APPENDIX 6.

INDIAN STATISTICAL INSTITUTE.

OFFICE-BEARERS AND COUNCIL FOR 1933-84.

PRESIDENT :

Sir R. N. Mookerjee, K.C.I.E., K.C.V.O.

HONORARY MEMBERS :

Sir George Schuster, K.C.M.G., C.B.E., and Sir Brajendranath Seal, Kt., M.A., Ph.D.

VICE-PRESIDENTS :

*Prof. P. N. Banerjea, M.A., D.Sc., Sir E. C. Benthall, Kt., M.L.A., *Dr. D. B. Meek, M.A., D.Sc., O.B.E., *Sir C. V. Raman, D.Sc., F.R.S., N.L., *Prof. Meghnad Saha, D.Sc., F.R.S., Prof. C. D. Thompson, M.A., Sir M. Visveswaraya, Kt., D.Sc., K.C.I.E., M.I.C.E., Sir T. Vijayaraghavacharya, K.C.I.E.

<table>
<tr><td>TREASURER :</td><td>JOINT SECRETARY :</td></tr>
<tr><td></td><td>*Dr. H C. Sinha, M.A., Ph.D.</td></tr>
<tr><td>Sir Hari Sankar Paul, Kt.</td><td></td></tr>
<tr><td></td><td>BRANCH SECRETARIES :</td></tr>
<tr><td>SECRETARY :</td><td>*Prof. D G. Karve, M.A. (Poona Branch), *Prof.</td></tr>
<tr><td></td><td>K. B. Madhava, M.A., A.I.A. (Bangalore Branch),</td></tr>
<tr><td>*Prof. P. C. Mahalanobis, B.Sc., M.A.</td><td>*Prof. C. N. Vakil, M.A., M.Sc. (Bombay Branch).</td></tr>
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MEMBERS OF THE COUNCIL :

Prof. H. R. Jatheja, I.E.S. (Principal, Muzaffarpur College), *Dr. G. S. Bose, M.B., D.Sc. (Calcutta University), *Prof. S. N. Bose, M.A. (Dacca University), Mr. H. H. Burn (Messrs. McLeod & Co., Calcutta), Mr. W. A. Burns, M.A., Bar-at-Law (Chairman, Calcutta Port Trust), *Sir J. C. Coyajee, M.A., I.E.S. (Retd.), (Andhra University), Mr. R. D. Cromartie (Mercantile Bank of India, Calcutta), Dr. Kedarnath Das, M.D., C.I.E. (Principal, Carmichael Medical College, Calcutta), Prof. Satis Chandra Ghosh, M.A. (Calcutta University), Mr. L. V. Heathcote (Burmah Schll Oil, Calcutta), Mr. J. S Henderson, (President, Bengal Chamber of Commerce), *Mr. J. V. Joshi, M.A. (Deputy Director, Commercial Intelligence Department, Calcutta), Prof. V. G. Kale, M.A., (Fergusson College, Poona) *Prof D. G. Karve, M.A. (Fergusson College, Poona), Mr. J. Reid Kay (Messrs. James Finlay & Co., Calcutta), Mr. D. P. Khaitan, (Messrs. Birla Bros., Calcutta), *Prof. K B Madhava, M.A., A.I.A (Maharaja's College, Mysore), *Mr. K. C. Mahindra, M.A. (Messrs. Martin & Co., Calcutta), *Dr. John Matthai, D.Sc. (Tariff Board, Simla), Mr. G. L. Mehta (Manager, Scindia Steam Navigation Co., Calcutta), Mr. R. N. Mookerjee, M.A. (Messrs Burn & Co., Calcutta), *Prof. Radha Kamal Mukherjee (University of Lucknow), The Hon'ble Mr. Ram Das Pantulu (Madras), Mr. J .Powvala (Tata Iron & Steel Co., Ltd., Calcutta), *Mr. T. J. Y. Roxburgh, I.C.S. (Session Judge, Midnapore), *Mr. B. M. Sen, M.A., I.E.S. (Principal, Presidency College, Calcutta), *Prof. N. R. Sen, M.A., D.Sc. (Calcutta University), *Dr. S. N. Sen, M.A., Ph.D. (Meteorologist, Calcutta, *Mr. G. Findlay Shirras, M.A. (Principal, Gujrat College, Ahmedabad), *Dr. J. C. Sinha, M.A., Ph.D. (Presidency College, Calcutta), Mr. N. R. Sirkar (President, Indian Chamber of Commerce), Mr. N. S. Subba Rao, M.A. (Director of Public Instruction, Mysore), Mr. A. R. Smith (Chartered Bank of India, Calcutta), Mr. R. A Towler, (Messrs. McLeod & Co., Calcutta), Mr. G. D. Tyson (Editor, Capital, Calcutta), *Mr. M. Vaidyanathan, M.A. (Imperial Council of Agricultural Research, Simla), *Prof. C. N. Vakil, M.A., M.Sc. (Bombay University).

JOURNAL COMMITTEE :

Prof. P. N. Banerjea, M.A., D.Sc., Prof. K. B. Madhava, M.A., A.I.A., Dr. D. B. Meek, M.A., D.Sc., O.B.E., Prof. N. R. Sen, D.Sc., Mr. T. J. Y. Roxburgh, B.A., I.C.S., Dr. H Sinha, M.Sc. Ph.D. and Prof. P. C. Mahalanobis (Editor, Ex-officio).

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*Members of the Technical Committee.

The Indian Statistical Institute is a Society registered under the Indian Societies Registration Act (Act No. XXI of 1860).

Extracts from the Memorandum of Association.

II. The objects of the Society shall be :—

(1) To promote the study of Statistics both pure and applied and allied subjects.

(2) To provide for research and instruction for the advancement of the study and dissemination of knowledge of Statistics and allied subjects.

      •   •   •   •   •   •   •

IV. The membership of the Institute and its constituent bodies shall be open to all persons irrespective of sex, nationality, race, creed or class.

V. The Institute shall not distribute any part of its income or profit as dividend, gift, or bonus or in any other way among its members, provided nevertheless that office-bearers, workers, and other employees shall not be debarred from receiving remuneration or participating in grants because of their also being members of the Institute.

The Institute consists of Associates, Ordinary and Life Members, Fellows, Honorary Members and Patrons. The supreme control including the power of making rules is vested in the members in General Meeting assembled. The President and other office-bearers are elected annually. The management of the affairs of the Institute is in the hands of a Council elected annually by the members of the Institute. There is a standing Technical Committee consisting of members who are specially qualified by their knowledge of statistics to undertake the direction or review of special investigations and technical problems. Members of the Technical Committee are appointed by the Technical Committee itself, and it is provided in the Rules that no opinion in technical questions shall be given on behalf of the Institute without the approval of the Technical Committee.

Membership Fee Rs. 15/- per year includes subscription to Sankhyā : The Indian Journal of Statistics.

Detailed information and Membership Forms may be obtained on application to the Hon. Secretary, Prof. P. C. Mahalanobis, Presidency College, Calcutta.

INDIAN STATISTICAL INSTITUTE

Annual Report and Audited Accounts for 1933-34

The Indian Statistical Institute has completed one year of slow but steady progress. Considering that the scientific study of statistics has only just begun in India we have no reason to be dissatisfied with the work done. Even if little has been achieved in the way of direct results, the Institute has served a useful purpose in gradually impressing on public mind the importance of statistical researches.

ELECTION OF PROF. KARL PEARSON AS HONORARY FELLOW.

Early in the year the Hony. Secretary wrote to Prof. Karl Pearson asking his permission to propose his name for election as an Honorary Fellow of the Institute. Prof. Pearson's reply is reproduced below :—

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DEPARTMENT OF APPLIED STATISTICS,

University of London, University College,

August 15th, 1933.

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Dear Professor Mahalanobis,

I feel much honoured by your suggestion, and of course sympathise with any movement to increase statistical knowledge in India. But what I think is most needed in India at the present time is two or three thoroughly trained statisticians as professors at the Indian Universities. I do not mean simply mathematicians but trained practical statisticians giving full courses. I have seen recently two or three papers from India printed for Government publications, which show a lamentable ignorance of statistical training, while indulging in quite a wide range of statistical mathematics. Till a number of young Indians have received such training as I have indicated, I doubt whether India can take its right place in the statistical field. The young men who come to England to be instructed are by no means the equals of some of the Indian mathematicians, and until the impression is destroyed that statistics is something easier than mathematics or physics no progress will be made. The subject requires the best intellect that India can produce, and until this is recognised in India no real statistical progress will be possible. Holding this view do you think that I am a proper person for Fellowship of your Statistical Institute? At least I should like your members to know before they elect me what my views are.

<div align="right">

Yours very sincerely,

KARL PEARSON.

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The nomination was approved by the Council and Prof. Pearson was unanimously elected the first Honorary Fellow of the Institute at the Annual General Meeting of the Institute held on the 16th May, 1934.

Sankhyā. The Indian Journal of Statistics.

With the co-operation of the Institute arrangements were completed for the publication of Sankhyā, the Indian Journal of Statistics. The first part has had a very favourable reception. The following review appeared in the Journal of Royal Statistical Society, Part I, 1934.

It is both the duty and the pleasure of the editors of a statistical journal on the verge of its centenary to offer a very hearty welcome to Prof. P. C. Mahalanobis and his colleagues who have launched Sankhyā, the Indian Journal of Statistics. Sankhyā bears to the Indian Statistical Institute a somewhat similar relation to that subsisting between this Journal and the Royal Statistical Society, and its first part (June, 1933) reflects great credit on all responsible. The format, a quarto, is more convenient for the reproduction of tabular matter than our own octavo, while both type and diagrams are pleasing. The contents are well calculated to appeal to different statistical tastes—a very important point, as all editors know. Those who are primarily interested in the application of numerical methods to economic problems will be attracted by Mr. Sarkendra Nath Sen and Dr. Hans Chaudra Sinha's study of Indian Prices during the Depression. This study, based on data taken down to the end of 1932, sounded at least one note of optimism, viz., that "the depression although still bad is not getting worse". Those attracted by problems of educational psychology will turn to Prof. Mahalanobis's paper on the reliability of a group test of intelligence in Bengali; a careful piece of work which, by the addition of explanatory notes, the author has endeavoured to make more intelligible to psychologists or administrators interested in the subject-matter but unfamiliar with statistical methods. Anthropologists will be interested in Mr. T. J. Y. Roxbargh's paper on Galton's Work on the Evidential Value of Finger-prints and in Prof. Mahalanobis's Pec n of some of Risley's Anthropometric Data. Messrs. Poornapregna, Sastry and Madhav a contribute a paper on maternity statistics of interest both to the anthropological and the medical readers. Finally, Prof. Mahalanobis describes Drs. Egon Pearson and J. Neyman's methods of testing the three hypothesis: (1) That samples belong to normal populations having the same mean and standard deviation. (2) That the normal populations have the same standard deviation but that it is immaterial whether the means are identical, (3) That the means are approximately equal and also the standard deviations. The three criteria proposed by Pearson and Neyman are called L_0, L_1 and L_2, and Prof. Mahalanobis provides tables facilitating their computation and various examples.

The editorial committee have set themselves a high standard. Their colleagues in London will watch the progress of Sankhya with hopeful interest.

Letters of appreciation were also received from many prominent statisticians all over the world among whom may be mentioned:—

Mr. A. H. Allman, *Hony. Secretary, Manchester Statistical Society*, Dr. Vittorio Castellano, *Institute of Statistics, Royal University of Rome, Italy*, Dr. Giorgio Colombo, *Director, Barometro Economico*, Dr. D. d'Elekes, *Secretary General, Hungarian Statistical Society Budapest, Hungary*, Prof. R. A. Fisher, F.R.S., *Galton Professor, University of London*, Prof. Corrado Gini, *Editor, Metron*, Prof. M. Greenwood, F.R.S., *Secretary, Royal Statistical Society*, Mr. M. Michael Huber, *Director, Statistical Department, France*, Dr. J. O. Irwin, *London School of Hygiene*, Dr. Karolyi Jordan, *University of Budapest, Hungary*, Mr. Pierre Jolly, *Chamber of Commerce, Paris*, Dr. Karstedt, *Minister of Labour, Germany*, Prof. H. W. Methorst, *Director, Central Bureau of Statistics, Hague*, Dr. C. M. Morant, *Biometric Laboratory, London*, Mr. J. A. C. Osborne, *Bank of England*, Dr. Egon S. Pearson, *University of London*, Mr. Franco Savorgnan, *President, Central Institute of Statistics, Italy*, Dr. J. Wishart, *School of Agriculture, Cambridge*, Dr. G. Udny Yule, F.R.S., *Cambridge*, Dr. Friedrich Zahn, *President, International Institute of Statistics.*

Prof. Corrado Gini has kindly agreed to act as the Italian correspondent of the Journal, an has already sent an article which is being published in Part 2 of the Journal. Prof. Zahn has also contributed an article which will be published shortly.

THE HONY. JOINT SECRETARY'S WORK IN EUROPE.

Dr. Harish Chandra Sinha, Joint Hony. Secretary, proceeded to Europe in July. Owing to his absence the administrative work of the Institute in Calcutta has suffered considerably, but his magnificent efforts in Europe has served to establish contacts with important institutions and groups of workers especially on the economic side. He has secured a large number of publications on an exchange or gift basis from various institutions and Governments. (A full list is published elsewhere).

In Rome he succeeded in securing the active co-operation of Prof. Gini, the Editor of 'Metron' and President of the School of Statistics, Senator Giroui Gentile the President of the Royal Institute of Statistics, Com. G. Colombo the Editor of *Barometro Economico*, Prof. Casalini and others. Dr. Sinha has contributed to the *Barometro Economico* an article on our Institute which has served to draw the attention of statisticians in South Europe to our work in India.

From Germany Prof. F. Zahn, President of the International Institute of Statistics, has already sent us an article for the Journal. President Richard, Director of the Central Statistical Office of Germany, and Prof. Methorst, Editor of the Journal of the International Institute of Statistics, Hague, Holland are also helping us in various ways. In France Dr. Sinha has attained a great deal of success and has established contact with Prof. Michael Huber, Prof. Henri Jeanmarie and others, and has succeeded in arranging with most of the important statistical associations and institutions in France to exchange their publications with Sankhyā.

In England Dr. Sinha has worked untiringly, and has secured the friendly cooperation of the workers of the Royal Statistical Society, the London School of Economics, and various Chambers of Commerce, Banks and other business firms who are sending us regularly their publications. With the help of the High Commissioner's Office, and the India Office he has also established contact with the Consulates of practically all the important Foreign Governments of the World from whom we are receiving a most valuable series of statistical publications.

Dr. Sinha attended the Centenary Celebrations of the Royal Statistical Society in April, and got into touch with a large number of statisticians of other countries like Prof. Schultz of U.S.A., Prof. J. Neyman of Poland and others. In many other ways he has rendered invaluable services in making the work of the Institute known abroad.

LOCAL BRANCHES.

Three Local Branches of the Institute are working at Poona, Mysore and Bombay. Prof. K. B. Madhava, Secretary of the Mysore Branch has worked steadily to foster the growth of statistical studies in Mysore. Prof. C. N. Vakil, Secretary, Bombay Branch, was absent abroad for a long time and consequently very little work was done in Bombay.

We are giving below a short report of the work in Poona. We take this opportunity of recording our appreciation of the zeal and enthusiasm of Prof. D. G. Karve, the Secretary of the Poona Branch, for having maintained its activities in spite of great difficulties.

WORK IN POONA.

Owing to the prevalence of plague in the city for over six months the activities of the branch in common with other academic and public activities suffered a considerable attenuation.

This year the Branch secured one more Life Member in the person of Dr. R. P. Paranjpye, at present Vice-Chancellor of the Lucknow University. Dr. Paranjpye has been taking a great deal of interest in the activities of the Branch since its inception. Whenever he is in Poona he makes it a point to attend the meetings of the Branch. Dr. T. G. Shirname, Professor of Agricultural Economics at the College of Agriculture, Poona, and Prof. B. R. Shenoy M.Sc. (London) Professor of Economics, Wadia College, have joined the branch this year as ordinary members of the Institute. Owing to their transfer out of Poona Profs. R. P. Patwardhan, S. G. Beri and N. A. Mavlankar left the membership of the Institute. Thus the total membership of the Branch continues to be 12 (9 Life Members and three ordinary members).

The activities of the Branch were happily inaugerated this year by a very instructive lecture from Dr. S. R. Savur on Advanced Statistical Methods. The lecture was very widely appreciated and it was decided to hold in Poona, under the auspices of the Branch, courses in statistical methods for the benefit of research workers in different fields of inquiry. Owing to the sudden intervention of the Plague epidemic effect could not be given to this decision in the current year. It is hoped that next year such courses will be introduced at the very commencement of the year.

Dr. Savur who is in charge of the statistical branch of the Indian Meteorological Department delivered another very instructive lecture on 18th September, 1933. The subject of the lecture, which was very well attended, was "Application of Statistical Methods to Long Range Forecasting of Rainfall." The lecture was rendered specially helpful by the use of a projector. (A summary will be published in the Journal).

On the 3rd December, 1933, Mr. R. J. Gokhale spoke on 'statistical examination of certain popular astrological forecasts of rainfall.' He principally concentrated on one such forecast issued by Mr. Bapt. A short summary of Mr. Gokhale's remarks is being published under statistical notes.

WORK IN CALCUTTA: MEETINGS OF THE INSTITUTE.

By the kind permission of Mr. B. M. Sen, Principal, Presidency College, meetings of the Institute were held in the Presidency College, Calcutta. A list of the meetings with short summaries of the topics and discussions is given below.

(1) *Tuesday, July 18, 1933.* P. C. Mahalanobis: *On the Interpretation of Certain Intra and Inter-class Statistics.* The generalised concept of correlation as based on the distinction between inter-class variance and intra-class variance. Karl Pearson's 'correlation ratio' (η), R. A. Fisher's z in the analysis of variance, Egon Pearson and J. Neyman's L statistics, Hotelling's generalization of Fisher's z as particular cases. Possibilities of manifold classification. Partitioning of the data in the case of time-series. Cycles and periods as special cases of such partitioning. Statistical criteria in periodogram analysis ultimately dependent on comparison of inter-cycle and intra-cycle variations.

(2) *Tuesday, July 25, 1933.* Amulya Ratan Sinha: *Supply and Price of Cotton in India.* (Paper published in Sankhyā Parts 2 and 3).

(3) *Tuesday, August 1, 1933.* Raj Chandra Bose: *Distribution of the Correlation Coefficient.* A critical survey of the geometrical method first used by R. A. Fisher and later developed by J. Wishart, with a discussion of certain simplifications in the treatment.

(4) *Tuesday, August 8, 1933.* M. K. Adyanthyaya: *Spurious Correlation.*

Prof. Mahalanobis introduced the speaker and offered him a cordial welcome. Mr. Adyanthaya had worked for a long time under Prof. Karl Pearson in the Biometric Laboratory of London, and had actively participated in the preparation of certain Tables included in Part II of Biometric Tables. Since his return to India he had been working as a Lecturer in the University of Madras, but had recently joined the newly created post of Special Statistical Officer to the Madras Government.

The speaker gave a short history of the early discussion of 'spurious' correlation by Prof. Karl Pearson. He then derived certain general theorems regarding the distribution of· indices of which the constituent parts were correlated variates.

A brisk discussion followed in which several members took part. Prof. Mahalanobis pointed out that the name 'spurious' should not deter us from using such statistics, but there was need for caution in interpreting them. Mr. A. R. Sinha discussed certain difficulties in using index-numbers in economic studies.

(5) *Satusday, August 5, 1933.* Sailendra Nath Sen: *Non-Pearsonian Frequency Curves.* A general descriptive and comparative study of the frequency distributions proposed by (1) Gram and Charlier, (2) Edgeworth, (3) Kapteyn and (4) Logarithmic Frequency curves of Wicksell.

The speaker pointed out the special merits of some of the above systems. In the discussion which followed Prof. Mahalanobis maintained however that statistical experience was definitely in favour of the Pearsonian system. Special treatments were no doubt some times necessary, but on the whole the Pearsonian system had stood the test of time. The bearing of the x^2 test was also discussed in this connexion.

(6) *Tuesday, August 15, 1933.* P. C. Mahalanobis: *Statistical Methods in Education.* Brief resume of the history of development of Intelligence Tests. Achievement Tests. Reliability and Validity of Tests. Use of correlational analysis. Measures of Intelligence. The Intelligence Quotient (I. O.). The Standard Measure (Gauss-Laplacian scale) of Intelligence. Correlational analysis of examination marks. Intelligence Tests and Achievement Tests in relation to success in school examinations. Hierarchical order among coefficients of correlation. Spearman's theory of Two-Factors. Difficulties of analysis. Probable error of Tetrads. Pearson and Moul's criticisms. Wishart's formula. The need for critical work.

(7) *Tuesday, August 22, 1933.* Subhendu Sekhar Bose: *The Principle of Maximum Likelihood.* R. A. Fisher's objections to the Problem of Inverse Probability and to Bayes' Theorem were discussed in detail. Fisher's method of Maximum Likelihood was explained and the principles underlying the method were discussed. It was pointed that the maximum likelihood has been found to be extremely fruitful in many lines of statistical investigations. In the discussion Mr. S. N. Venkataraman, Officer on training-deputation from Madras Agricultural Department, referred to the application of the principle in the estimation of linkage in Genetics.

(8) *Tuesday, August 29, 1933.* Subhendu Sekhar Bose : *Inverse Probability.* This paper was supplementary to the speaker's previous paper on "The Principle of Maximum Likelihood." The history and development of the problem from Bayes to Pearson was reviewed, and the limitations of the Principle of Equal Distribution of Ignorance were pointed out. R. A. Fisher's views together with Prof. Jeffrey's criticism (*Proc. Roy. Soc. A.* 1933, 140, pp. 523-35 were referred to in this connexion. In the discussion which followed, the speaker pointed out that the theory of Inverse Probability had led to valuable results in many cases, and that in spite of its serious limitations it still remains a valuable tool in the hands of Statisticians.

(9) *Tuesday, September 5, 1933.* Kiran Chandra Basak : *Theory of Logistic Curves.* The fundamental problem of population studies. Difficulties in graduation. Paucity of data. The mathematical theory of logistic curves. Practical Applications.

(10) *Tuesday, September 12, 1933.* P. C. Mahalanobis : *The Generalised Distance between Samples from Two Normal Populations.* The fundamental distinction between Tests and Measures of Divergence. In Tests of Divergence we seek to answer the question —Can we consider the two samples S_1 and S_2 to belong to the same population? The answer will be either 'yes,' or 'no,' depending on the odds in favour or against. In Measures of Divergence the problem is different. Consider three samples S_1, S_2 and S_3. We may know beforehand or decide by applying Tests of Divergence that they belong to three distinct populations P_1, P_2 and P_3. We now require to know whether in some suitably defined statistical sense P_1 and P_2 may be considered to be nearer than say P', and P_3. That is, we seek to find a kind of generalised distance between the different populations (based on the experience of the samples).

The speaker had formulated a tentative statistics called D in 1925, and had used it for the Analysis of Race-Mixture in Bengal. In 1927-28 a modified statistics was given (together with a number of alternative forms), and approximate expressions for the first four moment-coefficients were worked out and were verified by artificial sampling experiments, the most important of which was the assumption of statistical independence of the variates.

A more general statistics has been recently constructed by the speaker, and its distribution was being investigated by Mr. Raj Chandra Bose. The statistical concept underlying this expression was then explained in general terms.

(11) *Thursday, 23rd November, 1933.* Raj Chandra Bose : *The Surface of Best Fit.* A geometrical analysis of the problem. The generalized ellipsoid of errors. Invariants. Regression surfaces. Degenerate cases when correlation is perfect.

(12) *Wednesday, 6th December, 1933.* Amulya Ratan Sinha : Statistical Derivation of Demand Curves.

The distinction between the statistical curve showing the relation between supply and price and the theoretical supply curve or the demand curve in economics. The statistical price-supply curve would coincide with the ideal supply curve only when it was stationery, and with the ideal demand curve only when this was stationery. When both the supply and the demand curves were shifting, the price-supply curve will not even approximately describe either the supply or the demand curve. Statistical methods for studying price-supply curves. The usefulness of such studies. Illustration from Indian agricultural data.

Mr. Hari Charan Ghosh made a few remarks from the point of view of classical economics. Prof. Mahalanobis confessed his ignorance of economic science, but expressed the opinion that if economic studies were to become really useful some such revolution as had occured in the physical sciences had become necessary in economics also. In recent physics the general tendency was to get rid of unobservables. The elimination of the ether in the theory of relativity was one example of this tendency. Prof. Mahalanobis thought that the ideal supply or the ideal demand curve occupied the same kind of position in economic science as the ether in nineteenth-century physics. He wondered whether the time had not come to reconstruct economic theories in terms of observables like the statistical price-supply curve.

(13) *Thursday, December 21, 1933.* S. N. Venkataraman: *Genetics and the Chromosome Hypothesis.* In this discussion the recent advances in the study of the cell were discussed in relation to inheritance phenomena in plants and animals. The parallelism between Mendelian theory and the behaviour of the chromosome was pointed out, and the mechanism of cell was described to illustrate the observed phenoment of segregation, linkage and crossing over. It was shown not only how the factors for the character were situated in the chromosome, but that each factor has its own place or locus in the chromosome. The mathematical aspects of Mendelian phenomena were indicated, and the several methods of locating genes on the chromosomes were discussed, including the product methods and Fisher's method of maximum likelihood. The lecture brought out very clearly the importance of statistical methods in elucidating genetic observation and experiments.

RESEARCH WORK IN CALCUTTA.

Research Fellowship. An earmarked donation of Rs. 600/- was received from Mrs. P. C. Mahalanobis for a research fellowship, which was held by Mr. Raj Chandra Bose, M.A. He has prepared a series of critical notes on the geometrical methods developed in recent years by R. A. Fisher, J. Wishart and others for the study of the distribution of correlation coefficients and related statistics. These notes will be gradually published in the Journal. He is now working on the mathematical theory of distribution and has completed a paper on the exact distribution of D^2 in conjunction with Prof. Mahalanobis.

Work in the Statistical Laboratory Although the Statistical Laboratory is not officially a part of the Institute, in actual fact the two are intimately connected, and a short report of the research work now being carried on in the Laboratory is given below.

Besides Mr. P. C. Mahalanobis, and Mr. B. C. Sinha who had gone abroad early in the year, a number of members of the teaching staff of the University and Colleges in Calcutta worked in the Laboratory regularly . Messrs. Khagendra Nath Chakravarti, M.Sc., and Gurudas Bhar, M.A., both of the Mathematics Department of the Presidency College, and Mr. Jatis Chandra Sen of City College are working on educational statistics. Mr. Haricharan Ghosh, M.A., Lecturer of the Economics Department, Calcutta University, Mr. Amulya Ratan Sinha, M.A., Deputy Superintendent, Commercial Intelligence and Statistics, Calcutta, Mr. Sailendra Nath Sen, M.A., and Mr. Juan Ranjan Guha Thakurta, M.A., were engaged in the study of economic statistics. Mr Subhendu Sekhar Bose, M.Sc., and Mr. S. N. Venkataraman, B.Sc., B.Ag., who came from Coimbatore, Madras, on deputation for one year, worked on agricultural statistics. Messrs. Prabhatranjan Ray, M.Sc., and Anil Chandra Nag, M.Sc., were engaged in the study of maternity and

medical statistics, while Mr. Kiran Chandra Basak, M.A., worked on the theory of polynomial and logistic curves.

Besides the research workers mentioned above, a large number of advanced students Messrs. Sadasiva Sen, M.Sc., Anulya Kumar Sinha, B.A., Manmatha Kumar Mazumdar, B.Sc., B.T., Sati Prasanna Dey, B.A., and Bhupendra Nath Ray, B.Sc., were engaged in advanced studies and research work under the guidance of Prof. P. C. Mahalanobis. Messrs. Sudhir Kumar Banerjee and Jaladhar Sarma worked as computers throughout the year. A list of papers completed during the year will be found in an Appendix.

WORKERS FROM OUTSIDE CALCUTTA.

As usual a large number of workers from outside came to the Statistical Laboratory for various periods of study, among whom may be mentioned the names of Dr. G. Sahay, Ph.D., *Sriniketan,* Dr. B. B. Mundkur, Ph.D., *Imperial Institute of Agriculture, Pusa,* Mr. T. R. Mehta, *Shahajahanpur, United Provinces.* Mr. D. M. Sen Gupta, *Jorhat, Assam.* Mr. Tarakrishna Basu, *Sriniketan,* Mr. T. G. Menon, *Kollengode, Travancore,* Mr. V. N. Likhite, *Deputy Director of Agriculture, Baroda,* Mr. S. C. Chakravertti, *Rice Research Officer, Chinsurah,* Mr. E. A. R. Banerjea, *Chinsurah,* Mr. S. C. Bhattacharyya, *Karimganj, Assam,* Messrs. Sailesh Chandra Sengupta, M. Chakladar, Amrita Lal Mookerjee, Fariduddin Ahmed, I. B. Chatterjee from *Dacca Farm, Agricultural Department, Bengal,* Mr. J. R. Paul, *Rice Research Farm, Bankura.*

VISITORS.

A large number of persons visited the Statistical Laboratory last year, among whom may be mentioned the names of : —

Rabindranath Tagore, Prof. Pramathanath Banerjea, M.A., D.Sc., *Calcutta University.* Mr. J. N. Bose, M.A., B.L., M.L.A., *Bengal.* Prof. S. N. Bose, *University of Dacca.* Mr. J M. Bottomley, M.A., *Director of Public Instruction, Bengal,* Prof. A. L. Bowley, *London School of Economics,* Mr. M. Carbery, *Deputy Director of Agriculture, Bengal,* Mr. T. A. Carry, *Secretary, Irrigation Department, Bengal,* Sir Kedarnath Das, M.D., C.I.E., *Principal, Carmichael Medical College, Calcutta,* Prof. J. C. Ghose, *University of Dacca,* Prof. P. N. Ghose, M.A., Ph.D., Sc.D., *Calcutta University,* Mr. R. N. Gilchrist, M.A., I.E.S., *Joint Secretary, Finance Department, Bengal,* Dr. B. S. Guha, D.Sc., *Zoological Survey of India,* The Hon'ble Mr. J. S. Henderson, *President, Bengal Chamber of Commerce,* Mr. Anantakrishna Iyer, *Mysore,* Dr. W. A. Jenkins, M.A., D.Sc., *Special Officer for Primary Education, Government of Bengal,* Col. N. N. King, I.M.S., *King Institute, Madras,* Prof. George Mathai, D.Sc., *Lahore University,* Mr. K. McLean, *Director of Agriculture, Bengal,* Dr. W. McRae, D.Sc., *Director, Imperial Institute of Agricultural Research, Pusa,* Prof. S. K. Mitra, D.Sc., *Calcutta University,* Mr. K. Narialwala, *Tata Oil Mills, Bombay,* The Hon'ble Mr. K. Nazimuddin, M.A (Cantab), C.I.E., *Education Minister, Bengal,* Mr. K. C. Neogi, M.L.A., Dr. C. W. B. Normand, D.Sc., *Director General of Observatories, India,* Mr. M. K. Powvala, *Tata Iron and Steel Co., Ltd.,* Sir C. V. Raman, *Director, Indian Institute of Science, Bangalore.* Mr. S. V. Ramamorti, I.C.S., *Director of Agriculture, Madras,* Prof. J. N. Ray, *Lahore University,* The Hon'ble Raja Sir M N. Ray Chowdhury of Santosh, *President, Bengal Legislative Assembly,* Mr. D. H. Robertson, *University of Cambridge,* Mr. Nalini Ranjan Sarkar, *President, Federation of Indian Chambers,* Prof. N. R. Sen, D.Sc., Ph.D., *Calcutta University,* Dr. S. N. Sen, Ph.D., *Meteorologist, Calcutta,* Col. S. S. Sewell, I.M.S., F.R.S., *Director, Zoological Survey of India,* The Hon'ble Sir B. P. Singh Ray, *Minister for Local Self-Government, Bengal,* Col. A. D. Stewart, I.M.S., *Director, All-India Institute of Hygiene and Public Health,* Prof. P. J. Thomas, *Professor of Economics, University of Madras,* Mr H. R. Wilkinson, I.C.S., *Secretary, Education Department, Bengal,* The Hon'ble Mr. W. F. Woodhead, C.I.E., I.C.S., *Finance Member, Government of Bengal,* Mr. W. C. Wordsworth, M.A., *The Statesman, Calcutta.*

INDIAN STATISTICAL INSTITUTE

A SCHEME FOR STATISTICAL STUDIES IN BENGAL.

A scheme for the Organization of Statistical Studies in Bengal (reprinted in Appendix 2) was submitted in August, 1933 for consideration by the Government of Bengal. This note was favourably commented upon by *Nature,* December 30, 1933, as the following extract will show. Unfortunately, possibly owing to financial stringency, no action has so far been taken by Government.

"A Scheme for the Organisation of Statistical Researches in India," which was submitted for consideration to the Government of Bengal in August last, is largely concerned with a report on statistical researches which have been carried out since 1922. Prof. P. C. Mahalanobis, of the Presidency College, Calcutta, has been actively engaged during the past ten years in preparing reports for various Government departments, building up a laboratory for the application of modern statistical methods to a variety of problems and encouraging such studies in other ways. His labours in this direction have been receiving growing recognition and a plea is made for official support of the small institution which was created by individual initiative. The Indian Statistical Institute was founded in December, 1931, for the purpose of promoting "the study of statistics both pure and applied and allied subjects," and the first part of *Sankhyā*: The Indian Journal of Statistics, edited by Prof. Mahalanobis, was issued last June. This part contains original researches dealing with the theory of statistics and applications to particular economic, medical, anthropometric and psychological problems. There is obviously an enormous scope for useful work of this kind in India, and it is to be hoped that those who have proved themselves willing and capable of prosecuting it will receive all possible encouragement."

Prof. P. C. Mahalanobis gave a short talk on "Statistics—Old and New" at the Calcutta Rotary Club on the 2nd May, 1934.

AT HOME TO MEET PROFESSOR ARTHUR L. BOWLEY.

A very pleasant function took place in the Statistical Laboratory on the 23rd January, 1934 when the members of the Institute met Prof. Bowley and his colleague Mr. D. H. Robertson of the Cambridge University who had come to India at the invitation of the Government of India to give expert advice regarding the organization of economic and statistical surveys. Among those who were present, mention may be made of Principal B. M. Sen, Prof. Pramathanath Banerjea, Mr. W. C. Wordsworth, Prof. Benoy Kumar Sarkar, Mr. D. Ghosh, Dr. J. C. Sinha, and Dr. Dutt. Prof. Bowley and Mr. Robertson went round the laboratory and saw the work which was being done with great interest.

MEMBERSHIP AND ACCOUNTS.

The membership of the Institute at present consists of 2 Honorary Members, 15 Life Members, and 105 Ordinary Members against 2, 13, and 84 respectively in 1932-33. It was intended to collect the membership dues by sending the Journal by value payable post, but owing to the delay in the publication of Parts 2 and 3 of the Journal it has not been possible to arrange this.

AUDITED ACCOUNT FOR 1933-34.

The Accounts for the year 1983-14 are given below. They were very kindly audited free of all charges by Messrs. P. C. Nandy & Co., Chartered Accountants, Calcutta.

Receipts and Payments Account for the Year ending 31st March, 1934

	Rs. A. P.	Rs. A. P.		Rs. A. P.	Rs. A. P.
Opening Balance—			Research Fellowship		600 0 0
Bank	1,248 12 0		Salaries	180 0 0	
Cash	79 11 0		Postage ...	118 13 9	
		1,328 7 0	Contingencies ...	22 1 0	
Donation from Mrs.			Branch Expenses ...	27 8 0	
P. C. Mahalanobis		600 0 0			343 6 9
			Advance to Dr. H.		
Subscriptions —			Sinha ₹30 ...	..	399 5 0
Life members ..	245 0 0		Closing Balance—		
Ordinary members .	470 4 0		Bank	1,410 4 0	
Ordinary members'			Cash	78 7 0	
advance ...	15 0 0				1,488 11 0
		680 4 0			
Advances from Prof.					7,831 6 9
P. C. Mahalanobis ...	...	222 11 9			
		7,831 6 9	Examined and found correct.		

6, HASTINGS STREET,
CALCUTTA,
The 12th May, 1934.

Sd./- P. C. NANDY & Co.,
Hony. Auditors,
Chartered Accountants.

CONCLUSION.

The Institute started its work two years ago, and may now be considered to have passed the experimental state. The publications of the Indian Journal of Statistics, the only journal of its kind in India, is an accomplished fact. Scientific activities in Calcutta have developed in many directions notably in the sphere of medical and educational researches. Finally through the efforts of Dr. H. Sinha valuable contacts have been established with statistical workers in the western countries. Thus although there has not been any spectacular expansion, we have no reason to be dissatisfied with the steady progress achieved during the year under review.*

P. C. MAHALANOBIS,
Hony. Secretary.

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*The Annual Report and Audited Accounts were adopted at the Second Annual General Meeting held in Calcutta on the 18th May, 1934.

INDIAN STATISTICAL INSTITUTE.

PROCEEDINGS OF THE ANNUAL GENERAL MEETING
DATED THE 16th MAY, 1934.

The Annual General Meeting of the Indian Statistical Institute was held in the Board Room of Messrs. Martin & Co., 12, Mission Row, Calcutta, at 4-0 p.m. on Wednesday, the 16th May, 1934.

In the absence out of town of Sir R. N. Mookerjee, K.C.I.E., K.C.V.O., President of the Institute, Prof. P. N. Banerjea, M.A., D.Sc. (*Minto Professor of Economics, Calcutta University*), *Vice-President of the Institute*, presided :—

The following gentlemen were present :—

Sir E. C. Benthall, Kt., M.L.A. (*Messrs. Bird & Co.*).

Mr. S. S. Bose, M.Sc. (*Statistical Laboratory ,Presidency College, Calcutta*).

Prof. K. N. Chakravarti, M.Sc. (*Professor, Presidency College*).

Mr. B. Chatterjee, M.Sc. (*Port Commissioners Office, Calcutta*).

Mr. N. Chakravarti, M.A. (Cantab.) (*Asst. Inspector of Factories*).

Mr. R. D. Cromartie (*Mercantile Bank of India, Calcutta*).

Mr. H. C. Ghosh, M.A. (*Lecturer, Calcutta University*).

Mr. D. P. Khaitan (*Messrs. Birla Bros., Calcutta*).

Mr. G. L. Mehta (*Manager, Scindia Steam Navigation Co., Calcutta*).

Mr. S. C. Roy, M.A., B.L. (*Aryasthan Insurance Co., Calcutta*).

Mr. R. M. Sen, M.A. (Cantab.), I.E.S. (*Principal, Presidency College, Calcutta*).

Prof. N. R. Sen, M.A., D.Sc. (*Professor of Mathematics, Calcutta University*).

Dr. S. N. Sen, M.A., Ph.D. (*Meteorologist, Calcutta*).

Prof. J. C. Sinha, M.A. Ph.D. (*Professor, Presidency College, Calcutta*.

Prof. P. C. Mahalanobis (*Hon. Secretary*).

1. Proceedings of the Annual Meeting, dated 28th April, 1933 (previously circulated), were confirmed.

2. Prof. P. C. Mahalanobis, Secretary, placed before the meeting the Annual Report and Accounts for 1933-34. He reported that Mr. J. S. Henderson, Chartered Accountant, who had audited the Accounts of the Institute for 1932-33 having gone abroad, the Accounts for 1933-34 had been audited free of all charges by P. C. Nandy & Co., Chartered Accountants.

    (i) Resolved that the Annual Report and Accounts for 1933-34 be adopted.

    (ii) Resolved that this meeting places on record its appreciation of the services of P. C. Nandy & Co., Chartered Accountants, who had audited the accounts free of all charges.

        Proposed by—Dr. J. C. Sinha.   }   *Carried unanimously.*
        Seconded by—Sir E. C. Benthall.

3. Resolved that Sir R. N. Mookerjee, K.C.I.E., K.C.V.O., be re-elected President of the Indian Statistical Institute.

Proposed by—Sir Edward Benthall.
Seconded by—Mr. S. C. Roy. } Carried unanimously.

4. Resolved that Prof. P. N. Banerjea, M.A., D.Sc., Sir E. C. Benthall, Kt., M.L.A., The Hon'ble Raja Sir M. N. Ray Chowdhury, Mr. D. P. Khaitan, Dr. D. B Meek, M.A., D.Sc., O.B.E., Prof. M. N. Saha, D.Sc., F.R.S., Mr. Naliniranjan Sarker, Sir C. V. Raman, D.Sc., F.R.S., N.L., Sir T. Vijayaraghavachariar, K.B.E., and Sir M. Visvesvaraya, K.C.I.E., LL.D., D.Sc., M.I.C.E., be elected Vice-Presidents of the Institute.

Proposed by—Mr. K. C. Mahindra.
Seconded by—Mr. N. Chakravarti. } Carried unanimously.

5. Resolved that Mr. K. C. Mahindra be elected Honorary Treasurer for 1933-34.

Proposed by—Mr. D. P. Khaitan.
Seconded by—Dr. J. C. Sinha. } Carried unanimously.

6. Resolved that Mr. P. C. Mahalanobis be elected Honorary Secretary, and Dr H. C. Sinha and Mr. H. C. Ghosh be elected Honorary Joint Secretaries for 1933-34

Proposed by—Sir Edward Benthall.
Seconded by—Mr. D. P. Khaitan. } Carried unanimously.

7. Resolved that the following persons be elected members of the Council for 1933-34.

Prof. H. R. Batheja, I.E.S. (Principal, Muzaffarpur College), Dr. G. S. Bose, M.R., D.Sc. (Calcutta University), Prof. S. N. Bose, M.A. (Dacca University), Mr. S. S. Bose, M.Sc. (Statistical Laboratory, Presidency College, Calcutta), Mr. H. H. Burn (Messrs. McLeod & Co., Calcutta), Mr. W. A. Burns, M.A., Bar-at-Law (Chairman, Calcutta Port Trust), Mr. K. N. Chakravarti, M.Sc. (Professor, Presidency College, Calcutta), Mr. N. Chakravarty, M.A. (Assistant Inspector of Factories), Mr. D. D. Cromartie (Mercantile Bank of India, Calcutta), Sir Kedarnath Das, M.D., C.I.E. (Principal, Carmichael Medical College, Calcutta), Prof. Satis Chandra Ghose, M.A. (Calcutta University), Mr J. V. Joshi, M.A. (Deputy Director, Commercial Intelligence Department), Prof. V. G. Kale, M.A. (Fergusson College, Poona), Prof. D. G. Karve, M.A. (Fergusson College, Poona), Mr. J. Reid Kav (Messrs. James Finlay & Co., Calcutta), Prof. K. B. Madhava, M.A., A.I.A., (Mysore University), Dr. John Matthai, D.Sc. (Tariff Board, Simla), Mr. G. L. Mehta (Scindia Steam Navigation Co., Calcutta), Mr. M. K. Powvala (Tata Iron and Steel Co., Ltd., Calcutta), Mr. S. C. Ray, M.A., B.L. (Aryasthan Insurance Co., Calcutta), Mr. T. J. Y. Roxburgh, I.C.S. (Sessions Judge, Midnapore), Mr. B. M. Sen, M.A., I.E.S. (Principal, Presidency College, Calcutta), Prof. N. R. Sen, M.A., D.Sc. (Calcutta University), Dr. S. N. Sen, M.A., Ph.D. (Meteorologist, Calcutta), Mr. G. Findlay Shirras, M.A. (Principal, Gujrat College, Ahmedabad), Dr. J. C. Sinha, M.A., Ph.D. (Professor, Presidency College, Calcutta), Mr. A. R. Smith (Chartered Bank of India, Calcutta), Mr. N. S. Subba Rao, M.A. (Director of Public Instruction, Mysore), Mr. R. A. Towler (Messrs. McLeod & Co., Calcutta), Mr G. D. Tyson (Editor, 'Capital,' Calcutta), Mr. M. Vaidyanathan, M.A. (Imperial Council of Agricultural Research, Simla), Prof. C. N. Vakil, M.A., M.Sc. (Bombay University), Mr. W. C. Wordsworth (The Statesman, Calcutta).

Proposed by—Mr. K. C. Mahindra.
Seconded by—Mr. D. P. Khaitan. } Carried unanimously.

8.   Resolved that Messrs. P. C. Nandy & Co., Chartered Accountants be requested to serve as Honorary Auditor for 1934-35.

Proposed by—Mr. H. C. Ghosh.
Seconded by—Mr. G. L. Mehta.   } *Carried unanimously.*

9.   The Secretary stated that he had written to Prof. Karl Pearson asking for his permission to propose his name for election as the first Honorary Fellow of the Institute, and placed before the meeting the following letter from Prof. Pearson.

DEPARTMENT OF APPLIED STATISTICS,
University of London, University College.
August 15th, 1933.

DEAR PROFESSOR MAHALANOBIS,

I feel much honoured by your suggestion, and of coorse sympathise with any movement to increase statistical knowledge in India. But what I think is most needed in India at the present time is two or three thoroughly trained statisticians as professor at the Indian Universities. I do not mean simply mathematicians but trained practical statisticians giving full courses. I have seen recently two or three papers from India printed for Government publications, which show a lamentable ignorance of statistical training, while indulging in quite a wide range of statistical mathematics. Till a number of young Indians have received such training as I have indicated, I doubt whether India can take its right place in the statistical field. The young men who come to England to be instructed are by no means the equals of some of the Indian mathematicians, and until the impression is destroyed that statistics is something easier than mathematics or physics no progress will no made. The subject requires the best intellect that India can produce, and until this is recognised in India no real statistical progress will be possible. Holding this view do you think that I am a proper person for Fellowship of your Statistical Institute? At least I should like your members to know before they elect me what my views are.

Yours very sincerely,

KARL PEARSON.

Also considered the unanimous recommendation of the Council that Prof. Karl Pearson be elected the first Honorary Fellow of the Institute.

Resolved that Prof. Karl Pearson be elected the first Honorary Fellow of the Indian Statistical Institute.

Resolved further that Secretary be requested to send a suitable communication to Prof. Pearson.

Proposed by—Mr. P. C. Mahalanobis.
Seconded by—Dr. N. R. Sen   } *Carried unanimously.*

10. Considered a resolution of the Council recommending the election of Sir James Grigg as an Honorary Member of the Institute.

Resolved that Sir James Grigg be elected an Honorary Member of the Indian Statistical Institute.

> *Proposed by*—Dr. P. N. Banerjea. }
> *Seconded by*—Mr. R. D. Cromartie. } *Carried unanimously.*

11. Resolved that the Indian Statistical Institute offers its congratulations to the Royal Statistical Society of London on the occasion of its Centenary.

Resolved further that the Secretary be requested to send a suitable communication to the Royal Statistical Society on behalf of the Inida Statistical Institute.

> *Proposed by*—Dr. P. N. Banerjea. }
> *Seconded by*—Sir R. C. Benthall. } *Carried unanimously.*

12. Considered a resolution of the Council recommending that the Life Membership Fee be fixed at Rs. 150/- with a rebate for all ordinary members of Rs. 10/- for each completed year's subscription subject to a minimum composition fee of Rs. 100/- with effect from 1934-35.

Resolved that the above recommendation be accepted and the Life Membership Fee be fixed at Rs. 150/-.

> *Proposed by*—Mr. K. C. Mahindra. }
> *Seconded by*—Prof. P. C. Mahalanobis. } *Carried unanimously.*

13. Resolved that this meeting places on record its appreciation of the services rendered to the Institute by retiring office-bearers and members of the Council.

> *Proposed by*—Mr. B. M. Sen. }
> *Seconded by*—Dr. J. C. Sinha } *Carried unanimously.*

The meeting terminated with a vote of thanks to the Chair.

P. N. BANERJEA,   P. C. MAHALANOBIS,

Chairman.   *Hony. Secretary.*