

INDIAN STATISTICAL INSTITUTE

Thirteenth Annual Report: 1944-45

The Indian Statistical Institute, which was inaugurated on 17 December 1931 and was formally constituted into a non-profit making society registered under Act XXI of 1950 on 28 April 1932, has completed thirteen years of useful work. Its activities this year were even more varied than in the past, thus reflecting the rapid growth of the application of statistical methods to problems of human welfare in India. The Institute combines in one organization a scientific society, a centre for advanced training and research in statistics, and a fact finding agency using the technique of sample surveys on a large scale.

The total number of worker-months employed in the statistical branch during the year was 5520 with an average of 435 workers per month; and in the field branch, 5000 with an average of 417 workers per month. The statistical work was done as before at three places—in Calcutta, at Baranagore and at Giridih. Owing to limited accommodation in Calcutta, the major portion of the staff was posted at Baranagore and Giridih, the actual number of workers in March 1945 being 161 and 176 at these two places respectively.

CROP SURVEY WORK IN BENGAL

The sample survey of crop acreage and output entered in its eighth year of progress in 1944-45. The Government of Bengal had originally sanctioned a consolidated grant of Rs. 4,20,000 for carrying out a two-crore sample survey of the jute, *one paddy*, and *one or two pulses* in Bengal in 1941-45. In May 1944, H. E. Mr. Casey, Governor of Bengal, sent for P. C. Mahalanobis, and after personal discussions decided to sanction a three year sample survey programme on an enlarged scale for which the Government of Bengal agreed to pay a lump grant of Rs. 7,17,000 in the first year (1941-45) and Rs. 6,00,000 in each of the two subsequent years. Government also agreed to pay dearness allowance to the staff engaged in this work according to rates prevalent from time to time in Government service. The proposal was accepted by the Institute. The preparatory work of the *jute-one* season had already been completed by this time and the field work also had made considerable progress. Work was however, taken in hand on a small scale for giving effect to this enlarged scheme from the *one or two pulses* season of 1944-45.

Design of the Survey: The whole province was divided into zones each approximately 64 square miles in area. In the *one or two pulses* season each of these zones was divided into 64 cells (of one sq. mile each in area) and out of these 26 cells were selected at random in the first instance. In each cell so selected 4 grids of the uniform size of 2.25 acres were located at random, thus securing an average density of 1.6 grids per sq. mile for area enumeration. Crop-cutting was done in 240 zones selected at random, and in 16 grids selected at random out of 164 in each zone. The survey was arranged (as in previous years) in the form of two interpenetrating net-works of grids for each of which the information was collected independently by different parties of field investigators. About 8% of the grids were common to both net-works and were surveyed in duplicate by both parties.

Field organization: Mr. N. C. Chakravarti, M.A., B.C.S., Additional Assistant Secretary in the Agriculture Department, whose part-time services had been lent by Government for conducting the field survey under the Institute, continued to be in charge of the work throughout the year. The field staff under him consisted on an average of 4 supervising officers, 16 chief inspectors, 64 inspectors and 316 field workers.

Progress of Survey: The area survey of *jute* and *one paddy* was started in East Bengal districts by the middle of May 1944 and was extended to other districts in the course of a few weeks. The bulk of the area survey and crop-cutting work on *jute* and *one paddy* was completed by the end of August 1944, but continued in certain areas till October 1944. The *one or two pulses* survey started from the beginning of September 1944 and was completed by the end of January 1945. A total of over 64,000 grids had been surveyed in the *jute-one* season, together with an additional batch of about 5,000 grids which were surveyed for a second time during the harvest period. In the *one or two pulses* season about 1,35,000 grids were surveyed at first followed by a second survey during harvest of over 8000 grids.

Analysis of data: Tabulation of field records was arranged in such a way as to supply estimates of acreage and of output based on the material collected upto a fortnight previous to the date of report. This enabled progressive estimates being submitted to the Government every fortnight.

It may be mentioned here that along with the main area survey and crop-cutting experiments, various investigations were carried out for improving the technique of the sample survey. The total production of the main paddy crop, for example, was estimated directly from the estimated production of the individual grids surveyed at harvest time. Different sizes and shapes of cuts as well as different types of cutting apparatus were used in crop-cutting work; and experiments were also made to explore the possibilities of rapid estimating of rates of yield. An account of the technical work will be given in scientific reports.

Along with the sample survey in 1944-46, the Government of Bengal had arranged for a simultaneous "complete enumeration" of crops on all plots being carried out by the Development Commissioner with the help of a large field staff consisting of about 18,000 field workers and 1500 inspectors and supervising officers at a cost, it is understood, of nearly Rs. 50,00,000. The results of the complete enumeration have not, however, been sent to the Institute so far. It is not possible, therefore, to compare these results with those of the sample survey.

At the request of the Government of Bengal, Prof. R. A. Fisher during his recent visit to India examined both the schemes, the one for sample survey as well as that for complete enumeration. His opinion is quoted below:

"The sample survey of acreage as at present actually conducted in Bengal and Bihar could be depended upon to give provincial or district estimates with sufficient accuracy for all practical purposes."

Experience in the United States of America corroborates this. In an investigation of the Bureau of Agricultural Economics it was found that "in some items [including crop acreage] the sample survey was more accurate than the [Federal Agricultural] Census". (*See Research Bulletin No. 304, 1945, p.84*). In a later report it is stated that U.S. Census figures "are not known within ± 5 per cent of the actual", and also that in a sample survey "resulting accuracies... will probably exceed that of the Census". (*See Research Bulletin No. 309, 1944, p. 8 p. 332*).

Preparatory work for 1945-46: The preparatory work for the 1945-46 survey has been taken up early in 1946 and has made satisfactory progress.

CROP SURVEY WORK IN BIHAR

Previous history: As a result of discussions with His Excellency Mr. (now Sir) Francis Muelin, then Governor of Bihar, a five-year scheme for the improvement of crop statistics in Bihar by the method of sample surveys had been sanctioned in 1943. An exploratory survey of *rabi* crops in two districts Monghyr and Shahabad was started on 17 February and completed on 13 April 1944. A large number of field workers recruited in Bihar were trained up by a contingent of about 80 experienced field workers who were sent from Bengal to Bihar for this purpose. Preliminary reports were sent from time to time and the final report was submitted in November 1944.

The work in the exploratory survey was organized with such great success that it was decided to take up full scale provincial surveys from the *bhadoi* season of 1944. The field work in this scheme was done under the direct control of the Bihar Government. The Institute was responsible for the whole of the statistical work, for which a block grant of Rs. 20,000 per month was sanctioned for the period April 1944—June 1946. The bulk of the statistical work was done at Giridih.

Work in 1944-45: In the current financial year sample surveys covering the whole province were carried out in three different seasons: *bhadoi*, *ophant*, and *rabi* 1944-45; a survey of the early *musini* crop was also undertaken in 3 districts.

Design of the Survey: In *bhadoi* and subsequent surveys the whole province was divided into 1343 cells, each of approximately 80 square miles in area and roughly square in shape. In each season the cells were classified according to the intensity level of the crops under survey and were grouped into a suitable number of blocks of more or less homogeneous intensity. A suitable number of grids (or sample-units of size 4-acre each) were located at random in the different blocks, and were surveyed by field investigators. The whole work was arranged in the form of two interpenetrating net-works of samples information for each of which was collected independently by a different party of investigators. Certain grids were also surveyed in duplicate by both the parties and supplied a check on the accuracy of the field work. The total number of grids used in the three provincial surveys varied from about 85,000 to 75,000. Crop-cutting work on paddy, wheat, gram and *mauar* was done in a suitable number of randomly selected grids in which the area survey was also repeated at the time of harvesting. This supplied material for estimating the yield per acre of each crop as well as the total outturn directly from the joint area and yield survey

ANNUAL REPORT FOR 1944-45

Field organization : Rai Bahadur S. P. Sinha, a senior Deputy Collector, was throughout in charge of the field work. In the rabi survey of 1943-44 a strong batch of Bengal field workers conducted the field survey and gave training to the newly recruited Bihar workers. The Bihar workers were responsible for the entire field work in all the other surveys. Each field unit consisted of 4 investigators in charge of 1 inspector; and 4 such units were placed under one chief inspector. There were 84 field units with 16 chief inspectors, 64 inspectors and 256 investigators for the whole province. Besides this a number of investigators and inspectors were engaged in special work.

Progress of survey : The early *musli* survey in portions of districts of Monghyr, Bhagalpur and Purnia was carried out in May and June 1944. The *bladoi* survey (which was the first survey on a provincial scale) started on 3 July 1944 and was completed on 8 October 1944. The *aplaxi* survey started on 10 October 1944 almost immediately after the termination of the *bladoi* survey and continued till the middle of January 1945. This was followed by the *robi* survey which started in the middle of January and was completed on 10 April 1945.

Statistical work : As in the Bengal scheme, tabulation of field data was arranged in such a way as to supply crop estimates at intervals of from 10 to 15 days in the form of progressive reports. The preliminary analysis of the *musli* survey was finished during the progress of the *bladoi* survey. A report of *bladoi* survey based on full material was submitted early in November 1944; eight progress reports on the *aplaxi* survey were submitted from time to time and a report based on the full material was submitted in March 1945; and four progress reports have already been submitted on the *robi* survey.

Special studies : Apart from the general survey of acreage and output various special studies were made in all the surveys. P. C. Mahalanobis visited a special study camp at Bikanranjan during the *robi* season of 1943-44. In the *bladoi* season studies on cost and variance function for area survey were made at Giridih; and large scale studies were undertaken on "complete enumeration" of crops. In the *aplaxi* season apart from cost and variance studies special investigations on the technique of crop-cutting work were undertaken at Giridih, Gaya and Patna; similar work was undertaken in the *robi* season at Patna, Gaya and Pusa. Wherever possible such special study camps were placed under the charge of qualified Institute workers with knowledge of statistical theory.

Decision to terminate the sample survey scheme in Bihar : We regret to report that without any previous discussion with the Institute the Government of Bihar decided to terminate the sample survey scheme and substitute in its place a scheme of "complete enumeration" of crops. As already noted, Prof. R. A. Fisher, F.R.S. expressed the opinion that the sample survey as actually carried out during the last 6 months in Bihar could be depended upon to supply crop estimates with a precision adequate for all practical purposes. In a permanently settled area like Bihar, lacking as it does a well-established *potewari* system, it is not considered likely that accurate estimates of crop acreage can be obtained in the immediate future by the method of complete enumeration. Discontinuance of the sample survey would, therefore, leave a serious gap in crop statistics, and may in a bad year lead to the same dangerous situation as prevailed in Bengal in 1943. In written notes submitted to the Government of India and in the course of various discussions and conferences at New Delhi both Professors R. A. Fisher, F.R.S. and P. C. Mahalanobis, F.R.S. have strongly urged the continuance of the sample survey scheme in Bihar.

POPULATION DATA COMMITTEE

In March 1944 P. C. Mahalanobis went to Delhi at the request of the Department of Education, Health and Lands, to discuss possibilities of estimating the growth of population in India in future. As a result of informal discussions the Government of India in their order No. D.2549-B(c);44 dated 15 May 1944, constituted "a small expert committee to examine and advise the Government of India on the available data relating to growth of population" with Mr. M. V. M. Yeats, I.C.S. (Census Commissioner in 1941) as Chairman, Sir Theodore Gregory, Dr. K. C. K. E. Raja, and Professors K. B. Mahdava and P. C. Mahalanobis as members. The work of the Committee was based at the Indian Statistical Institute and a grant of Rs. 6,000 to the Institute was sanctioned for this purpose. The services of Prof. Mahdava were secured on loan from the Government of Mysore and were placed at the disposal of the Institute by the Government of India for this work.

As a measure of retrenchment most of the census tabulation work (including the preparation of age-tables) had been cut down in 1941. Fortunately, Mr. Yeats (as Census Commissioner) had issued instructions for extracting and preserving every fifth individual slip in each census area. This led to the preservation of a two per cent sample (called Y-sample) for the bulk of the original census material. The

sample slips numbering about 7 millions were brought over to the Indian Statistical Institute and appropriate statistical analysis was used to test the representativeness of the Y-sample and to ascertain the precision which could be attained in reconstructing age and other tables from the Y-sample. Two interim reports were submitted to the Government of India on 11 September 1944 and 18 November 1944 respectively, and the final report is nearly ready.

The results of the investigations are on the whole satisfactory. In many areas the Y-samples behave practically as true random samples; in certain areas there were, however, significant differences between results based on complete counts and those based on the Y-sample. Such discrepancies (which might have arisen from the Y-sample not having been drawn in strict accordance with specifications) were, however, invariably small in magnitude so that age and other tables reconstructed from the Y-samples were likely to be adequate for the preparation of life tables and population projections. It is expected that the work of preparing age and life tables and population projections would be started in the near future. If the present enterprise proves successful it will extend the scope of the sampling method very greatly in research work in future. A proposal for transferring to Hollerith cards the information on the available sample slips was submitted to the Government of India by the Institute in November 1944 and is under consideration.

BENGAL DISTRESSED VILLAGES ENQUIRY 1944-45

This survey was taken up at the instance of the Government of Bengal with a view to estimating the extent of damage done to rural economy by famine conditions in Bengal in 1943, and a block grant of Rs. 25,000 was sanctioned by Government for this purpose. The field survey was organized with the active collaboration and under the general control of Prof. K. P. Chattopadhyaya of the Anthropology Department of the University of Calcutta. The field work started in June 1944 and continued till the end of March 1945. Information was collected by direct enquiry by investigators for about 18,000 families selected at random from 400 villages which were also picked up at random in 40 subdivisions. Provisional reports were submitted to the Government of Bengal in February 1945, and other reports on subsequent dates.

A survey was taken up in Jagaddal (Bhatpara) as a part of the present enquiry with a view to making a comparative study regarding economic changes in rural and urban areas. The field work was started in December 1944 and was completed by 5 March 1945. Information was collected for 761 families, and the analysis of the material is proceeding.

ENQUIRY INTO THE ECONOMICS AND STATISTICS OF ROAD DEVELOPMENT

In November 1944 P. C. Mahalanobis went to Delhi at the request of the War Transport Department; and, after discussing with road engineers what could be done to investigate economic and statistical aspects of road development, he submitted a scheme for an exploratory survey. In their order No. PL-2(5) dated 5 January 1945, Government of India (War Transport Department) sanctioned a block grant of Rs. 45,000 to the Indian Statistical Institute for the purpose, and the period of loan of Prof. K. B. Mathava's services from the Mysore Government was extended till the end of 1945 for this scheme.

Arrangements were made to conduct a preliminary enquiry in several places in Bengal and Bihar, and by the end of March information was collected for 18 villages. In the original scheme it had been decided that the Government of India would appoint an Engineer whose services would be made available for this enquiry. This appointment had not however been made even by the end of March 1945, which prevented traffic census being completed in those areas, and hampered progress.

OTHER PROJECTS AND SPECIAL ENQUIRIES

A large number of other projects and special enquiries were also taken up.

Burdwan-Hooghly Hooply Scheme: Crop-cutting work on *aman* paddy had been carried out for six years (1938-39 to 1943-44) in this scheme to assess and grade the different classes of soil in terms of fertility as measured by rates of yield per acre of paddy. But after all this work had been done a scrutiny in the Statistical Laboratory of records of soil classification revealed large discrepancies. It is now proposed to check by direct re-survey and rectify the mistakes in soil-classifications of all plots in which crop-cutting experiments were ever conducted. This survey will have to cover about 70,000 plots in 1700 villages scattered over the three districts Burdwan, Howrah and Hooghly.

U. P. Anthropometric survey: The work on the anthropometrical material collected by Dr. D. N. Majumdar in 1941 for 33 castes in the United Provinces has been practically completed. The values of Mahalanobis's D. square were calculated, and a systematic classification of castes has been prepared and a report is being got ready.

ANNUAL REPORT FOR 1944-45

Preparation of roster of scientific and technical personnel : At the instance of the Government of India and the National Institute of Sciences some preliminary work has been done on the preparation of a roster of scientific and technical personnel in India on the lines of the roster prepared for U.K. by the Royal Society of London. Our thanks are due to Prof. A. V. Hill, F. R. S., Secretary, Royal Society, for sending us a complete set of forms and cards used in the U. K. roster.

River Research Institute : Statistical analysis of data relating to river physics, rainfall and flood was continued this year with the help of a grant of Rs. 5,000 from the River Research Institute, Bengal.

Famine Inquiry Commission : P. C. Mahalanobis submitted a written note, and also gave evidence before the Bengal Famine Inquiry Commission on 13 September 1944. At the request of the Commission the Institute prepared several notes on per capita consumption of rice and other selected food items and also on the number of deaths in Bengal in 1943 based on information collected by sample surveys. A grant of Rs. 2,000 was received from the Commission for this purpose.

Sriniketan Rural Survey : The analysis of material relating to rural families collected by the Vinobha Institute of Rural Reconstruction at Sriniketan has been completed at Giridih and a paper on the same has been prepared.

MISCELLANEOUS STATISTICAL ENQUIRIES

During the year under review, a number of miscellaneous statistical enquiries were attended to as usual. The distribution by subjects and administrative regions of important items are shown below :

By subjects : Agriculture 21; Educational 3; Industrial 8; Meteorological 2; Sample Survey 2; Socio-economic 7; Theoretical 3; Vital and Public Health 3; Other subjects 11; Total 60.

By regions : Assam 1; Bengal 22; Bihar 4; Bombay 2; C.P. and Berar 1; Ceylon 1; Delhi 10; Orissa 6; Punjab 1; Sind 2; Travancore 2; U. P. 8; Total 60.

THEORETICAL RESEARCHES

Theoretical work was continued on the following main topics: (1) design of large scale sample surveys; (2) design and analysis of experiments; (3) sampling distributions; (4) testing of hypothesis; and (5) construction of numerical tables. A lot of papers published and reports submitted during the year by workers associated with the Institute is given in Appendix 1.

Large scale sample surveys : P. C. Mahalanobis's memoir on "Large Scale Sample Surveys" was published in the *Philosophical Transactions* of the Royal Society of London in October 1944. Further work is proceeding on problems relating to zoning and mapping in the design of sample surveys, properties of random and non-random fields, and double sampling.

Design and analysis of experiments : Work on the design of experiments has been continued during the year by Raj Chandra Bose, C. Radhakrishna Rao, Hari Kinkar Nandi, Kailas Nath Bhattacharyya and Quazi M. Hossain. Elegant solutions were obtained for some of the combinatorial problems remaining unsolved in the construction of balanced incomplete block designs. Some new cyclic solutions have been given and the impossibility of some of the combinatorial problems has been demonstrated. A new line of study as to the enumeration of the number of non-isomorphic solutions to the incomplete block design has been opened and much progress has been made. A rigorous proof as to the conditions under which Youden's squares exist and can be constructed has been advanced. A study has been made as to the inequality relations connecting the number of blocks, treatments, plots per block etc. for a general incomplete block design. Further work has been done on the linear hypothesis leading to the inter-block and intra-block estimation in an incomplete block design.

Sampling distributions : Samarendra Nath Ray continued his earlier work on the p -statistic, developing methods by which k multivariate normal populations (supposed to have the same dispersion matrix) differing in the set of mean values could be suitably classified by ordering them against some sort of scale. Account was taken of the essentially vectorial nature of the problem involving as it does a number of characters. Manindra Nath Ghose made some study of the order of approximation of the central limit theorem.

Testing of hypothesis : Study of (1) the problem of testing composite hypothesis, (2) the exact nature of the usual tests in analysis of variance, D^2 , etc., and (3) their optimum properties, was taken up during the year by S. N. Roy, M. N. Ghose and H. K. Nandi; and many useful results have been obtained.

Construction of tables and other problems : The construction of 5% and 1% points of the classical D^2 statistic has been completed for different values of the parameters; the fiducial limits are now being calculated. A general study of the limiting forms of the statistical distributions (which ultimately tend

to normal) has been made, and a suitable curve along with a table for different levels of error has been constructed. The special form of Bessel function (I_0 and I_1) has been studied for large values of the argument. Further work on the unbiased partitioning of tall orders is being continued by Purmendra Kumar Bose.

BANKHYĀ : THE INDIAN JOURNAL OF STATISTICS

Printing of Bankhyā was delayed by the promulgation of the Paper Control Order by the Government of India in June 1944 which required the number of pages of every journal being reduced by 70%. As a result of representations made by the Honorary Secretary, special sanction has, however, been given by the Government of India relaxing the above limit to a considerable extent. Publication was also hampered by shortage of paper, lack of printing facilities, and other difficulties most of which have been overcome and it is expected that Vol. 7, part 1 would be published at an early date and would be soon followed by other issues.

Sasthya : Receipts & Payments Account for the Year ending 31st March 1945.

RECEIPTS		PAYMENTS	
To Opening Balance ..		By Press Bills & Paper etc.	1,969 6 0
Cash in hand ..	2 5 6	" Closing Balance	
Cash at Bank ..	390 15 6	Cash in hand	715 5 6
		Cash in bank	1,259 7 6
" Subscription ..	1,358 14 0		2,022 13 0
" Grant from the Govt. of India	2,000 0 0		
" Rockefeller Foundation Grant	260 0 0		
	4,002 3 0		4,002 3 0

TRAINING AND EXAMINATIONS IN STATISTICS

Although two other centres of training in statistics are now functioning in Calcutta, viz. the four-year old post-graduate department of Statistics of the Calcutta University and the recently opened honours degree course in statistics in the Presidency College, Calcutta, we received a large number of applications for admission to the training section of the Institute. We, however, could admit only 11 because of our limited capacity for arranging practical work. This year the Bihar Government granted three scholarships and the Orissa Government one to students nominated by them for receiving training in the Institute. The training section was in charge of Birendra Nath Ghose assisted by Nirmal Kumar Chakravarty, but almost all the senior workers of the Institute took part in teaching.

Besides regular students, a large number of officers from various institutions came to the Institute for consultation; and the heavy burden of supervising this work was borne by senior workers among whom Purmendra Kumar Bose deserves special mention.

Computer's training : A short course of training for helping the workers who appeared at the Computer's Certificate examination was given in Calcutta in the months of August, September and October 1944 under the supervision of Jitendra Mohan Sen Gupta and Sarbhu Nath Halder.

Institute Examinations in Statistics : This year Computer's Certificate examinations were held once in July 1944 at Giridih and again in January 1945 both in Calcutta and Giridih. A large number of candidates appeared in different sections of the Computer's Certificate examination while only one set for the Statistician's Diploma. Out of a total of 91 candidates 38 came out successful. The Board of Examiners consisted of Prof. P. C. Mahalanobis, Prof. K. B. Madhava, Dr. C. Chandu Sekar, and Messrs. R. C. Bose, S. N. Roy, N. T. Mathew and J. M. Sengupta.

ARRANGEMENTS IN THE STATISTICAL LABORATORY

As noted earlier, the Statistical Laboratory had to function at three places, namely, Calcutta, Benares and Giridih. In Calcutta itself work was carried on at 4 places—in the Presidency College, Hindu School, 210 Cornwallis Street, and a room in the Albert Institute. The Honorary Secretary went to Giridih several times during the year, and other workers were also sent there from time to time. Owing to postal delays and difficulties of communication arrangements had to be made for important records being carried between Calcutta and Giridih by special messengers.

A thorough reorganization was made of all Institute posts in a number of graded scales with effect from August 1944.

Number of workers : The number of workers employed on a monthly basis was 179 and the number of piece-rate workers 140 on 1 April 1944. During the year under review 178 new appointments were

ANNUAL REPORT FOR 1944-45

made on a monthly basis and 296 as piece-rate workers, while 78 on monthly basis and 180 piece-rate workers left the Laboratory, so that on 31 March 1945 the year closed with 279 workers on a monthly basis and 247 piece-rate workers with a total strength of 526 workers in all. The average strength of workers was 144 in Calcutta, 113 at Baranagore and 178 at Giridih during the year under review.

Institute staff: Jitendra Mohan Sen Gupta, C. Radhakrishna Rao, Nirmal Kumar Chakravarty, Manindra Nath Ghose, R. P. Bhargava, Ramkrishna Mukherjee and Mrs. Charuli Bose worked mostly in Calcutta and N. T. Mathew, K. C. Cheryan and Monimohan Mukherjee mostly at Giridih. Raj Chandra Bose, Sasaramrita Nath Ray, Harendranath Ghose, Purnevin Kumar Bose and Hari Kinkar Nandi, whole-time lecturers either in the Calcutta University or in the Presidency College, Calcutta, participated in the activities of the Institute as part-time workers. In the computing section, Jitendra Nath Talwar and Sambhu Nath Halder assisted by Arun Kumar Ganguly, Surendra Chandra Sarkhel, Shyamundar Bose, Sunith Krishna Gupta and Nirmal Banerjee were in general charge of the work at Baranagore and Calcutta while Haribhajan Choudhury assisted by Dhiresvara Nath Sarkar, Rajen Roy and others looked after the computing work at Giridih. Among old workers Sushir Kumar Banerjee, Hemanta Chandra Ghosal, Subodh Chandra Das Gupta, Jibananda Saha, Jalalhar Sarma, Narahi Chandra Mukerjee, Susanta Ranjan Ojha, Gayanath Aitak, Saree Chandra Mitra, Prabhat Sinha, Debabrata Dutta, Sukumar Hazra, Purna Chandra Ghose looked after various sections in Calcutta, Baranagore and Giridih.

In the field branch of the Bengal Crop Survey Scheme the part-time services of Nihar Chandra Chakravarti, B.F.S., Additional Assistant Secretary to the Government of Bengal, Department of Agriculture, were made available to the Institute. He worked as Supervisor of the Field Branch assisted by Dhiresvara Mohan Ganguly, Santipriya Bose, Pranay Kumar Chatterjee and Sanjay Kumar Chakravarty.

The services of Prof. K. B. Malhotra of Mysore University were made available to the Institute by the Government of India from June 1944. He took a large share of the superior administrative responsibility especially during the period June-August 1944 when P. C. Mahalanobis was suffering from an attack of appendicitis. K. N. Chakravarti and H. C. Ghosh acted as part-time barman during the year under review.

Our best thanks are due to the University of Lucknow for placing the services of Dr. D. N. Majumdar from February 1945 at the disposal of the Institute for organizing an anthropometric survey in Hangaal.

Changes in staff: After a long convocation of more than 8 years S. Raja Rao left us in September 1944 to join the Public Works Department, Sind, Karachi as Statistical Officer. Nirmal Chandra Ghose, who was with us for more than 4 years, left us in June 1944 to join the Dept. of Central Exchequer, Calcutta. Manindra Nath Ghose who had left to join a temporary post of lecturer of statistics in the Dacca University rejoined us in January, 1944. Miss Bina Sen came back in March 1945 on the expiry of service as temporary lecturer of mathematics in the Lady Dabornoo College, Calcutta. Anil Kumar Ghose rejoined us in December 1944 at the termination of his services as temporary lecturer in the Presidency College, Calcutta. Among the students of the Statistics Department of the Calcutta University who took their M.A. or M.Sc. degree in 1944, the following have joined the Institute in various capacities: Prasad Kumar Banerjee, Tarpada Choudhury, Durgaika Bose, Purnanjan Sengupta and Prafulla Kumar Bhownik.

Women's Section in Calcutta: One section with an average of 27 women workers employed on the piece-rate system of payment was run throughout the year under the supervision of Mrs. P. Sen at 210/8 Cornwallis Street, and a second section in charge of Mrs. Ha. Sinha was opened at 180/A Upper Circular Road in February 1945.

BRANCH LABORATORY AT BARANAGORE

As already stated, owing to limited accommodation at Calcutta, a large portion of the statistical staff was housed at Baranagore. A three storied building has been constructed to accommodate the workers the number of which is increasing steadily; the total number of workers was 161 at the end of March 1945. A separate office with a library section has been organized there. The bulk of the Bengal Crop Survey work is being done at Baranagore together with portions of other project work. The Baranagore Branch had to run 3 messes near the office. A medical welfare scheme was started in February 1945 and a tiffin club for workers in March 1945.

Land acquisition: Since April 1943 the Institute has been in occupation, free of rent, premises 'Amrapali' at 87 Barrackpur Trunk Road belonging to the Honorary Secretary. Owing to expansion of work there was urgent need of additional accommodation. It was, therefore, decided to acquire about 3 acres of land adjoining 'Amrapali', for which notification under the Land Acquisition Act was issued on the

11th January 1946, and it is hoped that possession would be obtained at an early date. The cost of acquisition would be met by an advance, with the consent of P. C. Mahalanobis, from the Director's Contribution Fund.

BRANCH LABORATORY AT GIRIDIH

The Giridih Branch of the Indian Statistical Institute had started mainly as an evacuation measure. On the inception of the Bihar Crop Survey scheme at the end of 1943 there was rapid expansion of work at Giridih during 1944-45. The strength of staff increased from about 118 in April 1944 to more than 210 in October 1944. N. T. Mathew, Superintending Statistician, was in charge of the branch up to November 1944, and Moni Mohan Mukherjee, offg. Statistician, during the remaining part of the year.

Project and research work: The bulk of the work in the Bihar Crop Survey scheme was done at Giridih. Analysis of material collected in the Bengal Labour Enquiry during 1940-42, Sriniketan Rural Survey 1937 and data relating to blood pressure proceeded systematically throughout the year. Laboratory workers at Giridih conducted two independent local enquiries relating to family fertility and cost of living. A family budget enquiry for workers' families is in progress.

Training section: Two training courses for computers were organised at Giridih and two examinations for Computer's Certificates were held by the Institute at Giridih during the year under review.

Women's section: Work in this section proceeded satisfactorily. In the beginning most of the workers preferred part-time work, but gradually many of them became full-time workers.

Workers' Club: A social and recreational club was organized by the workers, and was running successfully for about a year. A manuscript magazine called 'Mahua' is conducted by the Club; and an Art Exhibition was held under its auspices in June 1944. The annual sports of the Club were held in January 1945; and there were a number of other functions and activities.

Medical welfare scheme: In December 1944 the Honorary Secretary started a medical welfare scheme with a monthly contribution of four annas from each worker. Arrangements were made with Dr. Nirmal Kumar Das, M.B. to attend daily at the Institute and to examine each worker thoroughly and keep systematic records of such examination. Consultations at the Institute are entirely free; visits to workers' residences to attend the worker or any member of his family are charged for at the nominal rate of 1/8-annas per visit. The scheme has proved successful in every way and is highly appreciated by the workers.

Tiffin Club: The Tiffin Club which was started in February 1945 supplies daily tiffin to about 180 persons at a small cost. It is managed entirely by the workers of the Laboratory, and receives a subsidy from the Institute.

Puja Camp at Giridih: As in previous years the Honorary Secretary stayed at Giridih during October 1944 with a large contingent of Calcutta workers. A number of lectures and symposia were arranged at that time. The Honorary Secretary and R. C. Bose spoke on problems relating to sample surveys, and C. R. Rao on Markoff's theorem on linear estimation for several days. The Honorary Secretary met all workers on two occasions to discuss ways and means for general improvement of work at Giridih. He also entertained all workers on 23 October 1944 on the occasion of the birth-day of Mrs. Mahalanobis.

Mr. S. N. Roy, I.C.S., Financial Adviser to the Department of Civil Supplies, Bengal, and a member of the Council and Finance Committee of the Institute visited the Giridih Laboratory during October 1944 and inspected the work with interest. Mr. Chandmull Rajgharia, Vice-President of the Institute, also visited the Laboratory in the same month.

Accommodation and construction work: With the expansion of work, lack of accommodation became an acute problem. At the end of the year the Institute was paying Rs. 700 per month as house rent. The available floor space was, however, quite inadequate; and extensions to buildings already in the occupation of the Institute were undertaken and a good part of the work was completed during the year.

Land Acquisition: The Government of Bihar had agreed to acquire certain pieces of land adjoining the premises in the occupation of the Institute at Giridih; notification was issued accordingly in May 1944 and enquiries by the Land Acquisition Collector were also held in June and July. No further action was, however, apparently taken by the Bihar Government for a long time, and finally without any consultation with the Institute the notification itself was cancelled, and we were informed accordingly in March 1945. We had purchased a large quantity of building materials including cement and iron, permits for which were

ANNUAL REPORT FOR 1944-45

obtained through the Government of Bihar, for the construction of buildings on lands proposed to be acquired, and a great deal of loss, due to deterioration of coconut etc., is likely to be caused by the termination of the said acquisition proceedings.

Owing to increase of work in connexion with various new projects of the Government of India and also due to difficulties in securing necessary accommodation in Calcutta in the near future it will be necessary to maintain a large staff at Girish for some considerable time. Attempts are, therefore, being made to secure additional accommodation at Girish.

BUMKEN VACATION CAMP AT KALIMPONG

As in other years, a camp laboratory was set up at Kalimpong for about 2 months during the summer vacation of 1944 and was attended among others by Hajjeharun Bose, Samarvelinath Roy, Jitendra Mohan Sen Gupta, C. Radhakrishna Rao, Hari Kinkar Nayal, S. Janardan Puri, Dhivendramath Narkar, and Rathindran Neri Gupta; P. C. Mahalanobis was also there for some time. A small computing section was organized with men from Calcutta and local recruits, and considerable progress was made both in theoretical and applied topics.

STATISTICAL LIBRARY

The main stock of the Library continued to be maintained at Girish in accordance with the general evacuation policy, and books requisitioned from Calcutta and Baranagore were sent on loan for specified periods.

Catalogue : The classification of books and the preparation of the classified catalogues with author and title index made good progress and is expected to be completed in the course of the next few months.

New books : The Library obtained import licences from Controller of Imports, Government of India, and appointed foreign agents in New York and London for importing books directly from America and U.K. Difficulties in procuring foreign books were in this way partially overcome. The total number of volumes added to the Library during the year was 858 of which 21 were received as gifts; and the total number at the end of the year was about 25,000 volumes. Although exchange of publications with *Sankhya* has been seriously affected by the war, the Library received 171 periodicals and 22 annuals.

Lane of books : The use of the Library at Calcutta by the workers of the Laboratory, the Calcutta University and Presidency College increased very much during the year. Since December 1941 a special scheme was adopted to extend the Reference Library service from 8 A.M. to 8 P.M. on all week days and from 1 P.M. to 5 P.M. on Sundays. The number of volumes issued during the year was : day issues 8756, overnight 2719, loan 1438, with a total of 9910 (as against 2915 in 1943-44 and 2231 in 1942-43). Girish and Baranagore sections of the library were used much less, the total number of volumes issued being 1127 and 254 respectively.

Circulating Library : The workers' circulating library (of general and non-technical literature in English, Bengali and Hindi) had been started at Girish in 1942 and was extended to Calcutta and Baranagore in April 1944. In this scheme each worker paid Re. 1/- as annual subscription and the Institute made a contribution of twice the amount raised as subscription from workers. The Institute also made an additional grant for the purchase of books and magazines the total number of which at the end of the year was 1891. Books were divided roughly in equal proportions at the three places and arrangements were made to interchange the books at regular intervals. This service was very popular and the total number of issues were 2034, 3029 and 2132 at Girish, Calcutta and Baranagore respectively.

VISITORS

As usual a large number of distinguished visitors came to the Institute. His Excellency the Rt. Hon'ble Mr. Casey, C.H., D.S.O., M.C., Governor of Bengal, visited the Statistical Laboratory at Calcutta on 13 July 1944. Among other visitors mention may be made of Sir C. D. Drahmalkh (Governor, Reserve Bank of India), Mr. S. Dutt, I.C.S. (Secretary, Agriculture Department, Bengal), Mr. L. K. Elmhirst, Sir Hugh Hood (Chief Adviser to the Governor of Madras), Hon'ble Khan Bahadur S. Muazzamuddin Hossain (Minister of Agriculture, Bengal), Col. F. T. Jooas, Wing Commander Keedrew, Vernon and Barkla (R. A. F.), Major Clarke (A. E. C.), Seth Kasturba Lalbhai (Ahmedabad), Mr. D. M. Martin, I. C. S. (Commissioner, Postwar Reconstruction, Bengal), Mr. G. M. McKelvie (Consulting Engineer to the Government of India), Sir Cyril Norwood, Mr. S. H. Y. Oulman (Jt. Secy. to the Government of India, Department of Education, Health and Lands), Dr. K. C. K. E. Raja, Sir Archibald Rowlands (Finance Member, Government of India).

Mr. M. K. Sen Gupta (Financial Adviser, Communications, Government of India), Dr. M. R. Siddiqi (Omanian University), Mr. C. O. Tattersall (Scientific Adviser, M.O.D.), Squadron Leader J. W. Vernon, Mr. R. L. Walker (Finance Secretary, Bengal) and Mr. M. W. M. Yeats, I.C.S. (Chairman, Population Data Committee).

PROFESSOR B. A. FISHER'S VISIT

We had the great pleasure of having with us for a short time this year Prof. R. A. Fisher, F.R.S., Balfour Professor in the University of Cambridge. Arrangements for his visit were made jointly by the Institute and the British Council to which our best thanks are due for its active co-operation in this matter. He arrived in Calcutta on 24 January and stayed here till 24 February 1945. During this period he delivered a course of six lectures on Genetics in the Institute and conducted a large number of seminar meetings on statistical research which were attended by workers of the Institute and other scientific organisations in Calcutta.

Prof. Fisher's 56th birthday was celebrated by the workers of the Institute at 'Amrapali', Baranagore on 24 February 1945 and the function was attended by a large number of friends.

He visited the Cinchona Plantation at Murgupoo, and the *char* and forest areas in the Sunderbans in Bengal, and on 24 February left for Delhi, where he halted for a fortnight and left for United Kingdom by air on 11 March. In both Calcutta and Delhi he had a large number of consultations and discussions with officials and representatives of various departments of Government.

Prof. Fisher had visited India in 1938 at the invitation of the Institute. Like the first visit the second visit also was of great help to the Institute and its workers as it gave them an opportunity of having his opinion and stimulating criticisms on schemes of research. He also helped us by giving his advice about administrative aspects of statistical work.

LOCAL BRANCHES OF THE INSTITUTE

Up to the time of going to the press reports of the following branches have been received and short summaries of their activities are given below:

Poona (Deccan) Branch : Prof. V. G. Kale continued to be the Chairman of the Branch and Mr. N. V. Sovani, the local Secretary. Prof. N. V. Kanitkar delivered an interesting lecture on "the statistical lay-out of field experiments under dry farm conditions in the Bombay Deccan" on 17 January 1945. Prof. Gadgil and Mr. Sovani were engaged on the report of the socio-economic survey of Poona city during the year under review. The number of life-members during the year continued to twelve.

Mysore Branch : Early in June 1944 the services of Prof. K. B. Madhava, Secretary of the Mysore Branch, were placed by the Mysore Government at the disposal of the Government of India who deputed him to work in the Statistical Laboratory, Calcutta. In consequence of his transfer and other changes at Mysore the activities of the Mysore Branch of the Indian Statistical Institute remained suspended.

U. P. (Lucknow) Branch : During the session 1944-45 Mr. N. C. Mehta was the president and Prof. Radhakamal Mukherjee the Secretary of the branch. Analysis of the data collected in connection with the standard of living and social conditions of the middle class in Lucknow was taken up during the year and has been nearly completed.

Delhi Branch : There were two life members, twelve ordinary members and forty local members. No proper meeting could be held this year. Persons who had provisionally agreed to speak had been so busy with their official work that meetings announced to be held had to be cancelled at the eleventh hour. Sir T. E. Gregory was elected as the President for the year 1944-46 and Mr. G. R. Seth, as Secretary.

MISCELLANEOUS

Honours course in Statistics in the Presidency College, Calcutta : On the initiative of Principal A. K. Chanda and with the active collaboration of the Institute an honours degree course in Statistics was opened, for the first time in India, in the Presidency College, Calcutta, in July 1944. The inaugural address was given by P. C. Mahalanobis on the role of statistics in human affairs in general. K. B. Madhava worked as the Head of the Department in an honorary capacity; Birendra Nath Ghose and Purmandu Kumar Bose as professor and lecturer respectively and Sunith Krishna Gupta as laboratory assistant. Out of a large number of applications 12 students were selected for admission.

Post-Graduate Department of Statistics : Our collaboration with the Post-Graduate Department of Statistics continued as before for the fourth year. P. C. Mahalanobis was the Honorary Head of the Department throughout the year; R. C. Bose and S. N. Roy worked as lecturers, Hari Kinkar Nandi as whole-time assistant lecturer, C. Radhakrishna Rao, Nirmal Chakravorty as part-time lecturer, and Manindra

ANNUAL REPORT FOR 1944-45

Nath Ghose and K. C. Chelvan, as part-time assistant lecturers in the department. K. B. Madhava, Birendra Nath Ghose, Purnendu Kumar Bose and Mrs. C. Bose worked as part-time lecturers in an honorary capacity.

Eleven students appeared for the M.A. and M.Sc. examinations in Statistics held in August 1944, out of whom eight were successful. Most of the successful candidates joined the Laboratory in various capacities.

Training in Actuarial Statistics: The Institute of Actuaries, London, having announced that the examination of that Institute which had been suspended during the war would be resumed, war condition permitting, in 1945, there were inquiries whether the Indian Statistical Institute could undertake to give lectures for actuarial students. Advantage was taken of Prof. K. B. Madhava's presence in Calcutta to arrange a course of 50 lectures between August and December 1944 under the auspices of the Institute. There was considerable enthusiasm to begin with, but when the course terminated in December 1944 there were only 5 or 6 students who had attended regularly.

Bengal Administration Committee: P. C. Mahalanobis gave evidence before the Bengal Administration Committee on statistical matters. Sir Archibald Rowlands, Chairman of the Committee, and two members, Sir H. Wood, I.C.S. and Mr. R. L. Walker, I.C.S. spent one whole afternoon in the Statistical Laboratory examining the crop survey scheme and other projects.

At the request of the Administration Committee, Bengal, a memorandum prepared by K. B. Madhava and P. C. Mahalanobis was submitted by the Indian Statistical Institute on certain statistical and actuarial matters relating to recruitment to secretarial services of the Government of Bengal, giving estimates of the numbers to be annually recruited to each grade of service, current salary, costs and ultimate pension charges for cadres of different strength subjected to varying decrementary ratios.

Bengal Statistical Bureau: A Statistical Bureau, attached to the Finance Department, was started by the Government of Bengal from 15 January 1945, with P. C. Mahalanobis as part-time Statistical Adviser. No whole-time staff was appointed, but the work was done by the part-time services of the Institute staff, for which a grant of Rs. 225 for clerical work and Rs. 300 for technical help had been sanctioned by Government. The present functions of the Bureau are primarily advisory in character, e.g. the giving of technical advice regarding the collection of primary statistics, and the classification, tabulation and analysis of statistical material, and their publication.

Appreciation from abroad: The Weblon Memorial Prize was awarded by the University of Oxford to P. C. Mahalanobis in 1944, and he was elected a Fellow of the Royal Society of London in March 1945.

AUDITED ACCOUNTS

The accounts of the Institute were audited by Messrs P. C. Nandi & Co., Chartered Accountants. The audited accounts were considered by the Finance Committee on 25 April and the Council on 26 April, and were adopted at the Annual General Meeting held on 26 April 1945.

The Director's Contribution Fund (consisting of donations received from Prof. and Mrs. P. C. Mahalanobis and contributions received from various sources in lieu of the honorary services of P. C. Mahalanobis in connection with project work) was separated as a special fund last year. During the financial year under review Rs. 15,000 was received from the Government of Bengal as a contribution for the honorary services of P. C. Mahalanobis in the Bengal crop survey scheme, Rs. 18,000 from the Government of Bihar for the Bihar crop survey scheme, and Rs. 1,750 from the Population Data Committee (Government of India) for the statistical work of the Committee, for which we offer our thanks to the donors. The total amount in this fund at the end of the year was Rs. 71,715-11-9.

ADDITED ACCOUNTS FOR 1944-45

Indian Statistical Institute : Exarmarked & Special Enquiry's Fund, Account for the year ending
31st March, 1945

RECEIPTS		PAYMENTS	
<i>Bragnl Crop Survey</i>			
	Rs. & P.	Statistical Branch (1944-45)	Rs. & P.
To Opening Balance ..	26,081 5 0	By Salary & allowance ..	2,12,668 14 0
" Block grant (1944-45) ..	7,80,806 2 0	" By Other expenses ..	30,170 2 0
	8,55,997 7 9		2,42,838 16 0
		<i>Field Branch</i>	
		By Other expenses (1943-44) ..	567 12 0
		" Salary & allowance (1944-45) ..	3,13,211 0 0
		" Other expenses ..	1,23,231 4 0
		" Suspense a/c ..	13,916 10 0
		" Closing balance ..	4,21,826 11 5
			33,170 12 0
			8,55,987 7 9
<i>Burdwan-Hooghly-Hoornkh Ploekia Scheme</i>			
To Opening Balance ..	6,511 4 0	By Salary & allowance ..	4,092 14 0
		" Other expenses ..	1,670 2 0
			5,762 0 0
		" Closing Balance ..	718 4 0
			6,511 4 0
<i>U. P. Wheat & Sugarcane Scheme</i>			
To Opening Balance ..	5,218 5 3	By Salary & allowance ..	2,128 7 0
		" Other expenses ..	868 9 0
			2,997 6 0
		" Closing balance ..	2,221 5 3
			5,218 5 3
<i>Bihar Crop Survey</i>			
To Opening Balance (1943-44) ..	11,657 10 0	Statistical Branch	
" Block grant (1944-45) ..	2,10,090 0 0	By Salary & allowance (1944-45) ..	1,52,818 4 0
	2,21,657 10 0	Other expenses ..	62,418 10 0
" Advance from Indian Statistical Institute ..	5,012 15 6		2,15,237 0 0
	2,27,670 10 3	Field Branch, other expenses (1943-44) ..	11,523 10 3
			2,27,670 10 3
<i>Survey of Distressed Villages (Bragnl)</i>			
To Block grant ..	26,000 0 0	Statistical Branch	
" Advance from Indian Statistical Institute ..	14,691 0 0	By Salary & allowance ..	13,913 0 0
	30,691 0 0	" Other expenses ..	5,677 7 0
			19,591 0 0
		Field Branch, other expenses ..	19,500 0 0
			39,691 0 0
<i>Population Data Committee (Government of India)</i>			
To Block grant ..	13,250 0 0	By Salary & allowance ..	12,185 0 0
" Advance from Indian Statistical Institute ..	6,249 0 0	" Other expenses ..	7,314 0 0
	19,499 0 0		19,499 0 0
<i>Road Development Enquiry (War Transport Department, Government of India)</i>			
To Block grant ..	5,000 0 0	By Salary & allowance ..	5,907 6 0
" Advance from Indian Statistical Institute ..	888 0 0	" Other expenses ..	80 10 0
	5,888 0 0		6,388 0 0

Examined and Found Correct.

P. C. NANDI & Co., Auditors,
Registered Accountants, Chartered Accountants.

HARTING STREET CALCUTTA,
The 28th April, 1945.

APPENDIX I. LIST OF PAPERS PUBLISHED AND
REPORTS SUBMITTED IN 1944-45

1. BOSE, (Mrs.) CHAKRAI. The D^2 -statistic in some variatal experiments on the rice crop (Proc. Ind. Sc. Congress, 1945).
2. ——— Sampling error in the method of double sampling. (Proc. Ind. Sc. Congress, 1945).
3. BOSE, PURNENDU. Statistical study of rainfall in Calcutta : 1900-1930. (Proc. Ind. Sc. Congress, 1945).
4. ——— Determination of an unbiased critical region of type A in the case of F distribution. (Proc. Ind. Sc. Congress, 1945).
5. BOSE, R. C. The symmetrical factorial designs of the class S^2 with S^1 plots per block. (Proc. Ind. Sc. Congress, 1945).
6. ——— A note on Youden's Squares. (Proc. Ind. Sc. Congress, 1945).
7. BOSE, R. C. & CROWLA, S. Construction of Alias Difference Sets. (Proc. Ind. Sc. Congress, 1945).
8. ——— Theorems in the additive theory of numbers. (Proc. Ind. Sc. Congress, 1945).
9. ——— A new series of balanced incomplete block designs. (Proc. Ind. Sc. Congress, 1945).
10. CHAKRAVARTY, NIRMAL. On the income elasticity of demand when the incomes are distributed in the Pearsonian Type III distribution. (Proc. Ind. Sc. Congress, 1945).
11. ——— The present position of Indian sugar industry in relation to consumers : 1927-28 to 1939-40. (Proc. Ind. Sc. Congress, 1945).
12. GHOSH, BIRENDRANATH. Efficiency of rectangular plots of different shapes and sizes in field experiments or sample surveys. (Proc. Ind. Sc. Congress, 1945).
13. ——— The distribution of distances in a configuration of many rectangles with parallel edges. (Proc. Ind. Sc. Congress, 1945).
14. GHOSH, MANINDRA NATH. On the order of approximation involved in the Laplace's central limit theorem in probability. (Proc. Ind. Sc. Congress, 1945).
15. ——— On the problem of similar regions. (Proc. Ind. Sc. Congress, 1945).
16. MARALANOBIS, P. C. On Large Scale Sample Surveys. (Phil. Trans., Roy. Soc., London, Series B, No. 584, 231, 329-451).
17. ——— Report on the Bihar Crop Survey : Rabi Season 1943-44. (Submitted to Government of Bihar in November 1944).
18. ——— Note on per capita consumption of food stuff in Bengal, 1936-1942. (Submitted to the Famine Inquiry Commission in December 1944).
19. ——— Note on the mortality in Bengal in 1943. (Submitted to the Famine Inquiry Commission in February 1946).
20. ——— Bengal Crop Survey 1944-45 : Progressive reports were submitted to the Government of Bengal on jute and rice paddy crops on 31 August, 16 September and 14 October 1944; and on other paddy crop on 10 December 1944 and 16 and 24 January and 1, 8, 14 and 23 February 1945.
21. ——— Bihar Crop Survey 1944-45 : Progressive reports on bhadoi (monsoon) crops were submitted on 8 and 20 October and 4 November 1944; on aphan (winter) crops on 11 November, 1, 8 and 25 December 1944; 2 and 22 January, 2 and 9 February, and 21 March 1945; and on rabi (spring) crops on 19 and 23 March 1945.
22. NANDI, HANIKENTAR. On the average power of test criteria. (Proc. Ind. Sc. Congress, 1945).
23. ——— Note on the enumeration of all possible non-isomorphic solutions of balanced incomplete block designs. (Proc. Ind. Sc. Congress, 1945).

ANNUAL REPORT FOR 1944-45

APPENDIX 1. (Contd.)

24. RAO, C. RADHAKRISHNA. On finite geometries and theories of the number theory derivable from them. (*Proc. Ind. St. Congress*, 1945).
25. ——— Some new cyclic solutions of incomplete block designs. (*Proc. Ind. St. Congress*, 1945).
26. ——— Generalisation of Markoff's Theorems and tests of linear hypothesis. (*Proc. Ind. St. Congress*, 1945).
27. RAO, C. RADHAKRISHNA. On linear estimation theory and testing of hypothesis. (*Current Science*, 13(8) June, 1944).
28. ——— Familial correlations or the multivariate generalisation of the intra-class correlation. (*Current Science*, March 1945).
29. ——— Extension of the difference theorems of Singer and Rose. (*Science and Culture*, 19(1), July, 1944).
30. ——— On the linear set up leading to intra and inter-block information. (*Science and Culture* 10(8), December, 1944).
31. RAO SAMARASEKIVATHI. The individual sampling distribution of p -statistics on the non null hypothesis when the null hypothesis concerns equality of mean values for k p -variate normal population. (*Proc. Ind. St. Congress*, 1945)

APPENDIX 2. OFFICERS ON DEPUTATION FOR TRAINING OR SCIENTIFIC CONSULTATION : 1944-45

1. Q. M. HOBBS, M.Sc. (*Lecturer in Physics & Statistics, Dacca University, Dacca*), 13 to 16 April, 1944.
2. O. S. NAYAK, M.Sc., (*Lecturer in Mathematics, Jorhat College, Assam*) 2 May to 21 June 1944.
3. P. R. ROY, M.Sc., (*Statistician, Department of Agriculture, Bengal*) 6 to 13 May 1944.
4. J. R. PAL, B.A. (*Assistant Rice Research Officer, Bankura*) 13 to 20 May, 19 to 22 July, 28 July, 4 to 10 August 1944, and 2 to 6 March 1945.
5. DAS MONI ROY, M.A. (*Professor of Mathematics, Merrut College, U.P.*) 12 July to 11 December 1944.
6. M. Y. KAZI, M.A. (*Department of Economics, Madras University, Aligarh*) 22 July to 10 October, 1944.
7. K. P. PILLAI, M.Sc. (*Physiological Assistant, Haremsahar College, Coimbatore*) 2 May 1944, 5 to 12 March 1945.
8. SUBRATA SEN, M.Sc. (*Dasen Agricultural Farm, Dacca*) 9 to 31 October, 1944.
9. RAJNAY PRASAD MISHRA, B.Sc. (*Sugarcane Research Station, Patna*) 21 October 1944 to 5 January 1945.
10. AMODE KANJAN SEN, M.Sc. (*Senior Statistical Assistant, Department of Agriculture, U.P. Lucknow*) 2 January to 24 February, 1946.
11. SETHAKASHI SEN, M.Sc. (*Imperial Veterinary Research Institute, Muftenzar-Kumona, U.P.*) 2 to 22 January 1945.

APPENDIX 3. STUDENTS IN THE TRAINING SECTION. 1944-45.

(1) Y. D. BORWANKER, M.A. (*Alibabgar*); (2) ROBI NARAYAN DAS, B.Sc., (*Patna*); (3) GIRJJA SENKAR PRASAD, M.A. (*Patna*); (4) S. VISUVALINGAM, B.A. (*London*) (*Cydonia*); (5) P. SUNDARA RAMA AVADHANY, B.A. (*Madras*); (6) BISHWESHWAR PR. SINGH, M.A. (*Patna*); (7) DAYAL PRASAD, M.A. (*Math.*) M.A. (*Econ.*) (*Agro*); (8) KURUNDEKI ALAN M.A. (*Patna*); (9) SALLU BINDE OJHA, M.A. (*Lachhore*); all from August 1944. (10) PRASAD KUMAR BANERJEE, M.Sc. (*Calcutta*) and (11) AWADI RAJAN ROY, M.A. (*Math.*) & M.A. (*Statistics*) (*Calcutta*) in October and November 1944.

INDIAN STATISTICAL INSTITUTE
Proceedings of the Council dated 26 April 1945

A meeting of the Council of the Indian Statistical Institute was held at 5.0 P.M. on Thursday the 26th April 1945, in the Statistical Laboratory, Presidency College, Calcutta.

In the absence of the President, Sir C. V. Raman (Vice-President) took the chair.

Present: Mrs. Charnell Bose, Prof. K. N. Chakravarti, Mr. N. C. Chakravarti, Prof. H. C. Ghose, Mr. B. Das Gupta, Prof. K. B. Madhava, Mr. S. N. Ray, I.C.S., Mr. Samaradranath Roy and Prof. P. C. Mahalanobis (Honorary Secretary).

1. Sir C. V. Raman proposed from the chair that the Council notes with gratification the election of Prof. P. C. Mahalanobis as a Fellow of the Royal Society.

2. Proceedings of the meeting of the Council dated 23 February 1945 were read and confirmed.

3. *Election of members:* Narendra Nath Sarkar, M.A. (Chief Accountant, Corporation of Calcutta) was elected life member and the following persons were elected ordinary members of the Institute:

Purnendu Kumar Bose, M.Sc. (Statistical Laboratory, Calcutta), Birendranath Ghosh, M.Sc. (Statistical Laboratory, Calcutta), Dharendra Mohan Ganguli, M.Sc. (Dy. Superintendent, Bengal Crop Survey, Calcutta), Mahabirprasad Roy, M.Sc., (Calcutta Corporation), Palghat Ramakrishna Subramanyam, M.A. (Stock Share and Finance Broker, Bombay).

4. *Bengal Crop Survey:* The Honorary Secretary reported that the Government of Bengal (Agriculture Dept. Memo No. 3415 dated 4 April 1945) had sanctioned a grant of Rs. 6,50,000 plus dearness allowance of Rs. 1,50,000 for the continuance of the Bengal Crop Survey during 1944-46. Mr. Nihar Chandra Chakravarti, B.C.S., Asst. Secretary, Agriculture Department, would continue to be in charge of the Field Branch. The preparatory work had been completed and the field survey had already started. Resolved that the Honorary Secretary be authorized to take all necessary action in this matter.

5. *Appointment of Committees:* Resolved that the following Committees be re-constituted as follows, for one year, with powers to co-opt:

Journal Committee: Mr. Rajchandra Bose, Prof. Satyendranath Bose (Deputy), Dr. C. Chandra Sekar, Mr. Hariharan Ghose, Prof. K. B. Madhava, Prof. P. C. Mahalanobis (Editor), The Hon'ble Mr. Justice T. J. Y. Borburgh and Mr. Samaradranath Roy (Secretary).

Finance Committee: The President, The Treasurer, The Secretary, Prof. Kharendranath Chakravarti (Convener) Mr. Sudhir Kumar Banerjee, Mr. Nihar Chandra Chakravarti, Mr. Hariharan Ghosh, Mr. Bejoy Bhanu Das Gupta, Prof. K. B. Madhava, Mr. Satyendranath Ray, I.C.S. and Mr. Samaradranath Roy.

6. *Examinations Committee:* Resolved that Prof. Satyendranath Bose, Prof. K. B. Madhava and Prof. P. C. Mahalanobis be elected representatives of the Council on the Examinations Committee.

7. *Recommendations from the Finance Committee:* Considered the following extracts from the proceedings of the Finance Committee dated 25 April 1945:

"Land Acquisition at Baranapore: The Hon. Secretary placed before the Council a letter from the Land Acquisition Officer, and from the owner of the land, a letter offering to sell the land by private negotiation. The Hon. Secretary explained the present position, and stated that he was trying to settle the matter by private negotiation. He suggested that expenditure for purchasing the land may be met by borrowing, with his consent, from the Director's Contribution Fund.

Resolved that the Secretary be authorized to take necessary action on above lines and keep the Finance Committee informed as to progress of negotiation.

PROCEEDINGS OF THE COUNCIL

It was also recommended to the Council that necessary money be borrowed from the Director's Contribution Fund with the consent of Prof. Mahalanobis for the purpose of acquiring the land and that arrangements be made for payment of reasonable interest and for the ultimate repayment of the borrowed sums to the Fund."

Resolved that the proposal made by the Finance Committee be approved.

8. *Budget Estimate for 1945-46* : Considered the draft budget estimate for the year 1945-46 as prepared by the Finance Committee.

Resolved that the budget as modified by discussion in the Council be passed.

Budget Estimate for 1945-46

	Rs.	A.	P.		Rs.	A.	P.
Opening Balance (Cash & Bank)	16,988	15	5	Salary including research staff ..	3,10,000	0	0
Grant from the Govt. of India ..	51,600	0	0	Establishment & travelling ..	25,000	0	0
Grant from the Govt. of India ..				Books and journals ..	10,000	0	0
for Sankhya ..	2,000	0	0	Laboratory equipments ..	7,500	0	0
Membership fees ..	1,000	0	0	Stationery & stores purchase ..	30,000	0	0
Govt. of Bengal : Crop Survey ..	8,00,000	0	0	Postage, printing & contingency ..	15,000	0	0
Govt. of India : War Transport ..	75,000	0	0	Rentals ..	20,000	0	0
Govt. of India : Population Data ..				Other expenses (hire-charges of ..			
Committee ..	20,000	0	0	machines, furniture etc.) ..	20,000	0	0
Govt. of Bihar : Crop Survey ..	42,533	0	0	A.R.P., evacuation & emergency ..	3,000	0	0
Contribution in lieu of Prof. ..				Social activities at Gurukul ..	2,000	0	0
Mahalanobis's honorary services ..	25,000	0	0	Construction, maintenance & repairs ..	5,000	0	0
Miscellaneous Receipts ..	1,100	0	7	Housing scheme ..	10,000	0	0
Rentals ..	14,000	0	0	Govt. of India grant for Sankhya ..	2,000	0	0
				Contribution to Sankhya from ..			
				Institute ..	3,000	0	0
				Director's Contribution Fund ..	25,000	0	0
				Indian Statistical Conference ..	1,000	0	0
				Bengal Crop Survey (Field) ..	5,20,000	0	0
				Auditor's fee ..	1,500	0	0
				Closing Balance ..	10,000	0	0
	10,49,000	0	0		10,49,000	0	0

9. *Annual Report* : The draft Annual Report for the year 1944-45 was placed before the meeting by the Hon. Secretary.

Resolved that the draft Thirteenth Annual Report be forwarded to the Annual General Meeting.

10. *Audited Accounts* : The Hon. Secretary placed before the Council the Audited Report for 1944-45 which had been considered by the Finance Committee on 25 April 1945 and also statements relating to project and other funds.

Resolved that the audited accounts and statements relating to funds be forwarded to the Annual General Meeting.

11. *Institute Examinations* : To suit the convenience of examiners as well as of the examinees resolved that the Institute examinations this year be postponed till July/August 1945 and the Hon. Secretary be authorised to fix the dates.

Resolved also that Prof. K. R. Maithava, Prof. P. C. Mahalanobis (Secretary), Mr. R. C. Bose, and Mr. S. N. Roy be appointee members of the Board of Examiners for conducting the examination for the Computer's Certificate proposed to be held sometime in July/August and that the above four examiners together with Dr. P. V. Sukhatme, Mr. K. R. Nair and Dr. C. Chandra Sekar be appointed members of the Board of Examiners for the examination for the Statistician's Diploma to be held in July/August 1945.

12. *Membership fees of Local Branches* : In modification of first part of Bye Law (VI) of Bye-laws relating to Local Branches (adopted by the Council on 3 August 1937) the membership fee of Rs. 70 for members resident within the area covered by a Local Branch be allocated as follows :—

- (a) Rs. 12 for the Journal (a copy of which will be supplied free to each member of the Institute).
- (b) Rs. 3-8-0 for the Local Branch Fund.
- (c) Rs. 3-8-0 for the Institute Fund.

13. *Local Branch at Ahmedabad* : Considered a letter from Mr. G. D. Mathur dated Ahmedabad, 20 April 1945 proposing that a Branch of the Institute be started at Ahmedabad with the following persons as office-bearers :—

(1) *President* : Mr. Kasturbhai Lalbhai; (2) *Treasurer* : Mr. C. V. Mavliankar; (3) *Secretary* : Mr. G. D. Mathur; (4) *Joint Secretaries* : Prof. Y. D. Konkar and J. B. Sondil.

Resolved that sanction be given to the opening of a local Branch at Ahmedabad in accordance with the constitution of the Indian Statistical Institute and the list of office-bearers as above be approved.

14. *Over-draft arrangements* : The Honorary Secretary stated that owing to non-receipt of sanctioned project grants it was necessary to meet current expenses by increasing the limit of the over-draft of Rs. 15,000 arranged with the Imperial Bank of India.

Resolved that the limit of the over-draft arrangement with the Imperial Bank of India be increased to Rs. 50,000 for a period of 3 months.

Also resolved that the Finance Committee be requested to examine the questions of the working balance.

15. *Land Acquisition arrangements at Girdih* : The Hon. Secretary stated that the Government of Bihar had decided, without consultation with the Institute, to terminate the Bihar Sample Survey of Crops at the end of the work in the *rainy* season of 1944-45 and also the land acquisition procedure for acquiring land at Girdih for the Institute. He also stated that Prof. R. A. Fisher, F.R.S. was of opinion that the discontinuance of the sample survey of crops in Bihar would be a retrograde step as this was likely to create a serious gap in crop statistics; the Hon. Secretary was also of the same opinion. The Hon. Secretary further stated that the Institute was in need of land at Girdih not merely for the Bihar crop survey work but also for other projects and its general purposes, and that, with the approval and support of the Government of Bihar, iron, cement and other building materials for putting up structures on land proposed to be acquired had been purchased at Girdih. A good deal of this material was liable to be wasted and thus involve the Institute in heavy pecuniary loss.

Resolved that the Hon. Secretary be authorized to make suitable representations to the Government of Bihar in this matter.

C. V. Raman
Chairman.

P. C. Mahalanobis
Honorary Secretary.

INDIAN STATISTICAL INSTITUTE

Proceedings of the Annual General Meeting dated 26 April 1945

The Annual General Meeting of the Indian Statistical Institute was held at 8-45 p.m. on Thursday, the 26th April 1945, in the Statistical Laboratory, Presidency College, Calcutta.

Sir C. V. Raman, D.Sc., F.R.S., N.L., (*Vice President*), was in the chair.

The following members were present :—

Dr. B. N. Bhaduri, M.Sc., D.I.C., Ph.D. (Lond.) ..	.. <i>Asst. Physician, New Research & Control Laboratory Janakpurgar.</i>
Mr. H. G. Bhatnagar, M.A., B.Com. ..	.. <i>Statistical Station, D. O. M. P.'s Office, Dept. of Supply, Calcutta.</i>
Mrs. C. Bose, B.Sc. (Lond.) ..	.. <i>Statistical Laboratory, Calcutta.</i>
Prof. K. N. Chakravarti, M.Sc. ..	.. <i>Presidency College, Calcutta.</i>
Mr. N. C. Chakravarti, M.A., B.C.S. ..	.. <i>Add. Asst. Secretary to the Govt. of Bengal, Agriculture Dept.</i>
Mr. B. Das Gupta, M.A. ..	.. <i>Secretary, Indian Central Jute Committee, Calcutta University.</i>
Prof. H. C. Ghosh, M.A., P.H.S. ..	.. <i>Mysore University.</i>
Prof. S. H. Mahdava, M.A., A.I.A. ..	.. <i>Financial Adviser, Dept. of Civil Supplies, Bengal.</i>
Mr. S. N. Ray, I.C.S. ..	.. <i>Calcutta University.</i>
Mr. Samardevraj Nath Roy, M.Sc. ..	.. <i>Calcutta University.</i>
Prof. P. C. Mahalanobis, F. R. S. ..	.. <i>Honorary Secretary.</i>

1. Sir C. V. Raman proposed from the chair that the Indian Statistical Institute nominate with gratification the election of Prof. P. C. Mahalanobis as a Fellow of the Royal Society.

2. *Annual Report and Audited Accounts* : The Honorary Secretary placed before the meeting the Annual Report and Audited Accounts for 1944-45 as approved by the Council and mentioned that the Accounts had been audited by Messrs P. C. Nandi & Co., Chartered Accountants.

Resolved that the Annual Report and Audited Accounts for 1944-45 be adopted.

Proposed by Prof. K. H. Mahdava
Seconded by Mrs. Chandi Bose (Carried unanimously).

3. *Election of Officer-Bearers and Members of the Council* : The Honorary Secretary reported that in accordance with the Bye-law 3 for election of office-bearers and members of the Council, nominations for 1945-46 approved by the Council of the Institute had been circulated together with the notice of the Annual General Meeting on the 9th April, 1945. As the number of nominations was in no case in excess of the number of vacancies, no voting was necessary and no voting paper was therefore issued.

The election of the following office-bearers and members of the Council as circulated was then announced from the chair.

President

Sir C. D. Deshmukh, C.I.E. *Governor, Reserve Bank of India.*

Hon. Vice-Presidents (having filled the office of President)

Sir Badridas Goonka, Kt., C.I.E., *Calcutta.*
Mr. N. R. Sarkar *Calcutta.*

Vice-Presidents

Dr. P. N. Banerjee, M.A., D.Sc., M.L.A. (Central) ..	.. <i>Calcutta.</i>
Sir A. H. Choudhary, Kt., M.L.A. (Central) ..	.. <i>Messrs A. H. Choudhary & Co., Calcutta.</i>
Sir T. E. Gregory, D.Sc. ..	.. <i>Economic Adviser to the Government of India, Delhi.</i>
Dr. S. P. Mukherjee, M.A., B.L., M.L.A., D.Litt., Bar-at-law ..	.. <i>Calcutta.</i>
Sir C. W. G. Normand, Kt., C.I.E., M.A., D.Sc. ..	.. <i>Special Officer, The Observatory, Delhi.</i>
Mr. Chandanil Bagchi ..	.. <i>Minor Machine, Giridih.</i>
Sir Shri Ran, Kt. ..	.. <i>Delhi Cloth and General Mills, Delhi.</i>
Sir C. V. Raman, D.Sc., F.R.S., N.L., ..	.. <i>Indian Institute of Science, Bangalore.</i>
The Hon'ble Mr. Justice T. J. Y. Redburgh B.A., Bar-at-law, C.I.E., I.C.S. ..	.. <i>Judge, Calcutta High Court.</i>
Mr. H. S. Subrahmanyam ..	.. <i>Calcutta.</i>

Treasurer

Dr. Satya Churn Law, M.A., B.L., Ph.D., F.Z.S.,
M.B.O.U. Calcutta.

Secretary

Prof. P. C. Mahalanobis, F.R.S. Statistical Laboratory, Calcutta.

Joint Secretaries

Prof. K. N. Chakravarti, M.Sc. Presidency College, Calcutta.
Kumar Bimal Chandra Sinha, M.A., Calcutta.

Members of the Council

Dr. S. K. Banerjee, D.Sc. Director General of Observatories, Delhi.
Mr. Sushir Kumar Banerjee Statistical Laboratory, Calcutta.
Mrs. C. Bose, B.Sc., (London) Statistical Laboratory, Calcutta.
Mr. Raj (Chandra Bose, M.A., F.N.I., Statistics Department, Calcutta University.
Prof. S. N. Bose, M.Sc. University of Dacca.
Mr. P. H. Carpenter, O.B.E., F.I.C., F.C.S. Director, Indian Tea Association, Teochai, Assam.
Mr. Nihar Chandra Chakravarti, M.A., B.C.S. Addl. Asst. Secretary, Government of Bengal.
Department of Agriculture.
Dr. C. Chandra Sekar, M.Sc. Ph.D. All India Institute of Hygiene and Public Health,
Calcutta.
Prof. K. P. Chattopadhyay, M.Sc. (Canlab), University of Calcutta.
Mr. B. Das Gupta, M.A., Secretary, Indian Central Jute Committee.
Prof. H. C. Ghosh, M.A., P.R.S., University of Calcutta.
Prof. F. W. Levi, Dr. Phil. Nat., University of Calcutta.
Prof. John Maclean, M.A., Wilson College, Bombay.
Mr. A. C. Mackay, M.A., Dip. de Statistique, F.R.S. Director of Statistics, Baroda State, Baroda.
Mr. K. R. Nay, M.A., M.Sc., Food Department, Government of India, Delhi.
Dr. K. C. K. E. Raja, L.R.C.P. & S., D.P.H.,
D.T.M. & H., Deputy Public Health Commissioner, Delhi.
Dr. V. K. R. V. Rao, M.A., Ph.D. Director of Statistics, Food Department, Delhi.
Mr. S. N. Ray, B.A. (Canlab), I.C.S. Financial Officer, Dept. of Civil Supplies, Bengal.
Mr. Samarendranath Roy, M.Sc., F.N.I. University of Calcutta.
Dr. P. V. Sukhatme, Ph.D., D.Sc. Statistician, Imperial Council of Agricultural Research,
Delhi.

4. *Appointment of Auditors* : Resolved that Messrs P. C. Nandi & Co., Chartered Accountants be appointed auditors for the year 1945-46 on an honorarium of Rs. 1500.

Proposed by Mr. N. C. Chakravarti
Seconded by Prof. H. C. Ghosh (Carried unanimously).

5. *Appointment of Committee* : Resolved that as recommended by the Council the following Committee be reconstituted as follows with powers to co-opt.

Journal Committee (1 year) : Mr. Rajchandra Bose, Prof. Satyendra Nath Bose (Darwa), Dr. C. Chandra Seker, Prof. Haricharan Ghosh, Prof. K. B. Madhava, Prof. P. C. Mahalanobis (Editor), The Hon'ble Mr. Justice T. J. Y. Roxburgh and Mr. Samarendranath Roy (Secretary).

Finance Committee (1 year) : The President, the Treasurer, the Secretary, Mr. Sushir Kumar Banerjee, Prof. K. N. Chakravarti (Convener), Mr. N. C. Chakravarti, Mr. B. Das Gupta, Prof. H. C. Ghosh, Prof. K. B. Madhava, Mr. S. N. Ray, I.C.S., and Mr. Samarendranath Roy.

Proposed by Dr. B. N. Bhaduri
Seconded by Mrs. Chamoli Bose (Carried unanimously).

6. *Vote of thanks to the retiring Office-bearers* : Resolved that the Council place on record its appreciation of services rendered by retiring office-bearers and members of the Council.

Proposed by Prof. P. C. Mahalanobis
Seconded by Prof. K. B. Madhava (Carried unanimously)

C. V. Raman P. C. Mahalanobis
Chairman. Honorary Secretary.