This thrust block transmits the water pressure to the rock-fill and presents to the diaphragm a row of buttresses faced with pre-cast concrete blocks. Against these blocks leans the diaphragm, which forms the main water face and is an articulated structure composed of vertical panels 25 ft. in width. Each panel was made in 'lifts' of 20 ft. at one operation and is reinforced with a 'grille' of steel rods 1¼ in. in diameter.

Every precaution was taken to ensure water tightness, and when the reservoir was filled to top water-level there was no leakage whatever. The spaces between the buttresses, the centres of which are 12½ ft. apart, and the function of which is to support the diaphragm, constitute inspection pits whereby the diaphragm can be examined. Access is obtained to these pits by branch galleries connected with the main galleries, which are reached by steps from both ends of the dam. These pits would also, in emergency, act as interceptors of any water leaking from the reservoir and so prevent it entering and disturbing the sand wedge. It will be apparent that the design adopted has produced a structure possessing considerable flexibility so that disturbances might take place without giving rise to more than minor and controllable cracking. The details by which this result is obtained are described and illustrated in the paper.

River Physics in India

ONE of the major problems of India is that of the rivers, and it was with the object of inviting the attention of the central and provincial Governments to the urgency of making investigations on scientific lines that a symposium was organized by the National Institute of Sciences of India a little more than a year ago. The several papers presented have now been published (*Proc. Nat. Inst. Sci. India*, 4, No. 4) and show the profound interest that is being taken in the subject by a number of well-qualified workers. The presidential address by Prof. M. N. Saha pointed out the importance of the rivers to the agricultural life and as a means of the industrialization of India, and dealt with their influence on the level of cities on their banks, instancing the destruction of many ancient cities and the increasing difficulty now being experienced in the drainage of Calcutta by reason of this action (see also NATURE, 141, 797; 1938).

"The Post-Tertiary Hydrography of Northern India and the Changes in the Courses of the Rivers during the last Geological Epoch" were dealt with in a paper by D. M. Wadia, in which he traced the tectonic movements which have caused widespread and radical alterations in the whole system of drainage lines. The number, volume and direction of the units of this system bear evidence of changes which in some instances have amounted to the complete reversal of the flow of such a principal river as the Ganges. In a paper on the "Changes in the Drainage of India as evidenced by the Distribution of Freshwater Fishes", Dr. S. L. Hora adduced evidence from various sources to show that there was a reversal of the drainage in the post-trappean period. From the nature of the valleys of the rivers and from certain other features of the physiography of the peninsula, it is concluded that the present-day lower portions of the rivers are of great antiquity, whereas the upper reaches are comparatively recent.

Coming more closely into touch with the nature of the problem of the present day, one of the difficulties facing the engineer is the construction of works in an alluvial boulder river bed, and the problems in respect of river training thereby presented have yet to be solved. Associated with these is the need for constructing irrigation canals transporting alluvium from the river on such lines as should ensure a condition of working stability and tend neither to silt nor to scour. This aspect is dealt with in a paper, "Flow of Water in Alluvial Channels", by G. Lacey, in which he directs attention to those elementary principles which help to clarify issues and restrict generalization in river physics. He submits the view that despite the complexity of the problem presented by the great Indian rivers, the basic equations are of a simple nature and that it is on the foundation of the 'normal' or 'regime' channel flowing with constant discharge and silt charge that our ultimate knowledge of river physics must be based.

In his address on "The Use of Models for Elucidating Flow Problems based on Experience gained in carrying out Model Experiments at the Hydrodynamic Research Station, Poona", C. C. Inglis described several types of models and explained why some present little difficulty and yield results suitable for immediate application. Other types, especially those relating to alluvial rivers, present great practical difficulties, and in these cases, the data available are usually too meagre. In so many instances the problems presented are too urgent, requiring immediate steps to arrest the damage that is taking place. The magnitude of this class of problem is shown by the statement that during two years the cost of repairs to the Hardinge Bridge over the Ganges amounted to nearly a million pounds. Such questions require an intimate knowledge of the engineering side of the matter combined with a flair for diagnosis and a capacity to visualize a remedy.

It is the silt carried down by the floods which is at the root of much of the trouble. It has created the land, and made it habitable; it has also fertilized it and made it prosperous. But, as is shown in S. C. Majumdar's paper, "River Problems in Bengal", it has also, by damaging the river channels, caused their diversion through lower areas, leaving the other to become derelict. By raising the beds and consequently the flood level, the silt has created another set of problems, and it is the silt which has destroyed many of the tidal rivers in Central Bengal and is threatening also the cross channels so valuable to navigation. The concluding paper by Dr. N. K. Bose, entitled "River Physics Laboratories of Europe and America", deals briefly with what is being done on these lines elsewhere, but ultimately it must prove that the solution of the problems of India must be found by long and concentrated study of local conditions.