THE CENTRAL IRRIGATION AND HYDRODYNAMIC RESEARCH STATION

THE Annual Report of the Central Irrigation and Hydrodynamic Research Station, Poona (Research Publication No. 6 1944) is a record of the work done by the Research Station during the year 1941-42. It includes an index of the research work carried out during 1937-42. The contents of the volume are divided into three groups, (1) Introduction, (2) Specific Experiments and (3) Basic Experiments in connection with research into specific problems. During the year under report, 27 investigations were under progress, 15 of them being specific in character and twelve basic.

Divergence from Regime in Stable Channels in Alluvium forms the subject of a note in the Report drawing attention to the marked effect of sand-charge on slope and dimensions and shows that the 'divergence from regime dimensions' is due to divergence from 'regime balance between discharge, grade and load'. A number of sand channel experiments carried out with a view to get the dimensions of small stable channels emphasise the great difficulty of reproducing natural, stable channels under model conditions and indicate, that provided there is sufficient slope for free bed movement the final slope of the channel will almost exactly be the same, provided the bed-mix remains the same, even though the initial slope is considerably too steep or only a little steeper than the natural slope. Safe levels at which stone protection may be maintained round piers were determined by experiments conducted on a model of the Hardinge Bridge in which high level pitching at piers 2 and 3 was responsible for the deep scour-holes downstream of the second span. From experiments on models of submersible bridges it is found that for the same shape of obstruction to flow, the coefficient of 'form drag' (impact losses) for a pier was slightly less than that for a slab.

Exclusion of silt from canals has been for long a subject of experimental study at the Station and the adoption of methods indicated by the experiments at the Station has greatly reduced in several instances the silt trouble. The Sukkur Barrage Canals have been for years the subject of model experiments at the Station. The North-Western Cannal was in great danger of heavy silting from 1935 onwards, the depth of sand on the bed being over 4 feet at 2,000 feet from the Head and in 1938 there was 4 to 5½ feet of silt on the bed almost continuously and the future of the Right Bank Canals was threatened. Investigations conducted on two river models with horizontal scales of 1/300 and 1/150 with various vertical exaggerations and on several part-models at the Station led to the construction of a new Right Bank Channel which has successfully removed the menace to the Right Bank Canals. Canals under the Eastern Nara, the Mithrao Canal in 1933–34 and the Khipro Canal in 1941 have been rid of the silt trouble as a result of adoption of designs evolved at the Station. Methods of excluding sand from the Sarda Canal and from the Canals under Son Anicut at Dehri (Behar) continued to be the subject of model investigations.

Prevention of erosion occurring at several points along the foreshore of the Hooghly above Calcutta is another subject that is being examined on tidal models. In a note are indicated steps likely to retard the rapid westerly movement of the Kosi River carrying a very heavy charge of detritus and white sand, flowing over a wide stretch of country in a number of shallow channels and moving towards the West for hundreds of years. The note on siphon spillways deals with experiments conducted on a 1/10 scale model of Jamshedpur Siphon Spillway, with the usual air-inlet omitted, as this delayed priming and reduced disacharge, and a depriming device introduced. The new design primed with a small head and had a very much higher coefficient of discharge than the Indore type.

The Annual Report contains useful and instructive information on subjects of interest to the irrigation engineer. C. GOPALAKRISHNAN.

FREEDOM FOR THE SCIENTIST

THE ideal to be aimed at in the development of scientific research is not mechanization of the whole army of workers, for there can be no reasonable doubt of the dreary mediocrity that would follow or of the scientific genius that would fail to flower. Imagine Newton, with no leisure for physics or mathematics, compelled to spend his days devising new methods for assaying bullion, Faraday commanded by Gladstone to discover 'something useful', Einstein instructed by a government department to check the tables of seven-figure logarithms! That these are not tendentious exaggerations of what might happen is abundantly witnessed by the records of all governments in all countries and at all times. Let us indeed have more co-operation, more pooling of information, more purposeful and economical direction of research, but let us resolutely withstand the deadening fetters of bureaucracy.

Freedom for the scientist to follow his own bent is, in fact, the *sine qua non* of vigorous scientific progress. If an individual scientist add to our knowledge of natural phenomena, he has justified his existence, even if the facts he discovers are of no apparent use to the community. No knowledge of Nature is inherently useless, and no one can say that the seemingly trivial observation may not become significant. Cavendish's eighteenth-century bubble of argon was a chemical *object d'art*; to-day the applications of this gas are so extensive as to necessitate its extraction on an industrial scale. Any, happily, there are still those who inquire into the nature of things because 'all knowledge and wonder (which is the seed of knowledge) is an impression of pleasure in itself'. (*Endeavour*, 1942, 1, 49.)