

THE CUDDAPAH IGNEOUS ACTIVITY

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THE author read a paper at the Indian Science Congress at Patna, in 1948, in which the view was expressed that the trap occurring in Delhi Series near Bayana was the same as the Gwalior trap; and the Erinpura granite, being post-Delhi, was of the same age as the other acid rocks of late Bijawar period of Sone Valley, and these were intruded at the end of the Cuddapah period. Recently an interesting paper has been published by Prof. A. Holmes in the Geological Magazine, Sept.-Oct. 1949, in which the age of uranite occurring in the post-Delhi pegmatites of Rajputana, which are associated with Erinpura granite, has been determined by radioactive method. The age determined amounts to 735 million years and this now definitely confirms the view expressed by the writer¹ that the Erinpura granites were intruded at the end of the Cuddapah period. For the last three years the writer, with the help of his research students, has been carrying on field studies on the geology of the Bijawars of Sone Valley and of Bundelkhand. This has considerably clarified the views on the igneous cycle of the Cuddapah age.

The conclusions arrived at as a result of this study are that the Cuddapahs can be divided into three parts: Lower, Middle and Upper. The Lower period was without any kind of igneous activity. In the Middle period there was vast igneous activity as a result of which several thousand feet of basic lavas were poured out in Central and Southern India. The basalts of this age are found wherever the Cuddapahs or their equivalents are exposed. After this, came the intrusion of the ultrabasic rocks, which are the source* of diamonds. After this, at the end of Upper Cuddapah period came very thick flows of acid tuffs and rhyolites, and intrusions of granophyres, felsites, and granites.

In Sone Valley, besides the extensive development of acid tuffs, there are big intrusions of granophyres and flows of rhyolites. In Bundelkhand also the acid tuffs have been found. According to the writer, these acid flows and intrusions of the Sone Valley and Bundelkhand are contemporaneous with the Erinpura granites of Rajputana. In Bundelkhand and Sone Valley what has been called as Lower Vindhyan such as Semri Series really belongs to the Upper Cuddapahs, and in Rajputana also, some of the formations referred to as Lower Vindhyan correspond to the Upper Cuddapahs and the Malani rhyolites and the rhyolites of Sone Valley and Bundelkhand are of the same age. The granites of Jalor and Siwana are almost of the same age as these other acid rocks. All these acid flows and intrusions mark the end of the Upper Cuddapah igneous activity accompanied by heavy folding. Thus the igneous cycle is clear and complete.

The age of the acid intrusions of post-Delhi period corresponding to Erinpura granite has been estimated to be about 735 million years by Prof. Holmes. The basalts are slightly older and in Sone Valley a few thousand feet of quartzites intervene between the basaltic flows and acid tuffs. So the age of these Bijawar basalts may be somewhere about 800 million years. The Radium-helium method used by the writer² gave the age of 500 million years for these Gwalior basalts. From the exact determination made by the uranium lead method now it appears that about 30-40% of helium might have escaped from these basalts. As regards the age of the beginning of the Cuddapahs, it will be somewhere between 800 and 900 million years. This corresponds to a lead ratio of about 0.11 which has been taken by Prof. Holmes as the lower limit of the Upper pre-Cambrian in the different parts of the world. Thus in India, in the Sone Valley, in the Semeri Series of Bundelkhand, and in Rajputana, the age of these granites and acid flows marking the end of the Cuddapahs can now be fixed as the end of the Upper pre-Cambrian. The writer is of the opinion that there may be several areas in Northern India where the granites and other acid rocks of this age occur but which have not been differentiated from the other older granites like Bundelkhand. In Bundelkhand the acid tuff flows are definitely

* Near Panna, a diamondiferous kimberlite plug has been located. In the Sone Valley a large amount of ultrabasic rocks of this age intruding the basalts have been studied by the writer. It is highly probable that these ultrabasic rocks also occur in Hyderabad State and Sambalpur area in Orissa where they have been the source of diamonds occurring in these areas. But they still remain to be located and will be of great economic importance.

much later than the Bundelkhand granite, and in Sone Valley these granophyres are of slightly later age than the basic Gwalior lavas, being much later than the Bundelkhand granite.

The detailed study of the Bijawars of Sone Valley and of Bundelkhand and of other areas

in Northern India will shortly be published in detail.

1. Dubey, V. S., and Pathak, B. D., *Proc. Ind. Sci. Congress*, Patna, 1948. 2. Holme, The age of the earth (*Bullet. Nat. Res. Council U.S.A.*), 1931, p. 415.

WHO ON THE USE OF STREPTOMYCIN

THE Standing Technical Committee of the Tuberculosis Association of India have resolved that the following recommendations of the Expert Committee of the World Health Organization on the use of Streptomycin be adopted in India :—

Streptomycin, while being useful in the treatment of several forms of tuberculosis, is, at its best, only a part of the general treatment in most forms of the disease and is partially dependent for its full effect upon other more common therapeutic measures, such as bed rest, pneumothorax or chest surgery. It is generally known that even under the best therapeutic conditions, severe toxic manifestations occur, some of them fairly frequently. Furthermore, tubercle bacilli in certain patients acquire resistance to streptomycin which eventually necessitates termination of specific therapy. It was, therefore, recommended that during the initial period of study and use streptomycin should be distributed by governments only to institutions and medical centres regularly concerned with the diagnosis and treatment of tuberculosis. With such safeguards, limited supplies will be beneficially employed under the supervision of physicians experienced in streptomycin therapy, aware of its dangers and contra-indications and prepared to carry on further research on the more precise use of this and other newly developed antibiotics against tuberculosis.

Type of Cases Suitable for Treatment.—Streptomycin was not found to be suitable for all types and stages of tuberculosis infections.

It was unanimously agreed that patients with tuberculous meningitis and generalized hematogenous or miliary tuberculosis should be given prior consideration, because of the extremely high mortality-rate among untreated cases and the lack of any other dependable therapeutic approach.

It appeared that fulminating types of bronchopneumonic pulmonary tuberculosis of recent origin, which have not progressed beyond the possibility of healing, may frequently be ameliorated by streptomycin; residual

lesions of a more chronic and destructive character may require other forms of treatment.

Some of the most distressing complications of pulmonary tuberculosis, especially tuberculous laryngitis and tuberculous enteritis, may be greatly benefited symptomatically by appropriate streptomycin treatment.

Finally, streptomycin was found to be particularly effective in the treatment of tuberculous sinuses and fistulae; less favourable results have so far been reported in renal tuberculosis and in tuberculosis of bones, joints and glands.

Regimens of Treatment.—Optimum streptomycin regimens for the different forms of tuberculosis have not been determined with sufficient precision to make exact recommendations possible at this time. At the present stage of knowledge, the medical practitioner cannot expect to be provided with a universally accepted formula, but will have to make his own choice from several regimens recommended by various research workers. The group of experts could therefore hardly do more than define certain general principles to be observed in the application of streptomycin therapy. Thus, it was suggested, among other things, that in certain cases when the disease changes for the worse or when a relapse occurs, a subsequent or second course of streptomycin may be indicated, provided that the tubercle bacilli have not become predominantly streptomycin-resistant. The indications for a second course of treatment cannot, in the present state of knowledge, be specified precisely, but must be determined after careful review of all clinical and laboratory data in each case. There was, in the opinion of the group, some evidence that combined therapy (streptomycin plus sulphone derivatives or para-aminosalicylic acid) may be more effective in some forms of tuberculosis than either drugs used alone. At the present time, combined therapy shows greatest promise in the treatment of miliary tuberculosis and tuberculous meningitis.