
CURRENT SCIENCE — 50 YEARS AGO

Some Aspects of Modern Geology Discussed*

IN the Geology Section of the recent Jubilee Session of the Indian Science Congress presided over by the eminent Indian geologist Mr. D. N. Wadia of the Geological Survey of India, many important papers were read and valuable discussions held, dealing with several aspects of modern geology. There was a large and representative gathering of geologists including Professors of Geology from almost all the Indian Universities, and Officers of the Geological Surveys in various parts of India. There were also present some of the foremost geologists from abroad, as part of the foreign delegation, such as Prof. P. G. H. Boswell, O.B.E., D.Sc., F.R.S., Professor of Geology, Imperial College of Science and Technology, London, Dr. A. L. du Tott, D.Sc., F.G.S., Consulting Geologist of Johannesburg, S. Africa, Prof. W. G. Fearnside, F.R.S., Prof. of Geology in the University of Sheffield, Sir L. L. Fermor, O.B.E., D.Sc., F.R.S., Former Director of the Geological Survey of India, Prof. W. T. Gordon, D.Sc., and Prof. H. H. Read, D.Sc., Prof. of Geology in the University of Liverpool. The visiting geologists took a keen interest in the papers presented, and participated freely in the discussions, thus contributing to make the proceedings lively, useful and stimulating. The following is a brief account of some of the discussions and symposia held during the session.

Chronological testimony of fossil plants and animals

Under the joint auspices of the sections of Geology and Botany, a symposium on "Discrepancies between the chronological testimony of fossil plants and animals" was held on Tuesday, 4th January 1938. Dr A. L. du Toit, the well-known geologist of S. Africa, presided.

Prof. B. Sahni (Lucknow) in opening the discussion referred to the increasingly important part played by fossil plants in the age determination of strata, and said that the apparent discrepancies between the chronological testimony of fossil plants and animals were mostly of our own creation—due to such factors as incorrect identification of fossils, the absence of sufficiently detailed and accurate

observations in the field, etc. In all cases where stratigraphical position of a bed has been accurately noted in the field, and where the fossil plants and animals collected from that particular horizon have been investigated correctly, no discrepancy is ever noticed between their chronological testimony. In support of his conclusions, Prof. Sahni referred to a number of cases in Indian stratigraphy where there was supposed to be a discrepancy between the chronological testimony of fossil plants and animals, and after examining in detail the evidence in each case, showed how recent and more definite studies of the fossils and their exact position in the bed from which they have come, have made it clear that there is really no discrepancy of any kind. In fact it is not likely that a real discrepancy can ever exist between the chronological testimony of fossil plants and animals.

Mr D. N. Wadia (Calcutta) referred to four instances in India where there appeared to be a discrepancy in the testimony of fossil plants and animals—(1) the Po series of Spiti Himalayas, (2) the agglomeratic slate series of Kashmir, (3) the Gondwanas of the East Coast, and (4) the Deccan inter-trappean beds. Of these, he said, that except in the case of (3), the discrepancies were of minor significance, and can probably be accounted for as due to varying conditions of sedimentation, bad preservation, etc. In some cases, a real discrepancy may arise due to a lag in the rate of evolution of plants and animals in widely separated areas. He was of opinion that stratigraphic data carefully collected in the field, should be given prime importance in dealing with all such cases of discrepant testimony.

Dr M. R. Sahni (Calcutta) supported the view that there are no real discrepancies between the evidence of the plant and animal fossils. Detailed work has shown that the apparent discrepancies are merely due to such factors as (a) imperfection of the geological record, (b) misinterpretation of this record because of insufficient data, (c) incorrect determination of fossils, (d) conclusions drawn from purely geological evidence in the absence of fossils, and (e) even inadvertent mixing of fossil-collections, from different horizons. He amplified and substantiated these points with reference to

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three important formations in India where such discrepancies are supposed to exist: (i) the Deccan trap, (ii) the Gondwana rocks, and (iii) the Po series; and showed that the alleged discrepancy in each case may be explained, as due to one or the other of the above factors. Dealing with the question—do faunas and floras evolve at different rates?—Dr Sahni was of the opinion to suggest that marine animals evolved more rapidly than plants owing to differences in environment and organic structure, and so gave rise to discrepancies was not altogether justified by facts.

Dr A. L. du Toit (S. Africa) in concluding the proceedings, pointed out that the apparent discrepancies in the dating of formations by means of their respective marine and terrestrial fossils can be ascribed to a number of factors such as, for instance, (1) the uncertainties pertaining to the geological system—boundaries either locally or regionally, whereby correlation-errors are introduced, (2) evolutionary changes during migration along extended paths whereby widely parted faunas could become 'homotaxial' instead of synchronous, correspondences in stratal succession not necessarily implying contemporaneity in deposition, and (3) climatic, oceanographic, orogenic and other influences that have affected in different degrees or senses the life of the seas and lands, and impressed themselves differently on the marine and terrestrial biota. He particularly stressed on another vital factor, viz. continental drift. He pointed out how there was probably a creeping of the condensed land masses of Laurasia and Gondwana, over a revolving core, on the whole southwards during the Devonian and Carboniferous, when the motion became reversed with some anticlockwise rotation as well. Thus arose a progressive shift across the face of the earth of the main climatic zones, and the progress of such a climatic "wave" would naturally result in changes of biological environment, and therefore of evolutionary influences. He concluded by saying

that although the marine fossils would generally constitute a fairly consistent geological clock, palaeo-botanists should have no hesitation in stressing the plant evidence, should the latter be weighty, although at the moment, their conclusion may be at variance with that drawn from the associated marine faunas.

Boundary faults in the sub-Himalayas

"The Significance of Boundary Faults in the Sub-Himalayas", was the subject of an interesting discussion held on Wednesday, 5th January, under the presidentship of Mr D. N. Wadia of the Geological Survey of India.

Mr P. Evans (Assam) referred to the hypothesis developed by Middlemiss following a suggestion of Medlicott, which postulates that the faults within the tertiary strip of the sub-Himalayas are 'boundary faults' marking very closely the original limits of deposition of the successive groups. This conception of 'boundary faults' is still accepted as the orthodox interpretation of the structure and stratigraphy of the sub-Himalayan zone. But the recent detailed mapping in Assam has shown that the Disang thrust fault of the Naga Hills is not a south-eastern limit of deposition as suggested by the 'boundary fault' hypothesis. This and some other considerations seem to point to the need for the re-examination of the evidence on which the hypothesis is based. An alternative explanation which may be offered is that the faults are in the main of post-miocene age, largely contemporaneous, and have no close connection with the limits of deposition of the eocene and miocene beds. The object of the discussion is to consider the evidence for and against these two explanations, and it seems impossible to obtain any clear picture of the Himalayan mountain-building movements until such a fundamental contradiction is resolved.