, explanatory legends must be given in the languages which the common man understands—Hindi, Urdu, Bengali, etc. The author attempted, almost two decades ago, to focus attention on the more or less static character of museums in India (*Curr. Sci.*, 1938); This is due partly to lack of finances but equally to lack of imagination and reasoned planning.

In the field of Palaeontology and allied sciences, the Palaeontological Society is therefore expected to play a leading role in providing information in the Indian languages or popular English. Thus only can the value and meaning of these sciences be brought home to those who have only a modicum of education or inadequate scientific grounding; thus can the common man find his visit to a museum worthwhile.

For attaining these objectives, the Palaeontological Society proposes to organise a Museum of its own both for research and display, and a Library. While specimens from Indian localities would naturally constitute the major portion of the Society's museum collections, foreign specimens would also be exhibited. Already through the courtsey of Prof. J. A. Orlov, we have received a magnificent set of casts of Mongolian Dinosaurs from the Academy of Sciences, U.S.S.R.; also fossil specimens and publications from Mr. V. P. Sondhi, Director, Geological Survey of India, and some Mesozoic brachiopods from Prof. Ardito Desio, Milan, leader of the K_2 Expedition. The Academy have also sent a nearly complete set of publications of their Palaeontological Institute, and a similar set has been presented through the courtsey of Dr. Eigel Nielsen by the Museum of Mineralogy and Geology of the Universiy of Copenhagen. To these have been added reprints of scientific papers from other museums, institutions and individual authors all over the world. These publications and specimens constitute the nucleus of our library and museum to which, we are sure, much will be added in the near future.

INTERNATIONAL COOPERATION : A PALAEONTOLOGICAL SOCIETY FOR S. E. ASIA

It is not only our intention to assist in the solution of problems of Indian palaeontology, palaeobotany and prehistory, but also to work for the widest possible cooperation on the international plane. Indeed our aim is ultimately to widen our scope and to expand the Palaeontological Society of India into one for S.E. Asia, holding meetings in its capitals. This would help to give a

THE PALAEONTOLOGICAL SOCIETY OF INDIA.

We the undersigned wish to form ourselves into a Society, to be registered under the Societies Registration Act (XXI of 1860) in pursuance of the above memorandum of Association.

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Geology,
Lucknow University,
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Dated 26th January, 1950.

FOUNDERS OF THE PALAEONTOLOGICAL SOCIETY OF INDIA : SIGNATORIES TO THE MEMORANDUM

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Rajnath
Founder Vice-President

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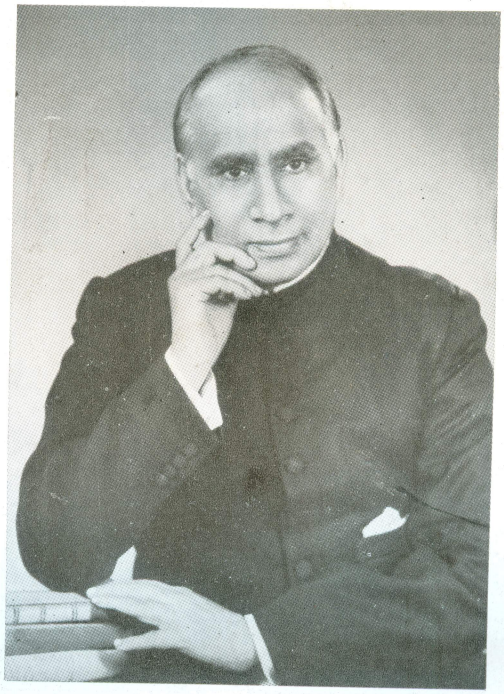

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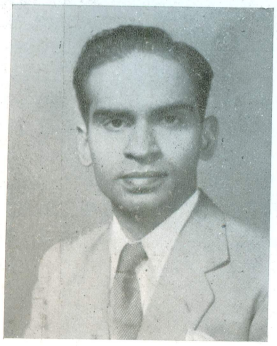

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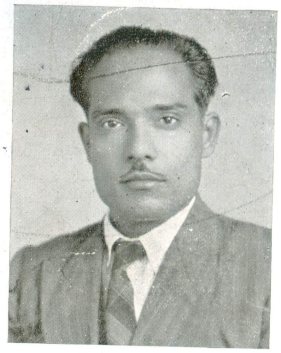
Secretary



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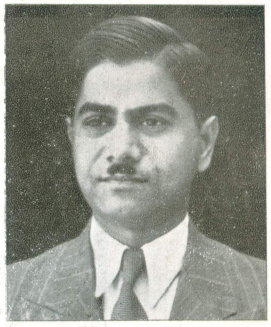

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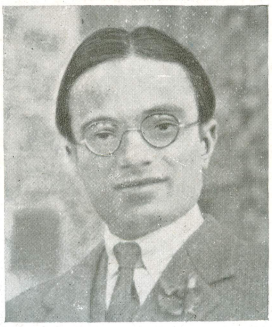

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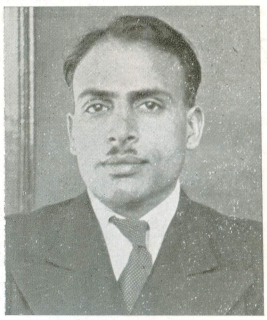

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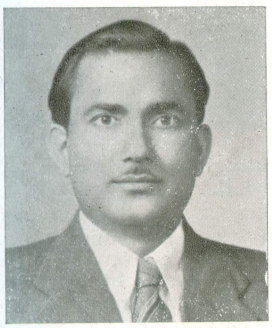

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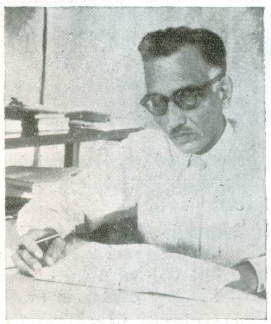

Y. Nagappa
Council Member

S. N. Singh
Founder Fellow

FOUNDERS AND OFFICE BEARERS OF THE SOCIETY

In a remote Himalayan outpost : grave of the distinguished Austrian naturalist, Ferdinand Stoliczka, at Leh. He was the first official palaeontologist to the Geological Survey of India (*Photo* G. Kohli, Geological Survey of India, 1955).

"Ferdinand Stoliczka, Ph.D., Born in Moravia, 7th June 1838; died at Moorgo, 19th June, 1874, while returning from Yarkund with the British Mission to which he was attached as Naturalist. Though young when he fell a sacrifice to duty, he had already achieved eminence by his researches into the geology and natural history of India and his early death deeply regretted by the world of science and by the Government of India, who, in recognition of his able and honourable services, have caused this monument to be erected, 1876."

clear, concise and coordinated picture of its geology, palaeontology and of those problems of economic geology which are dependent upon the study of fossils for their solution. In this way many countries will be the richer for the experience of others.

There are certain purely palaeontological problems that require international coordination for satisfactory solution. Such problems are, determination of relationships between certain Indian and extra-Indian faunas, the *Eurydesma* fauna, for example. This seems to evince certain differences between its Kashmir and Sikkim species on the one hand and Australian on the other, differences that may be even of generic rank. Doubts have been expressed whether all the Indian forms are assignable to *Eurydesma*, sensu stricto—doubts that have not been resolved even by recent work. The status of the Indian Cretaceous brachiopoda with reference to European forms is another problem. There are others. One solution of these problems seems to be to arrange for joint meetings and consultations between workers on individual problems, preferably with type materials available for such examination and exchange of views. This procedure will prevent the burdening of nomenclature with large numbers of species names, which sometimes becomes inevitable from a study of figures and descriptions alone. In any case, this seems to be a desirable procedure where forms with widespread distribution are concerned. Some of these problems would come within the purview of a "*Palaeogeography Committee*".

In this way it is hoped that the Palaeontological Society of India would be instrumental in solving or aiding in the solution of many important problems, local and regional.

STATISTICAL STUDIES; MEASUREMENT OF GEOLOGICAL TIME AND RATES OF EVOLUTION.

It was inevitable in the nature of things that palaeontological studies during the earlier years of the science would be confined to systematics and to amassing of details of a more or less descriptive nature. The voluminous memoirs appearing in Indian serial publications bear witness to this. But in the modern renaissance of the science, palaeontological and palaeobotanical investigations have assumed a different aspect, and more and more emphasis is being laid on the synthetic as opposed to analytic approach, and to palecology. For this the introduction of statistical methods is of fundamental value. We are fortunate in having a Statistical Institute under the inspiring leadership of Prof. P. C. Mahalanobis where the palaeontologist and biologist can usefully cooperate with the statistician in preparing variation graphs and in the elucidation of more complicated statistical problems connected with vertical zonal variation of species, or interrelationship of species groups.

A problem that has not so far been touched in India is that of rates of evolution in vertebrates, invertebrates and plants. How much time elapsed for any particular species to give rise to another, how long it took for one group to give rise to its next successor, what are the causes of the so called Explosive Evolution ? and so on. Not the least important is the problem of age determination and measurement of Geological Time. These are all interconnected facets of the same story, in the unravelling of which the Palaeontological Society will be concerned.

WE REMEMBER

In trying to visualise the future, we remember the past; on the threshold of achievement, we think of those who made success possible. We dedicate this, the Inaugural Number of the Journal of the Palaeontological Society of India, to the memory of those men of science—palaeontologists, palaeobotanists, archaeologists, geologists, explorers, army surgeons, surveyors, engineers and missionaries—who with a singleness of purpose revealed the scientific heritage of this continent, its lofty mountain ranges, its desert regions, its vast continental expanses, its shore lines; who worked incessantly and arduously in those difficult early days and

produced memoirs that are a lasting tribute to their noble worth. To all of them who laid the foundations of these sciences in India and now serve as fountains of inspiration, and some whose mortal remains lie enshrined in our soil, we dedicate this volume.