
CURRENT SCIENCE—50 YEARS AGO

SOME RECENT ADVANCES IN INDIAN GEOLOGY * †

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5. The Geology of Salt Range.

THIS comparatively small range of mountains in the northern Punjab has long been regarded as the show locality of Indian geology. Its fairly complete geological record, its abundant fossils and its complicated structure have combined to make it a place of great attraction to geologists. Bound up with the correct interpretation of its structure is the question of the age of the Saline series, concerning which almost every geologist who has visited the Salt Range seems to have propounded a theory. The problem, it will be recollected, lies in the fact that while in the Salt Range the Saline series underlies rocks of Cambrian (or possibly pre-Cambrian) age, in the Kohat district, only 17 miles away, it underlies rocks of Upper Nummulitic (Middle Eocene) age. And since in the latter place it was considered by D. N. Wadia and L. M. Davies to be of lower Eocene age,¹ a view subsequently corroborated by E. R. Gee,² its stratigraphical position in the Salt Range was difficult to understand.

There is no need to summarise the early stages of this controversy. Suffice it to say that Sir Edwin Pascoe, as a result of his studies of the oil-bearing strata or north-western India, suggested a Tertiary age for the salt deposits of both the Salt Range and the Kohat area. This view necessitated the introduction of an overthrust between the Saline series of the Salt Range and the overlying Cambrian beds.³ The chief objection to this view was that no Salt Marl had been found in the Tertiary rocks of the higher parts of the Salt Range. Subsequently C. S. Fox, as a result of a visit to parts of the range, gave reasons for reverting to the Cambrian age of the salt,⁴ a view which also received some support from the fact that salt deposits were found in Persia associated with Cambrian rocks.⁵ More recently, G. de P. Cotter, after first accepting in a Cambrian age as probable on the balance of evidence,⁶ has now supported the view that the Saline series is of

Ranikot age, suggesting that its place of original deposition was in the Soan geosyncline to the north of the Salt Range, and that during folding movements associated with the final uplift of the range and of the Kala Chitta hills some of the salt marl was intruded southwards into its present position beneath the Cambrian beds.⁷ It has to be admitted, however, that owing to the thick covering of upper Tertiary rocks in the Soan geosyncline of the Potwar, the Saline series is nowhere seen *in situ* in its supposed original position beneath the Laki beds.

In the midst of so much speculation it is refreshing to know that during the past six years a careful re-survey of the Salt Range has been carried out by E. R. Gee whose mapping has been continued westwards across the Indus to link up with the *trans*-Indus ranges and with the Kohat salt region to the north. A summary of the conclusions that have resulted from this survey has, in so far as the Saline series is concerned, already been published in *Current Science*.⁸ In this Gee maintains that the Saline series of the Salt Range area is essentially *in situ*, and that the deposit is homotaxial with that of the Kohat salt region and with the Nummulitic limestone and shale deposits of Lower Eocene age which cover wide areas in north-western India.

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6. Epilogue.

In bringing to a close this series of short articles outlining the main lines along which recent work in Indian geology has been developing, I may refer very briefly to certain researches which for various reasons

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† Published in *Curr. Sci.*, Vol. III, March 1935, p. 412.

¹ *Trans. Min. Geol. Inst. Ind.*, 1929, 24, 202.

² *Rec. Geol. Surv. Ind.*, 1931, 65, 20; and *Curr. Sci.*, 1934, 2, 461.

³ *Mem. Geol. Surv. Ind.*, 1920, 40, 358-371.

⁴ *Rec. Geol. Surv. Ind.*, 1928, 61, 147.

⁵ *The Structure of Asia*, 1929, 3.

⁶ *Proc. Eighteenth Ind. Sci. Congr.*, 1931, 295.

⁷ *Mem. Geol. Surv. Ind.*, 1933, 55, 149-156.

⁸ *Curr. Sci.*, 1934, 2, 460-463.

I have omitted to discuss, Chief among these is the recent work which has been carried out on the geology of the Gondwana system. This has been done in the main by C. S. Fox and H. Crookshank, who have added considerably to our knowledge of this important period of Indian geology. For a general account of the geology of these rocks the reader is referred to Fox's recent memoir on the Gondwana system,²⁵ which forms a part of this great work on the coalfields of India; while the Gondwana rocks of part of the Satpura hills in the Central Provinces have been described by the Crookshank in a memoir which is now in the press.²⁶ Perhaps the most interesting discovery in Gondwana geology has been the find by K. P. Sinor near Umaria in Central India of a marine fauna in rocks which had hitherto been regarded as wholly continental in origin.²⁷ These rocks were subsequently mapped by E. R. Gee,²⁸ and the fossils found in them described by F. R. Cowper Reed.²⁹ Reference should also be made to Sir Thomas Holland's presidential address to the Geological Society of London in 1933, wherein he discusses comprehensively the evidence bearing on the age of the glacial phase at the beginning of the Gondwana period.³⁰ Finally a general discussion from the palaeontological standpoint of the question of land bridges in Gondwana times has been given by C. Schuchert³¹; while A. L. du Toit, a supporter of the hypothesis of continental drift, has discussed the classification of the sediments of Gondwana times and the question of the boundary between the Carboniferous and the Permian.³²

I have in these articles made little reference to recent work on the general structure of India, except indirectly in the sections dealing with the Himalaya.

²⁵ *Mem. Geol. Surv. Ind.*, 1931, 63.

²⁶ *Op. cit.*, 66, Part 2 (in the press).

²⁷ *Rec. Geol. Surv. Ind.*, 1922, 54, 14, *Bull. No. 2, Geol. Dept., Rewah State, 'Rewah State Coalfields' 1923*, 1-22.

²⁸ *Rec. Geol. Surv. Ind.*, 1928, 60, 399.

²⁹ *Op. cit.*, 367.

³⁰ *Quart. Journ. Geol. Soc.*, 1933, 89, 64.

³¹ *Bull. Geol. Soc. Amer.*, 1932, 43, 875.

³² *Rept. XVI Intern. Geol. Congr. Washington*, 1933.

Attention, however, may be drawn to two papers which are of importance. The first contains a discussion by Dr. L. L. Fermor on the origin of the Aravalli range.³³ In this it is concluded that there was an original fold-range in pre-Vindhyan times which was largely eroded before the deposition of the Vindhyan (? Cambrian), and that this range was subsequently rejuvenated as a horst bounded by faults in post-Vindhyan times. Thus its present aspect as a mountain range is regarded by Dr. Fermor as younger than had hitherto been thought and not directly connected with the original folding. The second paper is by E. A. Glennie, and deals with the data provided by the geodetic investigations of the Survey of India.³⁴ This is an illuminating paper, for it marshals the geodetic evidence in such a way as to throw light from a new angle on many problems of Indian geology. And though it seems that there is still a long way to go before the observed facts of geology and the geodetic evidence can be satisfactorily correlated, the paper is one which should be read by everyone taking an intelligent interest in the broader aspects of Indian geology and in general problems of earth history.

In conclusion, it can, I think, be claimed that the advances which have been made in our knowledge of the geology of India during the past decade, which I have attempted to outline in the preceding articles, have been very considerable. If any general conclusion can be drawn from a survey of this work, it is perhaps that recent work has for the most part demonstrated the soundness of the foundations which were laid 60 and 70 years ago by the pioneers of Indian geology, chief among whom were H. B. Medlicott and W. T. Blanford. Much of this early work had a significance which extended beyond the boundaries of India. Whether the same can be said for the more recent work time alone can tell.

Finally, I express my thanks to Dr. Fermor for reading through the whole of these articles, and for offering a number of valuable suggestions.

"The man who makes no mistakes does not usually make anything."—EDWARD J. PHELPS.

³³ *Rec. Geol. Surv. Ind.*, 1930, 62, 391.

³⁴ Survey of India, Professional Paper No. 27, 1932.