

THE INDIAN STATISTICAL INSTITUTE

THE continued activity and growth during the war period of the Indian Statistical Institute is a striking example of the benefits which may flow from the stimulus of war conditions, when individual initiative is unhampered in putting itself at the service of Government and to meet the needs and deficiencies of existing official organization. Perhaps nowhere than in India have the prevailing conditions been more propitious, or the need greater, for the active use of agencies run at private risk for public purposes.

The Institute, as it has now developed, has many facets: on the educational side equally as a training ground for computers and routine statisticians, and as a centre of postgraduate research in the most far-reaching branches of the mathematical theory of statistics and experimental design; as a professional institute and learned society bringing together all schools of thought in Indian statistics; as an agency employed by departments of Government and advisory bodies, in the essential work of collecting, scrutinizing and digesting the facts upon which administrative decisions must depend. The achievement of co-operation among the many able men needed to guide these various activities has been the work of an applied mathematician, Prof. P. C. Mahalanobis, formerly professor of physics, acting as honorary secretary to the Institute. He was this year elected fellow of the Royal Society.

There can be no doubt that accurate knowledge by the Government of Bengal of the amount of rice available in the Province would have obviated the food crisis of 1943, in which approximately one million lives were lost, by forestalling panic and cutting the ground from under the food speculators. The story is told in the report for 1943-44:

"The most notable progress in the year under review was achieved in the sample survey of crops. It would be remembered that work was started on a small scale with a total expenditure of about Rs. 7,000 on an exploratory survey of the jute crop in Bengal in 1937. This was the beginning of a five-year scheme for the improvement of jute statistics which was financed jointly by the Indian Central Jute Committee and the Government of Bengal. The sampling technique, developed in the course of a gradually expanding series of surveys culminating in the full scale provincial work of 1941, which demonstrated beyond dispute the possibility of securing by this method a final estimate of jute acreage with a margin of error of only two or three per cent at a cost of one-fifteenth or one-twentieth of that of a complete enumeration. A general account of the five-year scheme with discussion of theoretical foundations was given in a memoir prepared by the Hon. Secretary in 1942 which is being published in the *Philosophical Transactions* of the Royal Society of London.

"The Hon. Secretary had been pressing from the very beginning of the five-year scheme in 1937 for the extension of the method to cover paddy and other important crops in Bengal. Each year from 1938 to 1942 he repeated his efforts but without success. In 1942 the Indian Central Jute Committee had expressed their complete satisfaction with the method of the sample survey and had recommended its continuance by Government in future. The Government of Bengal however decided at first to discontinue the

work but subsequently revoked their decision and asked the Hon. Secretary at the end of March 1942 to proceed with the Jute survey. By this time a good portion of Burma had been occupied by the Japanese, and the supply of rice from that country had been cut off. Apprehending a serious deterioration in the food situation (not because of the physical volume of the import which was small but because of the possible effect on prices) the Hon. Secretary submitted a definite scheme to the Government of India at the end of March 1942 for extending the sample survey to cover the paddy crop in Bengal. In the course of the next few months he also discussed the question with a large number of officials in Bengal but all his efforts failed completely. In the absence of reliable statistics both the provincial and the Central Governments were left entirely in the dark regarding the supply position of rice at the end of 1942. This made it impossible for Government to pursue a consistent food policy on any objective basis. The weakness of the statistical position was thus an important factor in bringing about the deplorable food crisis in Bengal in 1943."

It was not, therefore, until after the famine that the Institute was enabled to show what its organization could do with the immense problem of sampling the 70,000 square miles of agricultural Bengal. Adequate accuracy in areas under crops is much more difficult to attain than is yield for unit areas. Some 59,000 grids each of 2.25 acres, chosen on a system of stratified random sampling, were needed for Bengal, the whole being divided into zone cells of sixty-four square miles and sub-cells of one square mile, approximately the area occupied by a single village. A feature of great importance for Indian conditions, and worthy of study elsewhere, is the duplication of the system in interpenetrating networks, so that entirely independent pairs of estimates are available for each area. This not only facilitates the administrative checking of gross negligence, or misunderstood instructions, but also enables the precision of the final estimate to be assessed as it really is by including all causes, human as well as physical, which contribute to inaccuracy in the result.

There is perhaps no other organization in which practical and theoretical work are more thoroughly integrated. The combinatorial investigations of R. C. Bose and A. Bhattacharya and the studies of multivariate distributions of Mahalanobis and S. N. Roy supply not only the general plan but also very detailed guidance to the two hundred or so workers of the field and computing staffs.

EXCAVATIONS AT HYRAX HILL, NAKURU, KENYA COLONY

ALTHOUGH uncertainties in detail may still exist, the general structure of the prehistoric story of Kenya as laid down by Dr. L. S. B. Leakey is now accepted by most prehistorians. The various climatic changes that have occurred and their correlations with the more important cultures found are also clear. Following on a major pluvial phase called Gamblian and correlated with the Kenya upper palaeolithic, there were two merely wet phases separated by a dryer period. These are known respectively as the Makalian and the Nakuru wet phases. They are post-palaeolithic in age, and the latter is not of great antiquity.