JOURNAL & PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL.

Vol. VI. Extra No.

1910.

CALCUTTA

PRINTED AT THE BAPTIST MISSION PRESS, AND PUBLISHED BY THE ASIATIC SOCIETY, 1, PARK STREET, CALCUTTA.

1910

Issued 26th October, 1910.

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A COLLECTION OF POEMS BY THE EMPEROR BABUR.

INTRODUCTION.

The precious little manuscript from which the accompanying plates were photographed belongs to the Library of His Highness the Nawab of Rampur.[1]

Outside Rampur, where it is naturally regarded as one of the show pieces of the Nawab's Library, this little book has never become famous, in spite of the great interest which scholars have evinced in the Emperor Babur, ever since the translation and publication of his Memoirs. Locally the manuscript was, I found, regarded as the autograph of the Emperor throughout, and this the colophon would at first sight lead one to believe. For myself, however, I am convinced that the main text in its very neat *naskh* hand, is the work of a scribe, and that we have Babur's own writing only in the occasional marginal corrections and in the fragment of a rubā'ī written transversely across the last page.

The colophon says تحریر بابر دوشنبه ۱۵ ربیع الاخر سنه ۱۳۵ which would ordinarily mean Babur wrote this (with his own hand): but the endorsement of Shāh Jahān distinctly says that he guarantees the genuineness of *this rubā'ī* and *this signature*.[2] In the process of binding the original book has been much cut down, and it would appear that we have in this manner lost two lines of the rubā'ī and Babur's signature. Had the whole manuscript been in Babur's writing Shāh Jahān would not have made such a specific statement with regard to the *rubā'ī*. Apart from all other considerations this little manuscript at least offers us absolutely genuine specimens of the writing of two of the most famous "Great Moguls." What adds a special interest to the contents of this manuscript is the fact that it has preserved for us a poetical work by Babur, which was hitherto considered to be irretrievably lost. Not only is this work known to us by name, but the exact circumstances under which it was composed are described in minute detail by Babur himself in his Memoirs. I refer to the *Risāla-i Wālidiya*

[1] I take this opportunity of thanking His Highness both for his gracious permission to publish these poems, and also for the great kindness I received at his hands on the occasion of two visits I paid to Rampur to examine the very valuable Arabic and Persian collections in the Nawab's Library.

[2] The poem was completed on Saturday, the 8th of Rabī' II. thus, this fair copy was finished one month and seven days after the comple-

diyya, which occupies the first 14 pages (Plates I—XIII) of this little manuscript. The passage in the Memoirs relating to the composition in A.H. 935 (A. D. 1528) of this poem occurs on pp. 448, 449 of Ilminski's Turki Text; fol. 346 *a* and *b* of Mrs. Beveridge's Facsimile; pp. 357 to 359 of Pavet de Courteille's French translation, and pp. 388, 389 Leyden and Erskine's English translation.

I herewith give the original Turki text for which I have followed the Facsimile taking assistance from Ilminski :—

آدینه کونی آئی نینگ یکرمه اوچیدا حوارثی [1] بدنیم دا ظاهر بولدی انداق کیم جمعه نمازینی مسجد ته قشویش بیله اوتادیم - نماز پیشین احتیاطی نی کیلیپ کتابخانه بیر زمان دین سونگ مشقت بیله اوتادیم - ایندینی [2] یکشنبه کونی از راق تتراديم - [3] سه شنبه کیچه‌سی صفر آی نینگ یکرمی یتی سیدا حضرت خوجه عبد الله نینگ والدیه رساله سی‌نی نظم قیلماق خاطریغه کیچکی - حضرت نینگ روحی غه الفحا قیلیب کوزکلومگا کیچوردوم کیم اگر بو منظور اول حضرت نینگ مقبولی بولور خود نیچوک کیم صاحب قصیدهٔ برده نینگ قصیده سی مقبول توشوب اوزی افلج مرضی دین خلاص بولدی مین داعی بو عارضه دین قونولوب نظمیم نینگ قبولیغه دلیلی بولغوسیدور - اوشبو نیت [4] بیاه رمل [5] مسدس مخبون عروض و ضرب گاه ابتر گاه مخبون محذوف وزنیده کیم مولانا عبد الرحمن جامی نینگ سبحه سی هم او وزنده دور رساله نظمی غه شروع قیلدیم . هم

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tion of the original draft. During this interval Babur seems to have been in Dolpore.

[1] حوارثی has come out badly in the Facsimile.

[2] The Facsimile seems to read ايندي but *indini* is undoubtedly correct, *pace* P. de C. who quotes the word in his foot-note and says he does not think it a possible word. It is indeed wanting from his Dictionary. But the word is common enough and means two days after: just as *ertesi* means the next day.

Radloff says *indini* means "übermorgen. nach drei Tagen."

P. de C. must here have consulted the Persian translation, as otherwise he could not have given the correct meaning of a word which according to him was meaningless.

[3] *Tit-amaq*—to shake. Persian لرزیدن.

[4] The Facsimile reads ابنت *int.*, which is not a word at all as far as I am aware. Ilminski's نیت is probably correct. There is, however, a word *ánt* = an oath, which would at any rate not make nonsense here.

[5] These few technical terms of prosody have caused much confusion to editors and translators alike. It is unnecessary for me to explain the meaning of these terms, but I may at least explain the construction of the sentence as I understand it. "Six-footed *remel*, in which the first

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POPULATION AND HEALTH IN INDIA: THE REAL PROBLEM

By Major-General Sir John Megaw,
K.C.I.E., M.B., I.M.S. (retd.)

The title of this paper was rather hastily concocted by Mr. Brown and myself, but I make no apology on that account: if the words suggest a challenge so much the better, for I invite the frankest criticism of my views; indeed a complete refutation would be welcome. Population and health in India is far too big a subject to be dealt with properly in the short time at my disposal, so I propose to restrict myself to a few of the outstanding points.

The problem of human life in general is essentially biological. Man, like other animals, depends for his well-being on a favourable environment, but, unlike the lower forms of life, he has the power of controlling his surroundings to a large extent; his success or failure in securing a satisfactory existence depends greatly on the manner in which he makes and carries out his plans. Looking at the world today we observe a surprising degree of inequality in the results of man's efforts to secure a favourable environment for himself. In some respects he has succeeded in harnessing the forces of Nature in such a way as to make life more pleasant for mankind as a whole, but too often the products of his ingenuity are directed to the detriment or even destruction of his fellow-beings.

Medical science is one of the rare examples of a human activity which has enlisted the friendly co-operation of every civilized country in a movement for the welfare of humanity in general. Medicine is fortunate in being served by a brotherhood of men who attack their problems in a scientific manner and in a spirit of goodwill to all mankind.

Science is not enough, it may be directed towards destruction as well as construction; goodwill is not enough, some of the world's

greatest tragedies have been caused by idealists; it is only by a combination of the scientific with the humanitarian spirit that real progress can be made.

Basic Principles of the Population Problem

"Every schoolboy knows" that all animals produce more offspring than are needed to replace the parents: in the case of some kinds of fish each mature female produces millions of eggs, though on the average only two of these survive to reach the reproductive stage. Among mammals there are no examples of such excessive reproduction, yet it is estimated that a single pair of rats could have a hundred descendants in the course of a year if no casualties occurred.

Man is much less prolific than the lower forms of animal life, yet human beings could easily double their numbers every twenty-five years if no checks of any kind were applied. Thus, starting from a single pair, the present population of the world could be reached in 800 years if no checks were imposed. We have no accurate knowledge of the population of the world till recent times; obviously the rate of increase must have been very slow on the whole throughout the thousands of years since man appeared on the earth.

Shortage of food, disease, war, and other forms of violent death imposed effective checks on the growth of population till a few generations ago, when new factors have come into play in the case of progressive countries: the chief of these factors are increased production of food and disease prevention.

An opposing factor has come into prominence within the last century, the deliberate restriction of reproduction which originates from a desire to secure better conditions of life. In this connection a misunderstanding must be cleared up: the term "birth-control" is often used in the sense of contraception; but, of course, contraception is merely one of the methods of birth-control.

Celibacy and delayed marriage have the same effect as contraception in restricting the number of births, and therefore they have every right to be regarded as forms of birth-control. The opposition of certain Churches is not directed against the preven-

tion of births in itself, but against certain special methods of birth control, especially artificial abortion and contraception. Restriction of the population, by one means or another, is clearly inevitable, save in special conditions when the food supply is sufficient, for the time being, to provide for a swelling population. Time only permits of a very cursory glance at this aspect of the question, but obviously broad biological principles form the necessary basis of a proper understanding of the population problem.

Variations in Population

Experience is the best guide in human affairs, so I propose to refer to a few examples of what has actually happened to certain groups of human beings in varying conditions of environment. My first example is taken from one of Sir George Newman's fascinating books. Sir George tells us that in London 200 years ago something like three children out of four died before reaching the age of five. In such circumstances a high birth rate was essential if the family or race were to have a chance of survival.

Taking England as a whole, we are told that the population increased only from 5 to 5½ millions between the years 1600 and 1700, by 1800 it had grown to 9 millions, in 1900 it had swelled to 30 millions: now the 40 million mark has been reached. The rapid growth during the past 150 years or so has not resulted from a rise in the birth rate, but from an increase in the survival rate, due partly to disease prevention and partly to improved economic conditions. These two factors are so intimately associated that the exact share of credit due to each cannot be estimated with any degree of accuracy. One thing is certain: neither factor by itself could have caused the remarkable results which have been achieved in England.

My next example shows how precarious is the state of a people whose numbers increase while their economic condition deteriorates. The population of Ireland in 1700 was about 1¼ millions, in 1800 it was 4½ millions, by the year 1840 it had grown to about 8 millions.

The condition of the people in 1840 is vividly described by Stephen Gwynn in the following words:

"In a parish with a population of 9,000 the only wheeled vehicle was one cart, there was one plough, sixteen harrows, twenty shovels, no pigs, no clock, three watches, no fruit trees, people slept naked on straw and rushes, men and cattle were housed together. The school teacher, a man of distinction, had a salary of £8 a year. The people had one meal a day, sometimes only one meal in two days. The poor became a teeming multitude, living on potatoes with a little milk. Over two million persons were in distress for more than half of every year. At least a quarter of a million were driven to beg on the roads before the potato harvest."

The population of Ireland is now little more than 4 millions, yet there is overcrowding. The last census report shows how drastic are the measures that are being adopted to control the growth of population: about 25 per cent. of the people never marry; no less than 80 per cent. of the males between the ages of 25 and 30 are still unmarried. The calamity which happened in Ireland less than a hundred years ago is a striking example of the manner in which Nature deals with excessive and improvident reproduction.

One more case will be mentioned—that of Japan in recent years. The Japanese have been making determined efforts to control preventable disease and increase the output of commodities, so that the conditions seem to be favourable for improvement in the health of the community. Yet we find that the death rate in 1931 was 19 per mille, about the same as in 1886, whereas in England it fell from 18·5 to about 12 during the same period. The infant mortality rate of Japan rose during the years 1886 to 1931 and was about 132 in the latter year, while in England it fell from 145 to 66. The expectation of life of a child born in Japan in 1931 was 42½ years, actually 1½ years less than it was 15 years previously. In England it was about 58 years in 1931, having risen by 15 years during the past half-century.

Why has public health achieved so great a victory in England and failed in Japan? The explanation seems to be that while production of commodities was increasing in Japan, the population was growing even more rapidly. The birth statistics of England and Japan throw a flood of light on the question. In Japan the birth rate rose from 29 to more than 32 between the years 1886 and 1931, while in England it fell from 31 to about 15 during the same period.

One might well ask what would have happened in England if the birth rate had remained over 31 during the whole of the last 50 years, assuming that there had been no adequate outlet for the surplus population? Incidentally it may be observed that the international problem of Japan cannot be understood without taking into account the rapid growth of population: the Japanese question is one of biology rather than of politics. On a visit to Japan in 1925 I obtained an interesting sidelight on the Japanese outlook on life: I asked a leading public health official for his views on the great increase which was taking place in the population; his reply was: "Any discussion of the limitation of families in Japan is not permissible."

The Problem of India

The problem of population and health in India is simple in its broad outlines when studied in the light of general biological principles and the experience of other countries.

First of all, a few words must be said about the historical background of the question. The real history of India is not a record of wars or of political movements so much as the simple story of the conditions of life of the people. The population of India must have grown very slowly before the country came under British control: periods of increase must have alternated with periods of diminution caused by famine, epidemics, and war. Under British rule the output of food and other commodities has expanded greatly: famine and epidemics have been brought under control to a large extent, while violent deaths have been reduced to negligible numbers. The result has been that the population has doubled within a comparatively short time, while in spite of this increase in the number of mouths to be fed, the economic condition of the people as a whole has improved to some extent.

This is the bright side of the picture, but there is also a dark side. The most alarming facts are that between the years 1921 and 1931 no less than 34 millions were added to the population, and that the rate of increase is now greater than ever. Reliable estimates indicate that nearly 5 millions are now being added to the population every year, so that unless some unex-

pected check should be applied there will be about 400 millions of people in India by 1941.

Two questions arise—are the present conditions of life of the people satisfactory? and are they tending to improve or deteriorate? Evidence bearing on the first question is found in the official vital statistics. The death rate of India in 1931 was nearly 25 per mille as against about 12 in England. The infant mortality rate of India in the same year was 179 against about 66 in England. The birth rate of India was more than 34 against 15·8 in England. The expectation of life of a child born in India is less than half that of an English child.

About two years ago, with a view to filling in a few further details of the picture, I made a rough survey of some of the conditions of village life in India. A questionnaire was issued to a large number of doctors working in typical agricultural villages throughout India: the figures which I now give are based on the replies of 571 medical men.

About 60 per cent. of the people were reported to be poorly or badly nourished. There was little evidence of actual hunger, three meals daily being more common than two, but malnutrition due to unsuitable diet was the rule rather than the exception. The average amount of milk consumed by each person worked out at about $3\frac{1}{2}$ ounces daily; nourishing proteins and vitamins were obviously insufficient in the great majority of cases. It was reported that scarcity or famine had occurred at some time during the previous ten years in 22 per cent. of the villages which were surveyed. The average age at which girls begin to cohabit with their husbands is 14 years, and the average age of the mother at the birth of her first child is 16 years.

The maternal mortality rate worked out at 24 per mille births against a little more than 4 in England. Statistical accuracy is not claimed for these figures, but they do give a true general impression of the realities of the situation. They show that health and economic conditions in India are thoroughly unsatisfactory. On the other hand, the rapid increase which is still occurring in the population shows that the people can maintain some kind of existence on even lower standards of well-being.

Dealing with the second question—are the standards of health and life in India tending to improve or deteriorate?—our only guide is the official information of the output of crops and other commodities and of the growth of population.

The evidence goes to show that India has already reached a stage at which reproduction is increasing more rapidly than production, so that a close parallel exists with the conditions existing in Ireland a century ago. Economists are no longer regarded as infallible, but they are on safe ground when they assert that the amenities of civilized life are provided by the surplus of production over what is needed to maintain life. If, as seems to be the case, this surplus is dwindling in India, what is to happen to the structure of civilization? how are the army and police to be maintained? how will education and public health be provided for? how will trade and commerce fare? We used to blame the people of India for hoarding gold, but it looks as if the sale of these hoards had been staving off the evil day during the past two years. This relief cannot last indefinitely; hence the urgent necessity for considering very seriously what will happen when the next great failure of the monsoon occurs.

You may say that the world is producing more food than can be consumed, but difficulties will certainly arise if it be proposed to pour the surplus wheat into India: even if these obstacles could be overcome, the only result would be to promote a further expansion of the population, so that the problem, instead of being solved, would become greater than ever.

I have dealt very briefly with the Indian problem; it stands out so clearly that few words are needed to show that the country is in a state of emergency which is passing rapidly towards one of crisis.

What is the Remedy?

Some of you are doubtless impatiently waiting to ask me what is the use of trying to make our flesh creep when everybody knows that there is no remedy for the evils which have been described? My reply is—how do you know that there is no remedy? An attitude of fatalistic resignation will be justified

only after we have failed in a determined effort to discover and remove the causes of the ills which beset India. We take a justifiable pride in the wonderful work which has been done in India: the wealth of the country has been doubled, peace and justice have been established. Thousands of our countrymen have sacrificed health and even life itself in the struggle to harness the forces of Nature for the benefit of the people.

Nature now threatens to take her revenge for our interference with her destructive powers: her opportunity for doing so will certainly come if we fail to deal with the new situation which has been created as a result of our own labours. What is needed is not to bow our heads and wait for Nature to create a wilderness, but to recognize the fact that in the contest with Nature we have been short-sighted; we have upset her balance without applying a counterpoise. The plan of battle must be rearranged so as to make a well-considered advance along the whole front instead of progressing on one part of the line, leaving our flank unguarded. Nature, if handled with firmness and intelligence, is an excellent servant; if allowed to assume control she is a ruthless tyrant.

It would be cowardly to take refuge in the plea that we are preparing to hand over the responsibility to the people of India, and therefore action must be deferred till the new Government is in working order. Such a policy would be justified only if we could persuade the great biological forces to halt in their ruthless march until the new Government of India is in full working order. Apart from a miracle of this kind, the administration, whatever form it may assume, will find itself faced with a superhuman task.

Another pretext for inaction is that the only effective remedy for the ills of India would involve interference with the religious beliefs and social prejudices of the people. This view has been expressed many times by Europeans, rarely by Indians. I have discussed the question with many educated Indians: every one of them has freely admitted the urgency of the problem, and nine out of ten have assured me that their religious beliefs would not stand in the way of the necessary reform in the Indian outlook on life. The resolution on birth-control passed in December last

by the All-India Women's Conference must have been an eye-opener to many Europeans, but this was merely a reiteration of a similar resolution passed two or three years ago by the same body of educated Indian women representative of all races and creeds of the country.

Let me make it clear at once that I do not advocate any particular form of population control, whether it be celibacy, delayed marriage, or contraception. Each individual and community must decide as to the special method of control which is acceptable to them. What I do advocate very strongly is that the people should be instructed in the hard facts which have to be faced and told how other countries have dealt with a similar problem.

So long as this instruction deals with biological principles and historical facts there can be no objection: the practical application of the instruction can safely be left to the people themselves. The truth is that the inhibitions connected with the study of the population problem have been chiefly on our side: we have been accustomed to plan our own lives in such a way as to secure a comfortable existence, but we have assumed, quite wrongly, that education in life planning is inadmissible in India.

An account by an eye-witness of a little incident which happened nearly 60 years ago in India is a good illustration of the attitude of many educated Europeans to this question. Sir Richard Temple, Governor of Bombay, when on tour, was presented with an address by the Karbari of a Mahratta State who requested His Excellency "to use his high character and transcendent ability to restrain, in some measure at all events, the inordinate aptitude of the people to increase the population." Sir Richard's indignant reply was that "he would do everything in his power for the increase, and nothing for the diminution of Her Majesty's subjects." The Karbari and his friends were amazed that the Governor should have taken offence at so reasonable a request.

Even if time permitted, it would be inappropriate for me to bring forward a detailed plan of remedial action: this ought to be prepared after a thorough investigation of the case by the best brains of India and England.

The problem, fortunately, is outside the domain of party

politics and racial prejudice. It cannot be dealt with in a satisfactory manner by experts: the question is not one of disease prevention, of agriculture, of economics, of industry, of commerce, of finance, of sociology, or of education, but of all these subjects acting and reacting on each other in a very intimate manner. What is needed is a broad general survey of the situation by a body of men with a judicial rather than a specialist outlook, but, of course, the specialists can give very valuable help by supplying evidence.

The urgent need for inducing the people of India to adopt a new outlook on life has been stated with admirable clearness by the Royal Commission on Agriculture in the concluding chapter of their Report in the following words:

"Throughout our Report we have endeavoured to make plain our conviction that no substantial improvement in agriculture can be effected unless the cultivator has the will to achieve a better standard of living, and the capacity, in terms of mental equipment, and of physical health, to take advantage of the opportunities which science, wise laws and good administration may place at his disposal. Of all the factors making for prosperous agriculture, by far the most important is the outlook of the peasant himself. This, in the main, is determined by his environment, and it follows therefore that the success of all measures designed for the advancement of agriculture must depend upon the creation of conditions favourable to progress. If this conclusion is accepted, the improvement of village life in all directions assumes at once a new importance as the first and essential step in a comprehensive policy designed to promote the prosperity of the whole population and to enhance the national income at the source. The demand for a better life can, in our opinion, be stimulated only by deliberate and concerted effort to improve the general condition of the countryside, and we have no hesitation in affirming that the responsibility for initiating the steps required to effect this improvement rests with Government."

I venture to assert that if the whole of the rest of the Report had been ignored, and if a determined effort had been made to give effect to these weighty conclusions, we should already have made a good start in bringing India to a state of prosperity. A careful investigation would certainly bring about a realization of the fact that the sick man, India, is suffering from a progressive debilitating malady whose root cause is ignorance.

There is ignorance of the means of avoiding the infection of deadly diseases, ignorance of the disastrous effects of forcing im-

mature children to produce babies for whom they cannot provide, ignorance of the wastage which results from the use of cow-dung for fuel and the maintenance of millions of useless cattle, ignorance of the means of increasing the yield of nutritious food crops. Briefly stated the evils of India are due to ignorance of life planning.

The remedy is obvious: this consists in education directed definitely towards teaching the people how to make a success of life.

Up to a point the investigation would be simple: the real difficulty will be to prepare a sound working scheme for conveying instruction in life planning in an effective and acceptable manner. But if a new situation with new difficulties has arisen, science has provided us with new facilities for dealing with the problem.

I am convinced that if a quarter of the large expenditure on education in India were set apart for conducting well-organized propaganda by such means as the cinema and broadcasting, the whole outlook on life of the people of India might well be revolutionized within a few years. The rural population of India are thirsting for amusement to relieve the drab monotony of their lives. As was shown in the lecture to this Association in October last by Mr. Strickland, this can be supplied by broadcasting, and at the same time the opportunity can be taken of providing instruction in an interesting form.

The problem must be tackled as one of public health, but public health must be understood to comprise everything that makes for the production of a favourable environment for the people: it is not merely a question of disease prevention. Above all, the method of approach must be that which has characterized public health work throughout the world; it must be one in which scientific methods are applied in a spirit of goodwill to all mankind.

DISCUSSION ON THE FOREGOING PAPER

A MEETING of the Association was held at the Caxton Hall, Westminster, S.W. 1, on Tuesday, February 27, 1934, when a paper entitled "Health and Population in India: the Real Problem," was read by Major-General Sir John Megaw, K.C.I.E., M.B., I.M.S. (retd.). Sir George Newman, K.C.B., M.D., was in the chair, and the following ladies and gentlemen, amongst others, were present:

Sir John Kerr, K.C.S.I., K.C.I.E., Sir James MacKenna, C.I.E., Sir Malcolm Seton, K.C.B., Sir Reginald Glancy, K.C.I.E., C.S.I., Sir Charles Armstrong, Sir Alfred Chatterton, C.I.E., Sir Duncan Macpherson, C.I.E., Sir Albion Banerji, C.S.I., C.I.E., Sir Leonard Rogers, K.C.S.I., K.C.I.E., M.D., etc., Sir John Cumming, K.C.I.E., C.S.I., Sir Charles Innes, K.C.S.I., C.I.E., Sir Philip Hartog, K.B.E., C.I.E., Sir Ross Barker, K.C.I.E., C.B., Lieut.-Colonel Sir Cusack and Lady Walton, Lady Bennett, Lady Walker, Lady Abbas Ali Baig, Mr. R. A. Butler, M.P., Miss Eleanor Rathbone, M.P., Mr. F. G. Pratt, C.S.I., Mr. H. M. R. Hopkins, C.S.I., Mr. O. Gruzelier, M.V.O., Mr. H. R. H. Wilkinson, Mr. F. J. P. Richter, Mrs. Weir, Swami B. H. Bon, Mrs. Damry, Mrs. D. Chaplin, Miss M. Hooper, Mr. T. R. V. Chari, Mr. W. F. Westbrook, Mr. Sunder Kabadi, Mr. H. K. Sadler, Mr. R. A. MacLeod, Mr. N. N. Ghosh, Mr. T. A. H. Way, Mrs. Dewar, Rev. E. S. and Mrs. Carr, Miss C. K. Cumming, Miss Price-Simpson, Mrs. Gray, Mr. C. R. Corbett, Miss Leatherdale, Miss Hanson, Dr. and Mrs. T. T. Thomson, Mrs. B. D. Bery, Miss E. Macadam, and Mr. F. H. Brown, C.I.E., Hon. Secretary.

The CHAIRMAN: Ladies and gentlemen,—It is very kind of the East India Association to invite me to their meeting to-night, and I am very pleased to come. I looked up my records, and I discovered that it is now about fifty years since my father was invited by your Association to come and lecture here on "Water Storage and Irrigation in India." He had only been a private traveller in the East, but he had been much interested in questions of irrigation. He became a friend of Sir Arthur Cotton and was drawn into something in which he was not much more than an amateur, but a much interested amateur.

In the second place, I am very pleased to be here to preside for my distinguished friend, Sir John Megaw. Not only had he, as we all remember, a long and useful career in India, but we are now happy in having him back in England as President of the Medical Board at the India Office, and I am quite sure that we shall listen with the interest and attention which it deserves to what he has to say to us.

Major-General Sir JOHN MEGAW, K.C.I.E., M.B., I.M.S.: Let me first of all express the sense of honour which I feel at being invited to address you this evening, and especially at the fact that Sir George Newman has consented to come and preside over the meeting.

The paper was then read.

The CHAIRMAN: I am sure that we shall all feel that Sir John Megaw has placed us greatly in his debt by his paper to-day, by his lucidity and simplicity, by the fact that he deals with some of the fundamental issues of life not only in India but here also.

At first sight this problem of the population, as he has presented it, and as we all are witnesses of it in India, may strike us as novel, but a little reflection will show us that it is a very ancient problem, and one which has been met with on many occasions in the long history of mankind, and I doubt not that with the exercise of the suggestions which he has made to us, it may be solved or at least ameliorated in India.

You will not forget that we have experienced this problem in England. In 1348 the population of England was four millions, and in 1349 it was only two millions, because the plague had slain half the population, and a great deal of the subsequent history of England to-day in regard to wages and land tenure was permanently affected by this extraordinary situation.

Very much later, in modern times, in 1800, the population was nine millions, a growth, you see, over four or five centuries which was extremely slow. To-day it is between forty and forty-two millions. There are no doubt too many of us on this little island in a northern sea, and yet we have contrived, as our forefathers before us have contrived, to produce the healthiest nation in the world. We have done that, not because of medical science so much as because of social circumstance, which has been controlled by Government and by the individual, combined with education.

We learned lessons. England learned how to control disease, not because she has any particular genius in that regard, but because her history has taught her how to control disease, and her people have grown up more and more accustomed to such control. I suppose I am saying what is true, I believe it to be true—we have the healthiest nation in the world at the present time because the people are socially circumstanced more favourably than others, and by their growing experience and education and by the understanding of the common people of the art of living they have been able to survive and raise their nine millions to forty millions in a hundred and twenty-five years. They have been able to reduce their high mortalities by a recognition of the facts of nature, and a more and more biological understanding of those facts.

I have endeavoured to point out for many years to this country that the conditions of the health of its people are dependent not upon drugs but upon a fuller understanding of what I call for short "the art of living." I could give many illustrations of this, but they would probably only bore you, and they would not be exactly comparable to the problem which has been raised by Sir John Megaw. I read this paper with very great pleasure, and we have heard it with still more pleasure. The living voice and the living personality of a distinguished medical officer of the Government of India have added to the printed word.

It is a problem which seems to me to be threefold. The problem is a population so large that it is higher than the production of the nation is at present supporting. Secondly, it is to be solved mainly by the education of the people as a whole, and Sir John gives various illustrations where

education is sadly needed. He would be the first to admit the extreme difficulties in India, which has not had the advantages which the nineteenth century gave to England or anything comparable to them. We owe a very great deal to the early Victorians and to the nineteenth century. They built a solid foundation of health for us. The position in which England stands to-day is more dependent upon the Act of 1870 for the education of the people than many of the Public Health Acts which Parliament has since passed.

Thirdly, we must not be unduly depressed in regard to the ravages of disease. We have seen the great triumphs of science and of social reform, and they go hand in hand, changing the face of England to an incredible degree even in our own lifetime. If you want to see leprosy, you must leave England and go where you can find it. If you want to see plague, you must leave England and go where you can find it. If you want to see cholera, you must leave England and go where you can find it. Yet those three diseases have in the past swept England and brought it well-nigh to a conclusion. Four times in the nineteenth century the visitations of cholera impressed the English people so profoundly that we set to work to mend our ways, clean our water, and behave ourselves a little better than we had done formerly. Leprosy, plague, cholera—three diseases which India knows all too well to-day to its terrible cost—have been banished from England and are now curiosities in this country.

What man has done, man can do with those strange but all-powerful factors that Sir John Megaw mentioned in his lecture—knowledge, understanding, and goodwill. Then his actual recommendation commends itself to me as being a very sound proposal, one in which he and I have to indulge in our official work very often—namely, go and find out, enquire. So he says here, "What is needed is a broad general survey of the situation by a body of men with a judicial rather than a specialist outlook." I am with him entirely. That is the kind of way in which to begin to approach this vast human problem which so many English people overlook.

I am glad to be here to hear the President of the Medical Board of the India Office and the late Sanitary Commissioner of the Government in India; I am glad to hear from him of his appreciation of this splendid call to us all, for ourselves as well as for our fellow-citizens in India—namely, further education in the art of living, and an appropriate inquiry in India as to the exact situation in respect of maternity, birth control, and malnutrition, and the means for improving the public health and the prevention of avoidable disease.

Miss Eleanor Rathbone, M.P.: It was impossible to listen to Sir John Megaw's exceedingly lucid and interesting address without one's mind bristling with questions one wanted to put to him. So I shall proceed at once to put as many as I dare allow myself without taking up more time than is fitting for any one member to take up.

The first question one wants to ask him was led up to by what was almost the concluding sentence of his address—namely, a quotation from the Linlithgow Report, which ended with the words: "The responsibility

for initiating the steps required to effect this improvement [in the general condition of the countryside] rests with Government."

What I should like to hear from him is, what steps exactly would he like the Government to take? He did indicate one step. He suggested the necessity for a survey by men of judicial minds, who should hear expert evidence. I think many of us would like to see such a survey, but, if I may put the doubt quite brutally which I think is in some of our minds: What is the use of a survey unless you have a Government that is willing to carry out the recommendations of the survey, even if those recommendations should prove to be unpopular?

Therefore I should like to ask him to indicate perhaps the lines of the survey and the questions it should investigate.

Another point of his speech I should like to hear further elucidated concerns how and in what way information should be given that will tend to the limiting of this remarkable but menacing increase in the population.

Sir George Newman suggested that if India only chose, she could attack the problems of leprosy, plague, and cholera as effectually as we in this country did. But unfortunately Sir John Megaw's address suggests the conclusion that if India did that, they would only make the problem worse, because instead of adding ten millions to the population in ten years, if the enormous present mortality was decreased, they might add twenty millions.

Therefore I think all he has said suggests this: that the whole problem of population in India turns round the question of how the increase of population can be slowed down. As Sir John said, there are various ways of birth control. It may be through celibacy or postponement of the age of marriage, but when the problem comes in a concrete form to a doctor working in India, is the doctor, if he is working in the Government service, now at liberty to tell a woman whose health necessitates it, how she can prevent having another child? And if not, does he not think that the first constructive step the Government should take is to make it plain that it is not only the right of a doctor to give such advice, but his duty? I would like to know this. What should be the exact lines of this survey, assuming you have a Government courageous enough to carry out its recommendations?

My second question is, what does the Government at present do in this matter of encouraging information on birth control?

Does Sir John agree with a very interesting remark in the Report of the Census Commissioner, Dr. Hutton, to this effect, that it is doubtful whether the luxury of Baby Weeks in India should be longer permitted unless they are accompanied by information in methods of contraception. Are Government medical agencies and hospitals now permitted to give that information, and if not, is that not the very first step, that the Governments in India must surely face up to the question? Can they see any way of solving the economic difficulty, the frightful pressure of population upon the means of subsistence or all the questions that arise out of child marriage and bad midwifery, and so on, unless they are willing to grasp the nettle in both hands and permit and encourage their accredited representa-

tives in India—doctors, nurses, midwives, teachers—to give the information to the people which is requisite for their health; information about methods of contraception where the health of the woman requires it; information as to why child marriage is detrimental to health; active work to improve conditions of midwifery; information as to the detrimental effects of purdah in its extreme forms.

The real obstacle is that the moment a Government or Governments find that information on any of these subjects is likely to cause offence in any quarter, however intellectually contemptible, or to arouse agitation in any quarter, immediately they subside and a policy of hush-hush prevails, and their representatives are not allowed to speak the truth to the people even when every intelligent man or woman knows that the knowledge of that truth is essential if these evils, which are cutting at the vitals of the Indian people—over-population, child marriage, and so on—are to be stopped.

Dr. T. T. Thomson: In rising to represent a missionary body, I have not had time to obtain representative views from the various societies, and I really stand here because I have been privileged to live and work in the Madras Presidency and in the Mysore State for about twenty-five years, and perhaps to some extent can represent the views of the medical missions working in India. We thank you, sir, and the Association for giving us the opportunity and the honour of representing some views here this afternoon.

We really plead guilty to Sir John Megaw's accusation of helping to bring on this "population crisis" in India, because the medical missionaries in the various hospitals that they seek to manage with the very efficient help of Indian Christian doctors, do all they can to make people alive out there, and to keep those who are alive still more alive, whether they are diseased or weaklings, or strong and simply needing surgical attention. But still that is the duty of medical men all over the world.

I will divide my remarks into two headings. First, with regard to restricting the population. Some aspects of birth control are taught in our mission hospitals, where occasion arises, by those who are competent to deal with the subject. In the matter of voluntary sterilization also we are able to give advice. Quite often when we get patients coming for the Cæsarean operation, we are able to give that advice, and if the patients or their friends accept it, sterilization is performed. We could cite many cases where that has been done, and where life has been made much happier for the whole family after voluntary sterilization has been performed. These cases might be called extreme, but, in a population of three hundred and fifty millions, they are unfortunately all too common. Delayed marriage is a matter I should like to refer to, because I think it would be correct to say that in the Christian community the average ages of cohabitation and the birth of the first child are about two years higher than the figures Sir John Megaw mentioned, fourteen and sixteen. In the Christian community I think the figures could be put at sixteen for cohabitation and eighteen for the birth of the first child.

It seems to me from my experience in India that this matter is most

> Only three quarters of an acre is under cultivation per head of the population. These facts are staggering, and you will agree with me that they must give matter for serious thought to all thinking men and women in India."

Lord Linlithgow made this statement for the purpose of emphasising the urgent need for an extension of irrigation, but on other occasions he has shown clearly that he regards irrigation as being only one of the factors concerned in a many-sided problem. Indeed, so complex is this matter of the population of India that it will only be possible in a brief talk to deal with a few of the points in a sketchy and somewhat discursive manner.

My object is to arouse interest in the subject. I used to hope that my papers and talks on population would provoke criticism, but these hopes have only been realised to a small extent. Too many of my hearers and readers have expressed their agreement, and that has been the end of the matter. Sharp criticism and a heated controversy would do far more to advance the good cause of population control than acquiescence followed by inaction.

Pressure of Population as a Biological Problem

Pressure of population does not concern merely the people of India or even human beings in general; it is a great biological problem which affects all kinds of living things. Every plant and animal tends to reproduce its kind in far greater numbers than are needed to replace the parents. For example, some bacteria can double their numbers every twenty minutes or so when conditions are favourable; if they had unlimited scope for multiplication it would only take a few months for them to invade the whole world, to the exclusion of every other living thing. Needless to say, such an invasion cannot happen; after each period of rapid multiplication the food supply becomes exhausted, or some other adverse factor comes into play so that more deaths than births occur among the bacteria.

Among the higher forms of life the provision for reproduction usually appears to be out of all proportion to the needs of the case; for example, the females of some kinds of fish produce many millions of eggs during their life-time, but if the number of individuals belonging to each species of fish is to remain constant over a long period of years, an average of only one daughter of each mother fish can reach maturity. If an average of two were to survive, it would only be a matter of time before the species would monopolise the waters of the rivers or seas in which it lives.

The rate of reproduction among human beings is much slower. In the most favourable conditions it takes about twenty years for a group of people to double their numbers, as compared with as many minutes in the case of the bacteria which have been mentioned; but the following example shows what has actually been accomplished by a human community. Sir Evelyn Wrench in *The Times* of March 1st, 1938, stated that the 60,000 French Canadian settlers in Canada in 1759 had become nearly 5,000,000 in the present year. Even this astonishing

increase does not represent the maximum capacity of human beings for increasing in numbers, for if the French Canadians had doubled their population every twenty years, and this is by no means an impossible feat, they would now be more than 20,000,000 instead of a mere 5,000,000. A community of 1,000,000 people which doubles its numbers every twenty years would become 32,000,000 at the end of 100 years, more than 1,000,000,000 after 200 years, and 32,000,000,000 in 300 years. Unrestricted increases in population take place by geometrical progression, so that given a few hundred years a very small community could populate the whole world.

Malthus on Population

Malthus was the first person who made a serious study of the human population problem. To-day, when the name Malthus is mentioned, most people shrug their shoulders and dismiss him with the remark that his views have been exploded. They adopt this attitude because they judge him, not by what he wrote, but by what he is wrongly assumed to have written. Surely there never was a man who was so greatly abused and misrepresented in his own time, and so completely misjudged by posterity.

Malthus pointed out that "the constant tendency of all animals is to increase beyond the nourishment which has been provided for them," but he also insisted that this tendency could be, and actually was, controlled in the case of human beings by certain checks which he called "moral" and by others which he called "vice and misery." Under the heading "misery" he included disease, war and starvation. His moral check was restraint in the matters of marriage and sexual intercourse.

The modern check with which his name is libellously associated never entered into his calculation, because it was almost unheard of in his days; certainly the good Malthus would not have included it among his moral checks. Malthus regarded starvation as the ultimate though seldom the immediate check. He made the important observation that "great privation depresses man below the very capacity for improvement," and that "comfort must reach a certain height before the desire for civilised life can come into being at all." My tribute to Malthus is, to some extent, an act of penance; like so many others, I had long accepted the popular notion about the teachings of the great man, and did not take the trouble to find out what he actually wrote. In my case, the punishment fitted the crime, for I spent much time and labour in arriving at conclusions which Malthus had expressed nearly 150 years ago in language much more polished that any that is at my command. Anyone who will read for himself the "Essay on Population" must be convinced that its doctrines, far from having been exploded, have been justified by after events in every part of the world.

Checks on the Growth of Population

Primitive man was subjected to the natural checks: disease, famine,

catastrophes, death from attacks by animals, etc. When human beings began to employ their newly-found reasoning powers, they realised that life became uncomfortable when there was not enough food to go round, and accordingly they adopted such rough and ready checks as the slaughter of the aged and infirm members of the community, and infanticide. In carrying out infanticide, the weakly and deformed infants would naturally be the first to perish, so that the procedure, in spite of its barbarity, must have improved the physical standards of the race. Warfare for the possession of food supplies must have been one of the earliest checks on the growth of population. At a later stage certain communities employed crude methods of abortion and contraception. Examples of the use of all these checks can still be found among some aboriginal tribes. With the advance of civilisation, more humane methods, especially celibacy and delayed marriage, came into use when the natural checks failed to keep the population within the desired limits.

Nature's Checks on Population

Nature's chief checks on population are disease, starvation and natural catastrophes.

There is a tendency to idealise Nature and to regard her as a kindly mother who watches over the interests of all her children. This sentimental view has little support from the actual facts. Nature's scheme is based on excessive reproduction combined with ruthless destruction of the surplus population. She does not create smiling fields, but inhospitable jungle where war to the death is constantly being waged among its inhabitants. On the other hand, when the forces of Nature are controlled and directed in an intelligent manner by human beings, she becomes a trusty servant, and richly deserves the praises which are lavished on her.

But it must be realised that when we set about the work of controlling Nature we must do so with both eyes open; it is not enough, for example, to get rid of preventible disease and thereby upset the balance between population and the resources of life. We must at the same time increase the output of food and other commodities or restrict the growth of population; still better, we can do both things and so enable an increasing number of people to enjoy a comfortable existence. If we attack Nature only on one front by controlling disease, she will have her revenge by causing a rapid increase in the population, and so setting the stage for the next act in her drama—famine; this will inevitably be followed by a return of the diseases which had been checked. Nature, then, is a cruel mistress; but, when wisely directed, a good servant.

Some Facts Bearing on the Problem

Little is known of the historical background of the population problems of India. One writer estimates that the population of the country was 150,000,000 in 1750, but Sir Frederick Nicholson, shortly before his death, stated that it was not much

more than 100,000,000 in 1800. For some thousands of years prior to the beginning of the sixteenth century, there must have been great fluctuations in the population, depending on epidemics, famines and warfare; probably the population was never more than about 100,000,000, and after a great famine it may well have fallen to half that figure.

Some people cling to the belief that a golden age existed in India in ancient times, but from what has been said about the rate at which the population can increase when all conditions are favourable, a golden age could not last for many years. A population which can double itself every twenty years would soon catch up with the greatest possible increase in the food supply. There may well have been periods of plenty, but these would have followed after great calamities which killed off the surplus population.

There is no need to labour the question of the population of India in prehistoric times; the differences between ancient and modern conditions of life are such that we cannot extract much help or guidance from the statistics of bygone ages. On the other hand, the changes which have taken place in the population during recent years have an important bearing on the present conditions of India and on the prospects for the future. The great outstanding feature of the population of India is that it has doubled itself within the lifetime of some people who are alive to-day; indeed, if we accept the estimate made by Sir Frederick Nicholson, it has almost quadrupled itself since 1800. To take the most conservative estimate; it is astonishing that the number of people should have been doubled within the span of life of a human being, and this in spite of the great toll which has been levied by epidemics and famines. Such an increase would have been impossible but for the great strides which have been made in the exploitation of the resources of the country. Irrigation, railways, roads, industries and improvements in agriculture have been important factors; and we must not forget the importance of the part played by the establishment of law and order. The rate of growth of the population is known with reasonable certainty since 1891. The average *yearly* excess of births over deaths in British India and Burma alone, since 1891, is shown in the chart. The actual figures are as follows :—

1891–1900	.. ..	512,277
1901–1910	.. ..	933,623
1911–1920	.. ..	667,654 (Includes the influenza epidemic)
1921–1930	.. ..	1,995,301

Since 1930, the rate of increase has risen almost without interruption to reach the prodigious figure of over 3½ millions in 1936, during which year the births were nearly 10 millions and the deaths about 6½ millions. This rapid increase in the rate of growth of the population has been due chiefly to the fall in the death rate from an average of about 34 per mille during the first twenty years of this century to an average of about 24 per mille during the past six years. The birth rate has not fallen much during the same period.

It is both interesting and instructive to compare what has been happening in

urgent with the rural population. After all, 90 per cent. of the people of India live in the villages. The educated Indian knows by education and by his own common sense that delayed marriage is important not only to the mother but for the health of the offspring, and for the mother that at the tender age of sixteen she should not bear her first child. I think it is therefore not amongst the educated Indians that we need to stress the subjects of birth control and delayed marriage or even voluntary sterilization, but amongst the vast masses of India, the uneducated in the villages. That is being striven for in our various high schools, where we teach hygiene and biological education. We are training nurses, and we do not mind if those nurses whom we train get married, because they take with them the knowledge of childbirth into the villages.

I pass on to the second heading, how to support the existing population. There are not the ravages of famine, pestilence, and war, fortunately, that existed in past generations. Missionaries are out to help Indians in as understanding a way as possible and with goodwill to assist them to plan a more effective life—that "life planning" which is so lacking in the Indian village. Agriculture must be improved and brought up to date, and farmers and field workers taught accordingly. One method of imparting such instruction is through rural reconstruction centres.

A survey has been undertaken in a small way by the missionary bodies in India along the lines of co-operation in rural community work. The rural uplift is stated to be of the very essence of the Gospel of Christ, and therefore an integral part of the Christian message. Interest in rural problems has been stimulated by the Royal Commission on Agriculture, referred to by Sir John. The heart of the matter is quoted by him from the Commission's report.

Interest has also been stimulated by the work of Mr. Brayne in rural uplift at Gurgaon, the Moga School, in relating education to rural needs, by the development of co-operative credit societies, and by the work of men like K. T. Paul, Samuel Higginbotham, and others. Dr. Butterfield, the counsellor on rural work of the International Missionary Council, gave the idea of the Rural Reconstruction Unit, which is thus defined: "A Rural Reconstruction Unit is a group of contiguous villages, ten or fifteen in number, in which as full a programme as possible of rural reconstruction service shall be made available to all the people. All agencies for education, health, economic and social progress will be urged to pool their efforts, through some form of Community Council, in an attempt to get the people to co-operate in building a new type of Indian rural community. The Church must lead this endeavour to make the enterprise thoroughly Christian in spirit."

An International Missionary Conference, which met in Jerusalem four years ago, added in their Report: "The only practicable way is to select suitable reconstruction centres, and demonstrate in them an intensive form of work that may eventually spread over wide areas, as the Church grow in power and influence."

That has been put into practice within the last three years, and there are about a dozen of these Rural Reconstruction Centres working now in India

with very real benefit. Our efforts as a missionary body are comparatively small, but we seek to help and to forward the great example which the Government of India has shown, the rule of justice which has been brought into India. Our medical missions supplement the magnificent work of the Indian Medical Service, which is manned by both Europeans and Indians.

Sir LEONARD ROGERS: I have listened with somewhat mingled feelings to the paper of my old friend Sir John Megaw, because I cannot help wondering if, after having spent my life in finding new forms of treatment and prevention of cholera, dysentery, liver abscess, etc., I might not have been better employed in finding a lethal gas which would put the excess population out of their misery. However, as I have often felt that one of the greatest disappointments of a research worker is that when he does make discoveries they can rarely be applied in India on any large scale, because the majority of the people live in villages where they cannot obtain or afford to employ a medical man, so I now have the consolation that I have not saved as many people as I might otherwise have done.

We control epidemics to a large extent, but I am not sanguine as to the control of all cholera outbreaks. We have not had very big epidemics lately owing to good monsoons; so we have been very fortunate in recent years. In the famine years 1875 and 1892 and 1900 we had big cholera epidemics, which are likely to recur under similar conditions.

The greatest Viceroy I have served under, Lord Curzon, showed his wisdom in taking up the question of improving agriculture. He started the Agricultural College at Pusa to improve food supplies. That is the best way to deal with the problem, as what we want to do is to increase our food supplies for this increased population, and this is gradually being done.

Sir John Megaw referred to that panacea of all our ills—education. That, of course, is a very wise and safe thing to fall back on. We do really want in India a great extension of the primary education which now is being attempted. But to find money for that we shall have to curtail the education of the enormous number of people turned out of the Indian Universities who can find no work to do.

The real crux of the question is finance. That fact was brought out very well some years ago by my old friend Sir William Osler, who wrote a letter to a medical journal, saying that in Panama at a cost of only £1 per head malaria had been nearly stamped out, so why could not this be also done in India?

I wrote to my friend to point out that in India, in my time, in an ordinary small municipality, the yearly income was one rupee per head, 1s. 4d. a year, and for that they had to keep up the roads, hospitals, and sanitation, and carry on education. There is one hopeful point for Sir John Megaw: he had many conversations with the members of the Legislative Council in India to inoculate his ideas into their minds. So let us hope that our legislators will now turn their hands to some practical method of working out this problem, which will be of much more benefit to their fellow-countrymen than the showers of rhetoric in which they indulge.

SIR ALBION BANERJI : This to my mind is one of those happy and helpful occasions when we are privileged, under the auspices of the East India Association, to listen to an address given by a distinguished public servant from India on a subject which is non-controversial and non-political.

I must add my word of tribute to the author of the paper for the lucidity with which he has explained the vast complexity of the problem connected with the population of India. He has not been critical towards the Government of India nor towards the people of India, and I dare say, if he had attempted to do so, he would have found much that he could have said in those directions. He has been most sympathetic, and has touched those vital points which relate to our social and economic life. The statistics he has quoted give much food for thought; for instance, this vast increase at the rate of thirty five millions per decade, the annual increase of five millions, and by deduction from those figures—namely, one million six hundred thousand—which we lose per annum, bring to our mind many problems for which it is very difficult to find an immediate solution.

To my mind the increase in the population of India is due to peace and tranquillity and security of life brought about by British rule and the slightly higher standard of living amongst all classes. It is not, as Charles Pell has said in his standard work on the subject, by the working of the law, "The higher the grade, the slower the reproduction." But the effective increase is not recorded at any stage, either during the census operations or during the periodical registration of vital statistics in the rural parts of India, for which we District Officers were responsible. The unfit and the sick disappear at each successive stage, and so the very large increase in the population need not alarm us to the extent that it otherwise would do.

Further I venture to say that the vital statistics returns of India are the most unreliable of all the statistics prepared by the Government. I would give you my own experience while I was serving in the Tanjore district, a fairly healthy district and most populous. Cholera was raging in three parts of the district, and carried away thousands of people. For the period relating to a quarter succeeding the months when cholera was raging, the return had to be prepared by the clerks in the Collector's office, and when the returns were submitted the very clever Brahmin clerk, who was a graduate in mathematics, repeated the figures of the previous quarter. These mistakes do occur, and I venture to think that our vital statistics returns, in spite of the fact that registration is compulsory, are most unreliable, so we need not be too alarmed at these enormous figures that are shown under the increase of births, of infant mortality, or the increase of deaths.

I would also like to say that in matriarchal states the increase goes with economic growth, whereas in backward localities the population is stationary or decreases, and such a tendency is due to infanticide, poverty, and disease. In Kashmir, for instance, tuberculosis and venereal disease are prevalent amongst the small population of three and a half millions to an alarming extent. In India we cannot say with any certainty that every mouth has got a pair of hands to work for it. In some parts of India that is so; in most parts of India it is not the case.

Nor is it possible for us to find out the effective vitality of the people of India from the statistics, the reports of hospitals, or of the public health department. The only rough-and-ready way to find that out would be to adopt the formula of Rubens, who said, Take the square of the death-rate and divide it by the birth-rate. If you do that you will find that the effective vitality of the people of India to-day is extremely low.

Community and caste groups are fettered by customs of birth and marriage. Hence infant mortality shows no signs of decrease, in spite of the spread of education and improved public health administration.

I agree most heartily to the suggestions as to remedies proposed by the learned author of the paper. I would add that no National Government in India could apply all these remedies, and a great deal will depend upon the people acting in co-operation with the Government. We cannot expect to have in India dictatorships as in Russia, Germany, or Italy.

The raising of the age of consent of or the age of marriageable girls, thus decreasing the number of immature mothers, to my mind will touch only the fringe of the problem. Natural conditions cannot be altered. For instance, in India 36 per cent. of girls attain the age of puberty at thirteen, as against 10 per cent. in Europe. I would therefore suggest that in addition to the remedies that have been proposed, we Indians should also very sincerely consider the following measures: (1) Reform of our social system; (2) the emancipation of our women, who for the most part are unwilling mothers; and (3) the increase of agricultural production to reduce the percentage of half-fed.

I may say with a certain amount of confidence that the estimate given by Sir William Hunter in the eighties as regards the half-fed population in India still remains good through the length and breadth of the country. We should also have eugenic education, and, furthermore, propaganda for birth control and the prevention of venereal disease. We should have clinics, and I may say with great pride that Mysore has been the first part of India to introduce clinics for birth control.

In this country we have had recently a cinema picture called "Damaged Lives," and I believe that it has produced a deep impression upon the people. We should have similar cinema propaganda in regard to tuberculosis, malaria, venereal disease and birth control. I may add that the prediction of Malthus, that the world will die of starvation if reproduction is unrestrained, may be well kept in view, for though we need not be too pessimistic, we are face to face in India with a grave danger on account of the spread of disease and want of education. If India is confronted with this population problem without finding a solution to mitigate its evil effects, the destruction of our whole population and culture will have to be prevented with all the earnestness and sincerity at our command.

Sir JOHN MEGAW: I am sorry that Sir George Newman has had to leave for a lecturing engagement. I wish to thank him for the kind words that he said about me. I agree with him that I have placed you under a debt of gratitude, but perhaps not for the same reasons as he gave. I think that the speech of Sir George Newman and the subsequent discussion have been

of so interesting a nature that you really ought to be grateful to me for having been the cause of bringing them about. I was rather pleased at Sir George's optimistic outlook with regard to the problem of India. I think there really are grounds for optimism in spite of the extreme difficulties of the problem.

Miss Rathbone laid about me in good earnest. She rather ingenuously produced a stick and placed it in my hand, with the suggestion that I should proceed to beat the Government with it. Miss Rathbone knows quite well that I am not allowed to beat the Government, but, even if I were, I would be inclined to suggest to her that she attaches too much importance to what Governments can do in matters of this kind. You will find, if Government indulges in legislation which is in advance of the public opinion and public demand, very little benefit results from it.

This is a case for stirring up public opinion, and when public opinion is stirred up, then Government, I have not the slightest doubt, will respond to the demand of public opinion. I think if Government were so ill-advised as to introduce advanced legislation of the kind that I personally would like to see introduced and Miss Rathbone would like to see introduced, the probability is that the result would be much the same as in the case of prohibition in America and the Sarda Act.

The same thing applies to Miss Rathbone's very pertinent criticism about Baby Weeks. There again you cannot go in advance of public opinion. I quite agree that we are promoting the increase of the population by saving life and by preventing disease. We ought at the same time to recognize the absolute necessity for applying a counterpoise by regulating the flow of babies. If you do not do that, every biologist knows you will get over-population and starvation. But that, again, is a thing that cannot be controlled by Government. It must be done by the expression of public opinion, and I think that what we want to do is to educate the public not to confine themselves to throwing stones at Government and suggesting that the whole blame is theirs.

I was very interested to hear from Dr. Thompson what the missionaries are doing. They can be of very great assistance in this matter. I have been rather inclined to be critical of what they have done in the past. The problem is one which some of the missionary bodies have been a little nervous about tackling. What one feels is that the missionaries have had an opportunity of building up in India an example of what can be done in the matter of life planning. They can help tremendously by teaching their followers how to plan their lives in such a way as to have not only spiritual advantages but physical advantages, such as they themselves enjoy in their homes in England. I have felt that the missionaries might have done more in that direction, and I am pleased to hear from Dr. Thomson that this aspect of missionary work is being kept fully in mind by the missionaries today.

I am sorry that Sir Leonard Rogers has left the meeting, because he was the one person who really did attack me in good earnest by suggesting that if you believed what I told you, you would shut down all medical and public health work. This is a superficial criticism which has been directed against

my talks on this very subject over and over again. I want to make it particularly clear that I think there is a great and increasing need for disease prevention. My one point is that public health work in India will be deprived of its just reward if the other aspects of the case are not borne in mind. You cannot possibly have a satisfactory condition of public life in India if you have a population which is in excess of the production of the country.

Sir Leonard was perfectly sound when he said that we had to attack the problem by increasing production. I agree entirely with that view, but I say if you do that you have to attend to the other aspect of the case, because if you merely increase production the population very rapidly swells and increases to the same degree as your production, the result being that you have a larger number of people, but they will not be any healthier or better off than they were before. He talked about the cost of introducing the kind of education which was needed. My suggestion is that very large sums of money are being spent on education already, and I claim that if a proportion of the money, say one-third, were spent on enlightening the people in the subject of life planning, you would get excellent results.

I thank Sir Albion Banerji for the kind remarks that he made about me. I agree with him that the statistics in India are not reliable. We all know that very well, but taking them in the bulk they do stand the test fairly well. In the village survey of which I spoke, I deliberately introduced some questions dealing with the infant mortality rate and various other things, and I was rather surprised to find that the result of my broad survey made by the men on the spot corresponded fairly closely in most respects with the statistics which are published by the Public Health Commissioner. I agree very heartily with the suggestions that Sir Albion made of other lines of reform that are needed. I hope that if I have succeeded in doing nothing else, I have at any rate aroused a little interest in this very great and pressing problem, and in the necessity for thinking about it, and still more for doing something about it.

Sir James McKenna, speaking from the Chair, said: I now have the pleasant duty of proposing a very hearty vote of thanks to Sir George Newman—whose shadow I am—for presiding, and to Sir John Megaw for his exceedingly interesting and human paper. During the many years I spent in India there was nothing that struck me more than the remarkable work done by the Indian Research Fund's officers, of which group Sir John Megaw was a most distinguished member, followed up by the extremely efficient services of the Public Health Departments of the various provinces. There is nothing spectacular about this work. It is done by very modest workers, who do not parade their goods in the shop window. But there is nothing that makes a greater impression upon the intelligent and inquiring visitor to India.

Sir John has given us the sort of paper one would have expected from a man of his standing, and the Association is extremely fortunate in having obtained his services to-night, combined with the distinguished Chairman, for whom apparently we have to thank Sir John Megaw too. We are also

particularly pleased to have with us the Under-Secretary of State for India, Mr. Butler, a name which is well known all over the Indian Continent. I now ask you formally to record a very hearty vote of thanks to Sir George Newman and to Sir John Megaw.

The motion was carried by acclamation, and the meeting closed.

Journal of the East India Association
April 1934

NEPAL AND HER RELATIONS TO THE BRITISH GOVERNMENT*

By Hugh Wilkinson-Guillemard, c.s.i., c.i.e.

The country that is to be discussed this evening is commonly spoken of as "Nepal, the land of the Gurkhas." The inhabitants use the word "Nepal" for the capital, Káthmándú, almost exclusively—perhaps disgusted that Mr. Kipling and other English people pronounce it Kăthmăndú. The word "Gurkha" is not used at all. There is a town named Gorkha, three or four marches west of Káthmándú, and "Gorkhális" are descendants of those who came to the present capital with the conqueror, Prithvi Narayan, in the second half of the eighteenth century. We need not, however, be bound by the nomenclature of the inhabitants. They still speak of British India as "Mughalán," the land of the Mughals, and of British Government rupees as "Company" rupees. We can safely use the words Nepal and Gurkha in the sense familiar to us.

I wish to remark at the outset that I am sure that I am voicing the sentiment of everyone present when I say that we feel real grief and most genuine sympathy with Nepal in the calamity which the earthquake has brought upon her Royal Family, her people, and her beautiful buildings.

Nepal has an area of about 54,000 square miles—that is to say, it is slightly larger than Greece or England without Wales, but about 60 per cent. greater than Austria, Scotland, or Portugal, and more than four times the size of Belgium. The population is about 5½ millions—slightly less than that of Sweden, slightly greater than that of Scotland, nearly 80 per cent. of that of Australia, and four times that of New Zealand.

The country is roughly a rectangle, 500 miles long, 120 broad. It consists of four zones running roughly east and west—and of

* Based on an Address at a Discussion Meeting of Members of the East India Association on March 21, 1934.

THE POPULATION PROBLEM IN INDIA

By Professor Radhakamal Mukerjee
(Lucknow University.)

Population Increase and Agriculture

It was Malthus who first warned mankind of the danger of population outstripping the means of subsistence, and enunciated the law of diminishing returns so important for a country like India which depends mainly on agriculture. Over-population did not strike Malthus as a possibility because population would not, according to him, overstep its limits owing to poverty, war and pestilence. But even in Oriental countries the notion that population automatically regulates itself by external checks has become incompatible with modern social ideals. In fact, with the spread of democratic ideas and institutions in the East, the notions of optimum and over-population have become highly significant along with a desire to regulate population policy. The entire outlook in modern population study is thus changed, the emphasis being now shifted to the means of social control of numbers and the aims and objects of such regulation, due regard being paid to the qualitative and selective aspects of population changes.

The whole of India with an area half that of the United States has a population almost three times as large. In the sixteenth century the population of India stood roughly at 100 millions, and in the middle of the nineteenth century at 150 millions. In 1931 the population was 353 millions; now it is approximately 377 millions. Population has increased roughly from 20 to 50 millions in the United Provinces; from 5 to 25 millions in North and South Bihar; and from 10 to 51 millions in Bengal—a total extraordinary increase from 35 to 125 millions in four provinces of the Gangetic Valley, giving some of the world's highest records of rural aggregation.

With a rapid population increase, the total percentages of cultivated to cultivable area have now reached the phenomenal

figures of 75 to 95 per cent. in the Ganges Valley. Forests, meadows and marshes, all are now invaded by the plough as a result of population increase, which also leads to the scarcity of fodder and grazing grounds. For the same reason holdings have been fragmented to tiny bits. Continuous subdivision of holdings restrains the cultivator from adopting improved methods of cultivation, constructing wells and even intensive farming. In the United Provinces during 1928-33 the net area sown diminished by 100,000 acres and the double-cropped area by 400,000 acres as compared with the average for 1920-25. In Bihar also the net area diminished by 250,000 acres in the same period. "Nor can it be asserted," observes the Census Superintendent, "that the yield per acre of land has increased to any extent through new and improved methods of exploitation." Similarly, Bengal's net cultivated area has decreased during the last decade. It was 2·4 million acres on an average between 1915-20. Between 1920-25 and 1928-33 it stood at 2·3 millions. Except in Assam, Burma and Sind a high proportion of available cultivated area has been brought under the plough, ranging from 65 per cent. in Bihar and Orissa to 86 per cent. in Bombay.

Throughout Northern India there is now little room for expansion of cultivation. Settled conditions have long been established, permitting the extension of the frontiers of cultivation into the forest and marsh, ravine-stricken jungle and sand-dune. The possibilities of large canal irrigation schemes have been almost exhausted. Much new uncultivated land can no longer be brought under the plough as a result of the construction of new canal systems. The Malthusian law of diminishing returns is now operating in agricultural development, not only by soil exploitation, but also by water acting as a limiting agent.

Insufficiency of Food Production

In an appendix, I give the index numbers of variation of population and food supply in India during the last quarter of a century. It is true that on the whole the increase of total agricultural production has outstripped population growth between 1910 and 1935, but the margin is less in the case of food production, only 4

per cent., which is further reduced to 2·5 when we compute the food supply actually available for consumption. The increase of food production has been chiefly due to the phenomenal expansion of cane, barley and jowar, which have almost doubled in output. During the period 1910-35, rice, the cereal of about two-thirds of the population, increased in aggregate output only by 6 per cent. Wheat has shown a steady decrease since 1925; while barley (103 per cent.), jowar (25 per cent.), maize (15 per cent.) and gram (16 per cent.) increased steadily. The difference between the indices for population and food production or available food supply is getting narrower and narrower.

In the same period India's increase of mineral and industrial production has no doubt gone much ahead of increase of numbers, the figures respectively being 17 and 57, but mineral and industrial production occupies a relatively small place in contrast with agricultural production in the economic life of India and in relation to India's population and standard of living. The relative percentages of contribution to total national income from agriculture, industrial and mineral production are 79·8, 18·1 and 1·3 respectively.*

By using Lusk's coefficient of comparison with those of an average man and woman we estimate "the average and total man value" of India's population of 1931 in the following table:

Ages.	*Population in Millions* (1931).	*Man Value per Head.*	*Total Man Value in Millions.*
0 to 15 (39·9 per cent.) ...	141·2	0·7	98·84
Males of 15 and upwards ...	109·2	1·0	109·20
Females	102·6	0·83	85·15
	353·0	0·835	293·19

Allowing 2,800 calories per man per day (calculating on the basis of 2,400 and 3,000 calories respectively for rice and wheat eaters and deducting 200 calories for wastage during distribution), the total requirement of the Indian population will amount approximately to 292 billion calories per annum. Estimating on the basis of 100 calories per oz. per average food grain, India's

* Mr. Findlay Shirras has worked out the total agricultural and industrial production and national income. See his *Science of Public Finance*, p. 248.

aggregate food supply available for consumption in 1931 (60·1 million tons) would yield 215·4 billion calories, to which should be added 34 billion calories from an approximate milk supply of 113,000 million lbs. and 0·7 billion calories from the total fish supply, roughly estimated at 700,000 tons. The amount of energy contributed to Indian food requirement from all sources is accordingly 250·1 billion calories as compared with her minimum need of 292 billion calories. Between 1931-35, India added 24 million mouths to feed and increased her food supply to 280·4 billion calories approximately (her sugar adding a quota of 26·1 billions). India thus has now fallen short of food for 48 millions of her average men—*i.e.*, for 12 per cent. of her present population. The following important facts and conclusions emerge out of the study:

1. India's population in 1931	353	millions.
2. India's population capacity on the basis of her food supply in 1931	291	,,
3. India's food shortage in 1931	42	billion calories.
4. India's present population	377	millions.
5. India's addition to food supply between 1931 and 1935	30·3	billion calories.
6. India's present food supply	280·4	,, ,,
7 India's present food needs	321·5	,, ,,
8. India's present population capacity	329	millions.
9. India's present food shortage	41·1	billion calories.
10. Present number of average men estimated without food, assuming that others obtain their normal daily ration	48	millions.

India's total waste lands, which are available for cultivation but either not taken up or abandoned, comprise 162 millions of acres which might provide about 29 million tons of food grains given unremitting pressure of population. Under the most complete expansion of cultivation, which will not be possible without the adoption of vast measures of land reclamation and irrigation and the strenuous efforts and practices characteristic of the Chinese peasantry, India's total population capacity cannot be above 447,000,000 persons. Immediately after 1921 India's present population capacity was overstepped and by the middle of the century, assuming that the present real increase continues, India will in all probability overstep 447,000,000, her ultimate population

capacity under the existing farming and living standards and industrial conditions of the people.

Famines and Epidemics

The biological effects of over-population in India have been a direct correspondence of birth rate and inverse correspondence of death rate with favourable harvests and a gradual adjustment of natality and mortality, so that an equilibrium density or an average abundance is reached. These were the unclassified Malthusian "positive" checks of population which are now operating in large areas in India in a somewhat modified manner. The mortality from famines has been estimated by William Digby as 4,485,000 between 1850-75 and 25,740,000 between 1875-1900. Thus during the latter half of the last century the total toll of life on this account was represented by the figure of 28·25 millions. In the famine of 1901, the worst of recent years, one million people perished. The incidence of mortality from famine or scarcity diseases has not yet been investigated. In areas which have just been under the grip of scarcity, the increase in mortality from diseases like dysentery, diarrhœa and fever as well as from wasting and deficiency diseases needs enquiry. The Report of the Famine Commission (1910) abundantly shows that mortality due to privation is followed by a further rise in mortality due to cholera, diarrhœa and fever owing to the reduced power of the people to resist infections.

Though famines have now lost their rigour, drought and agricultural scarcity are accompanied by a high death rate and low birth rate. Epidemics thus continue to play their important rôle in checking population growth; the mortality from the main epidemic diseases between 1901 and 1931 was about 67·25 millions. In some congested districts in the United Provinces the trend of vital statistics over a period of 60 years indicates that the damage done by epidemics to these populations is severer than elsewhere. A more significant phenomenon is a slackening of birth rate after a district's saturation density is overstepped. The absence of an agricultural surplus, and malnutrition, which affects especially women and children, lower the birth rate temporarily

and alter the age and sex distribution for a long period to the long-run detriment of the birth rate.

A state of chronic food shortage, punctuated by spells of unfavourable seasons, particularly affects the very young and old women, and notably those in the child-bearing age, when the ancient practices of infanticide, abortion and abstinence from intercourse have been largely discarded. The result of this is high infantile and maternal mortality. The reduction of the number of women at the reproductive period, worn out by a long struggle with food deficiency and by frequent child-bearing, is one of the demological causes of the slackening of the birth rate in the heavily congested plains of India.

Slackening Birth-Rate

The violent fluctuations in the birth and death rates in many parts of India, in close correspondence with harvest conditions, represent accordingly an unhealthy demological symptom indicating not only the absence of an agricultural surplus but also the vulnerability of population due to overstepping an equilibrium density. Reproductive powers may also be directly impaired in the case of the lower economic strata as a result of chronic malnutrition, or deprivation of certain vitamins in wheat (which is superseded by barley and millets), and of milk and vegetables discarded in unfavourable years. A variety of biological factors contributes directly and indirectly to lower fertility. These are not "immutable forces of Nature," as assumed in Pearl's somewhat mystical hypothesis.

That birth rate declines if the population continues for long above its average abundance and resistance to epidemics declines was not anticipated by Malthus, though this is the best evidence of the reality of the Malthusian positive checks in India, even though war, epidemic and famine no longer scourge population back to a suitable or equilibrium density as before. The average birth-rate declined from 35·5 to 27 per mille in Bengal, from 41 to 34 in Bihar and from 41·4 to 36 in the United Provinces between the decade 1901-10 and 1929-33. The annual average death rate has also been amazingly reduced in the United

Provinces and Bihar from 40 and 37 to 26 per mille between 1921 and 1931, but such reduction is due to the absence of epidemics of diseases which will now, it is expected, take a heavier toll than before due to lower resistance of the population. In Bengal also the average death rate, 31·1 for 1911-20, was reduced to 15·3 for 1921-30. But this, again, is due to the absence of any serious epidemic, the population becoming accustomed to the scourge of malaria.

The expectation of life is now considered as a suitable criterion for optimum density. Actuarial examination indicates that on the whole during the last 50 years the expectation enjoyed by both males and females in India does not show an uninterrupted increase, as in most countries in the world. In Bengal and the Punjab the enjoyed expectation for females has actually declined. In Australia, in a period of 35½ years, the expectation of life for men increased 12 years, and that for women 12½ years. In Germany, Great Britain, Norway, Holland and Switzerland the expectation of life at birth per man is 55. In New Zealand the life-span has reached 62 years. "India with an expectation of life of 23 years" (now increased to 26½ years), observes Ross, "is a bench mark from which ascent can be measured."

Effects of Agricultural Variation

Recent movements of prices, especially of agricultural produce, have compelled, and will compel, an increasing number of even the well-to-do peasants to reduce their standard of living. There had been a marked rise of prices of all commodities in India from 1917, rice and wheat prices showing an increase of 58 and 39 per cent. respectively. But prices began to fall about the time when the last decade opened. The main characteristic of the Indian price index numbers during the whole of the last intercensal period was the larger fall in industrial prices as compared with agricultural prices. As a result the agriculturist was better off than the wage-earner the artisan or the employee, and, since he forms the most considerable majority in all provinces, a rapid increase of population was not accompanied by economic stress. But agricultural commodities did not continue indefinitely to

command prices relatively higher than manufactured goods. As a matter of fact, during the last few years quite the reverse tendency is shown by price indices, viz., the larger fall in agricultural prices as compared with industrial prices. Between 1928 and 1930 wheat declined by 24 per cent. and rice by 33 per cent. In 1930 the heaviest declines in prices were shown by wheat (47 per cent. on the basis of September, 1929) and oil seeds (43 per cent.), along with cotton and jute, and in the next three years, 1931-33, rice uniformly showed the heaviest falls, going down by 58 per cent. Such a fall in prices of the chief cereals has led to a shrinkage of agricultural income in India by nearly a half in 1931-32 as compared with 1928-29.

This must tell heavily on the provinces that have added greatly to their commitments in the shape of extra mouths to feed. Economic prophecies, especially of a dismal kind, are risky and thankless, but in this case it is not difficult to forecast that a definite decline in the standard of living is to be expected in the provinces which show the largest disparity between population increase and value of agricultural production. A decline in the present low standard of living in any province cannot be thought of without grave apprehensions as the population as it now stands appears to be exceptionally vulnerable, its natality and mortality showing a close correspondence with agricultural conditions. Now the latter have not been unfavourable in India as a whole during the past few years. When a famine comes or a virulent epidemic sweeps over the country, the Malthusian equilibrium will be re-established through Nature's cruel and haphazard methods.

	Mean Density per Square Mile.	*Acreage under Food Grains* per capita			*Increase or Decrease of Population 1921-31 (per cent.).*
		1921.	1931.	*Increase or Decrease (per cent.).*	
Punjab	208	1·2	1·03	− 14	+ 14
United Provinces	442	1·3	1·3	Nil	+ 6·7
Bihar and Orissa	379	1·3	1·5	+ 16·6	+ 10·3
Bengal	616	2·8	2·1	− 58·3	+ 8·3
Central Provinces and Berar ...	137	0·9	0·7	− 16·3	+ 12·6
Bombay	174	0·9	0·9	Nil	− 1·8
Madras	329	1·4	1·6	+ 16·6	+ 8·5
Burma	63	1·01	1·01	Nil	+ 11·1
India	195	0·58	0·69	+ 9·2	+ 10·5

	Order according to Population Increase.	Decrease of Value in 1932-33 of Total Production of the Principal Crops from 1928-29.	Order according to Decrease in Agricultural Income.
Punjab	I.	36·8	VI.
United Provinces ...	VII.	35·2	VII.
Bihar and Orissa ...	III.	58·2	II.
Bengal	VI.	61·1	I.
Central Provinces and Berar	II.	48·5	IV.
Bombay	VIII.	39·4	VIII.
Madras	V	45·0	V.
Burma	IV.	35·5	III.
India	—	47·5	—

The phenomenal multiplication of population between 1930 and 1935 in the midst of the agricultural depression could be explained largely by the proportionate increase of births towards the end of the last census decade, and hence of persons now in the reproductive age. The number of married females increased by 2 to 4 per mille between 1921-31 in the principal provinces. This increase was due to the agricultural boom between 1917 and 1927 and the sudden and even astonishing recovery in the birth rate in some provinces after the influenza epidemic.

Emigration

Even without any calamities like famine or a serious epidemic, population pressure normally leads to an outward flow of emigration, but industrial depression in the country and the slump in rubber, tea and mining production in Ceylon, Burma, Malaya and the Dutch East Indies has discouraged population movements both inter-provincial and overseas.

Migration in recent years has indeed been much reduced and overseas emigration is now negligible. The total number of emigrants from the United Provinces was reduced from 15 lakhs in the decade 1901-11 to 9.7 lakhs in the decade 1911-21 and 10 lakhs in the decade 1921-31. In Bihar and Orissa also the number of emigrants was reduced from 15 lakhs in 1901-11 to about 13 lakhs in 1921-31. It was only in Madras that the number increased from 6 lakhs in 1901-11 to 7 lakhs in 1911-21 and to about 9 lakhs in 1921-31. Recently, however, the decline in the planting industry has resulted in large numbers returning home. Bengal, in

spite of her high rural density, receives a considerable number of immigrants from the up-country and Madras, who flock especially to her mill towns and cities. The social circumstances which account for a considerable volume of immigration (that, however, shows progressive decrease during the last two decades) are peculiar.

We may conclude generally that the United Provinces, Bihar and Orissa, Bengal and Madras have all overstepped an equilibrium density, and it is the heavy and differential population pressure which explains emigration from these areas to the less thickly populated provinces. Amongst these Assam, Burma, the Central Provinces and the N.W.F. Province may be said to be under-populated although an optimum density may have been outstripped even in some under-populated provinces. Like Japan, India should adopt a scheme of assisted emigration overseas, defraying the cost of passage to emigrants to foreign countries which are under-developed or undeveloped and which may encourage agricultural colonization.

The British Empire, the population of which is 90 per cent. non-white and which now comprises the greater part of the undeveloped sections of the earth, should deal with Indian emigration, like tariff and industrial co-ordination, as essentially an Imperial problem. The solidarity of the British Empire demands Imperial economic planning, which cannot be successful without a modification of racial discrimination in the policy of Indian emigration in Australia, South and East Africa. For as long as the Indian masses are not freed from the cramping effects of economic pressure and soil exhaustion on their two-acre holdings, their low purchasing power will prevent any marked increase of shipments to India from Great Britain. The Imperial Conference has the appropriate machinery that could, boldly used, formulate reciprocal agreements between the different parts of the Empire which might, through a more liberal emigration policy, increase the Imperial food supply and trade, and level up the standards of living among different peoples within the Empire.

Industrial Employment

Industrial development in India as a whole is still exceedingly tardy. Only 5,000,000 may be taken as the figure of organized labour out of about 154,000,000 workers in India. The daily average number of hands employed by establishments to which the Factories Act applies is only 1,500,000. In Madras the number of operatives in factories is only 101,655 out of a total of about 29,000,000 workers. Out of 23,500,000 workers only a lakh (*i.e.*, 0·5 per cent.) are employed in organized industries in the United Provinces. Even in Bombay, which is the most industrialized of the provinces, the present slump has in no small measure retarded industrial expansion. It has not merely resulted in a decline of the population of Bombay City (due to large numbers having been forced back on to the land), but has thrown upon agriculture a greater burden than ever. A grave economic situation, in the face of increasing population pressure, is indicated by the decline of the relative proportion of industrial employment during the last three decades.

	1911.	1921	1931.	*Percentage of Variation* 1911-31	1941 (*estimated*).
Population in (millions)	315	319	353	12·1	+400
Working population (in millions)	149	146	154	4·0	+170
Persons employed in industries (in millions)	17·5	15·7	15·3	12·6	− 16
Percentage of workers in industry to the working population	11·0	11·0	10·0	9·1	− 9·4
Percentage of industrial workers to the total population ...	5·5	4·9	4·3	21·8	− 4·0

The increasing population, indeed, is not being absorbed in industries at all. On the other hand, the dependence of the population on agriculture shows a steady increase, as shown below:

	1891.	1901.	1911.	1921.	1931.
Percentage population supported by agriculture	61	66	71	73	73

In Bengal the number of workers in industry more steadily and uniformly diminished—the percentage of industrial workers to

the total population diminishing from 3·9 in 1911 to 3·7 and 2·5 in 1921 and 1931.

Fruit growing and market gardening may solve the problem of uneconomic holdings, cultivated as these may be on gardening lines by the spade rather than the plough. But these are yet in the region of possibilities in India. Cattle breeding and dairying in association with small-scale farming have developed only in the canal colonies of the Punjab, the Ganges Doab and North Gujerat. Small-scale trade and rural industries are found as excellent substitutes to agriculture, or as supplementary to it, only in the hydro-electric zones in the Punjab, United Provinces, Madras and Bombay. Meanwhile the peasantry in the absence of epidemics multiply heedlessly. More mouths to feed also accompany more hands to work, but the hands are idle. The ancient traditions of forbearance and self-control, Malthus's moral restraints, are inoperative amongst the masses. Malthus emphasized the postponement of the age of marriage accompanied by strict continence. In India one of the significant factors in the population problem is the social sanction and encouragement of child marriage.

The Small Family Habit

In the past, India developed the planned family system and the small family was the general rule. As in China or Japan in the past, the limited family habit depended upon innumerable social canons and regulations, which governed daily life and practice including conjugal relationship. Such customs included the postponement of marriage for large sections of the population and prolonged abstinence from intercourse for married persons, who were bound to conform to certain religious injunctions in this regard. Hypergamy, a heavy bride-price, and an expensive and elaborate marriage ceremony also contributed towards less frequent marriages. A large section of the population, again, lived a single life in *maths*, monasteries and convents. The greater the number of these in a period of religious revival in India the smaller was the number of births. Infanticide, especially the exposure of female babies, was also a common practice in India

among the castes who practised hypergamy. Prostitution, which Malthus also regards as a check on the growth of numbers, has been associated in South and Western India with temple girls forming an honoured priesthood, devoting itself to devotional song and dance. Early abortion was also not uncommon, and there is also evidence that in the villages some crude and casually found methods of birth control are in use among the women.

Birth control is now adopted in the higher social circles in Bombay, Bengal and Madras, and it is not unknown in some rural areas. Contraception of a crude kind has, for instance, been observed among the Goundans of Salem, apparently in order to prevent the undue growth of families and consequent fragmentation of holdings and weakening of the joint family system and influence.* The small family tradition, the postponement of marriage, and the social emphasis on celibacy checked unrestricted increase of numbers. The results of the Mohammadan conquest proved, however, disastrous for the small family system in India. Infant marriage, which was unknown in the epic and Buddhist literature and did not play any part until the Gupta period, began to prevail and to be widely adopted, especially in the central areas which were most powerfully affected by the Mohammadan influences, touching on one side or the other a line drawn from Sind to Rajmahal.

Infant marriage was promoted by the desire of the family to get its girls safely mated to suitable husbands in an age when there was danger of an improper alliance due to the Mohammadan contact. But since then child marriage has been practised mostly by the lower social strata. The Brahmins, Kayasthas and the intermediate castes are less addicted to this practice, except in the Central India Agency and Hyderabad. Since it is these lower castes who also allow their widows to marry again, the result has been an unrestricted multiplication in their case. As the industrial revolution promoted population increase in Europe in the 19th century and in Japan in the 20th, so the continued subdivision of holdings making agriculture less and less remunerative, and de-industrialization due to the decline of cottage indus-

* *Census Report of Madras*, 1931, p. 46.

tries and handicrafts, are to-day discouraging thrift or home-spun prudence and promoting multiplication in India.

Climate also is a factor in over-population by reducing the age of puberty. In India girls attain puberty between 12 and 15 years and reproduction has not been unusual at 13. Violations of the Law of Consent are not u nusual. "Cases are not uncommon," says a witness before the Age of Consent Committee, "in which girls bring forth six or seven children before they attain their eighteenth year." The lactation also appears to be reduced and there are shorter intervals between childbirths among low castes than among high castes. Social customs and taboos do not adequately protect the Indian mother against the demands of the house, the field and the cattle-shed. Though child-bearing is frequent, the woman is not relieved from toil and drudgery. "Enquiries into a large number of cases," observes the Age of Consent Committee, "show that when the marriage of young people is consummated at an early age, say, when the boy is not more than 16 years or the girl is 12 or 13, a fairly large percentage of wives die of phthisis or some other disease of the respiratory organs or from some ovarian complication within ten years of the consummation of marriage."

Need of Population Restriction

Apart from the neglect of female children, too early and frequent maternity, ignorant midwifery, dangers of childbirth, and disorders and diseases continuing as a result of bearing too many and too frequent children have all contributed (in the absence of selective epidemic diseases) towards a higher death-rate amongst females than amongst males in India, especially in the reproductive ages. The risk which the Indian woman runs at her first child-bearing is aggravated later when her strength has been broken by her having borne too many children at too short intervals. The net result is a deficiency of females in India as a whole and in the higher castes in particular, which is on the increase. It is because early marriage and maternity are so widespread and their effects are so disastrous upon health, mortality and the biological condition of the popula-

tion that appropriate and cheap devices of birth control derived by the rural population from materials in its own domestic surroundings are necessary, so that contraception may be applied until the man has attained the age of, say, 21 or 23 and the woman the age of 20 or 22.

It is sometimes suggested, and tha on the basis of historical experience, that there is only one way in which we can seriously reduce the Indian birth rate; that is, by raising the standard of living. If under the term " the standard of living " man's family and marriage habits and social tradition connected with the increase of his family are included, the suggestion is not wide of the mark. But, with a mere economic conception of the standard of living, to depend upon an uplift of the standard of living for an automatic decrease of the birth rate is putting the cart before the horse. The introduction of improved seeds, fertilizers and implements, change in marketing methods, or even a reform of land tenure—these are all thwarted in India by the fractionalization of holdings and cheap and inefficient labour in the countryside, which are the indirect results of population increase. The offensive against illiteracy is similarly baffled because population outruns the capacity of education. The dead weight of illiteracy among the backward castes and the Muslims of India makes the problem of its removal a formidable one, both from financial and administrative points of view. As population continues to outrun the educational facilities that are provided it is clear that the pressure of population cannot be viewed merely in relation to the food supply. As a matter of fact, in India the present attitude of most provincial governments in deferring schemes of village education and sanitation, amelioration, and uplift, and in lowering for the time being the accepted standard, is entirely due to an expanding population which makes readjustments more and more difficult.

A rational family planning and education of the masses in birth control must be accepted as one of the important means, though not the only means, of combating population increase. The small family system, deliberately planned and integrated with other habits and traditions which regulate different sides of domestic

life, must now be adopted in India as the social and ethical norm; and such a custom as polygamy, which by encouraging a large family has become an obvious economic misfit, must be declared illegal. At the same time, without better farming and increase of the agriculturist's income, industrialization, and absorption of farm hands and casual labourers in small industries and workshops, an improvement of the standard of living of the masses—which alone can create the mental attitude that is the sole bulwark of the small family habit—cannot be effected. Birth control is after all a special measure. It can effectively regulate population increase and help towards a solution of the population problem in India only when the customs and attitudes of the masses towards the family support it. Why should Indian peasant women, who will in the future obtain education, leisure and a few luxuries of life, and lose only, say, 5 or 10 per cent. of their infants in the first year, bear at the same rate as now when they lose 20 or 30? The present fertility has the accompaniment of mud hovels shared with cattle and goats, one-third of the babies dying in infancy, thin gruel and a loin cloth for the survivors, widespread abortion and appalling maternal mortality. As the desire grows for better food and higher standards of living, and for giving the children better opportunity for advancement; as women gain in enlightenment and self-consciousness, and as men rid themselves of the over-awing authority of religious injunctions of remote spacious times which have now become obvious misfits, the prejudice against "interference with nature" will yield to economic necessity.

Modern education, medicine, and public hygiene have reached the Indian village, and as these spread more, birth control will shock the people less, and what Ross calls "an adaptive fertility" will relieve the present heavy population pressure. Nothing is more important than this adaptive fertility for securing in India the economy of reproduction, the absence of which has made it more and more difficult to raise the standards of farming and living, led to chronic unemployment in the fields and in the cities, and brought about an appalling waste of life spilling on all sides. On the other hand, it is only when the fertility of India's work-

a-day millions becomes somehow adapted to the present situation of definite and increasing food shortage through their forethought and a new attitude in the matter of the family, that India can look for a fresh advance in improved agriculture, education and mass sanitation in her villages. These will be followed up as in the West by a reduction of mortality and increase of average longevity and thus as more and more of human fertility is left to lie fallow, there will be an enrichment of the equipment and experience of life.

APPENDIX I

INDEX NUMBERS OF VARIATION OF POPULATION, AGRICULTURAL PRODUCTION AND FOOD SUPPLY IN INDIA

	1.	2	3.	4.	5.
Average of 5 Years 1910-11 to 1914-15 (base).	*Population.*	*Total Agricultural Production.*	*Food Production (weighted).*	*Food Supply available for Consumption (unweighted).*	*Excess or Deficit of Food Supply Index over Population.*
	100	100	100	100	—
1915-16	103	123	129	125	22
1916-17	104	122	135	126	22
1917-18	104	125	130	122	18
1918-19	105	104	91	87	18
1919-20	100	107	130	113	13
1920-21	99	105	99	99	0
1921-22	100	109	127	120	20
1922-23	101	119	144	125	24
1923-24	101	120	127	109	8
1924-25	101	117	121	103	2
1925-26	101	127	121	113	12
1926-27	102	118	126	117	15
1927-28	102	132	117	111	9
1928-29	103	138	118	120	17
1929-30	104	146	123	122	18
1930-31	107	145	126	123	16
1931-32	114	149	126	122	8
1932-33	117	127	124	123	6
1933-34	118	Not available	123	122	4
1934-35	120	„	125	123	3

Weights are assigned according to protein values. Food supply available for consumption is computed after deducting exports, seeds amounting roughly to 1 million tons per every 200 million acres of food grams and 10 per cent. wastage, and adding imports of sugar and cereals.

APPENDIX II

VARIATION OF POPULATION AND FOOD SUPPLY IN INDIA

	Population (in millions).	*Food Production (million tons).*	*Food Supply available for Consumption (million tons).*
Average of 5 Years 1910-11 to 1914-15 (base).	315·4	69·0	49·0
1915-16	323·0	80·8	61·3
1916-17	325·9	83·1	61·8
1917-18	328·8	83·5	59·6
1918-19	331·4	59·8	42·5
1919-20	315·4	77·0	55·5
1920-21	313·6	65·9	48·4
1921-22	314·6	79·4	59·0
1922-23	318·9	82·9	61·1
1923-24	319·0	75·3	53·4
1924-25	319·0	75·8	50·6
1925-26	319·4	76·0	55·6
1926-27	319·7	77·4	57·4
1927-28	321·0	74·3	54·3
1928-29	323·0	78·1	58·6
1929-30	327·3	80·0	59·9
1930-31	335·8	81·1	60·4
1931-32	352·8	81·4	60·1
1932-33	367·0	81·3	60·3
1933-34	372·0	80·6	59·8
1934-35	377·0	81·1	60·5

DISCUSSION ON THE FOREGOING PAPER

A MEETING of the Association was held at the Caxton Hall, Westminster, S.W. 1, on Tuesday, July 13, 1937, when a Paper by Professor Radhakamal Mukerjee was read by Mr. Alexander Farquharson. The Right Hon. Viscount Goschen, P.C., G.C.S.I., G.C.I.E., C.B.E., was in the chair.

The CHAIRMAN: The paper which we are to hear read this afternoon is by Professor Radhakamal Mukerjee, who as you know is a Professor of Economics and Sociology in the University of Lucknow. He is widely known for his many contributions to the studies of Indian economics and sociology. I think perhaps I might say that he is one of the foremost, if not the foremost, of living Indian authorities on these questions.

He came to this country at the end of May and delivered lectures to the Institute of Sociology, to the Institute of Social Science at Liverpool, and elsewhere. He has recently been lecturing to the University of Cologne and at other learned centres on the Continent.

In response to pressing invitations he is leaving Hamburg on Thursday for the United States of America to deliver a series of addresses at American Universities. So he cannot be with us in person today. But we are very happy in having a deputy for him in an old friend of his, and one who has for many years entered into a scholarly correspondence with him. I refer to Mr. Alexander Farquharson, the General Secretary of the Institute of Sociology. He has most kindly consented to read the paper here this afternoon, and though perhaps he may not see eye to eye with Dr. Mukerjee in all the questions raised, I think it may be convenient if he will be kind enough to take part in the discussion towards its end, when he may be able to reply to some of the points which have been raised by the various speakers this afternoon.

Mr. ALEXANDER FARQUHARSON then read the paper on "The Population Problem in India."

Major-General Sir JOHN MEGAW (President of the Medical Board, India Office): Let me begin by congratulating Professor Mukerjee on the very able and convincing paper which has just been read on his behalf. I am delighted that the economists are now taking up this problem, which I have personally described—and I think the description is true—as the real problem of India. It is quite impossible for me in the brief time which is available to criticize the points raised by Professor Mukerjee, and there is the less necessity for doing so because I am in substantial agreement with nearly everything that he has written.

Professor Mukerjee made several references to Malthus. Malthus has been described as the best abused man of his age. I might also add that

even up to the present time he is the best misrepresented man of his age. Some of you may be aware that Professor Malthus was for nearly thirty years Professor of History and Economics at the old Haileybury School, where the predecessors of our present I.C.S. people were trained, and I have frequently regretted that he has not a worthy successor to carry on the instruction which he must have given to the students in those days.

I must confess with sorrow that it was only within the last year or two that I became acquainted with any of Malthus' writings. Had I only read them I would have been saved a good deal of labour, because I found that some ideas which I had formulated with very great difficulty and travail had been very much better stated by Malthus more than a century ago, and I should think there must be many others who are in the same position as myself.

Malthus was grossly misrepresented in his lifetime, and even now, a century later, we find that his name has come to be associated with certain practices which I am quite sure from reading his works he would have regarded with disgust and horror.

Even Professor Mukerjee in one place, I think, has hardly done justice to Malthus. He says, "Over-population did not strike Malthus as a possibility because population would not, according to him, overstep its limits owing to poverty, war and pestilence." But surely Malthus would have regarded a country where the population was being kept in check by poverty and pestilence as being already an over-populated country.

There is another matter in regard to which Malthus is frequently misrepresented. People say that Malthus has been discredited because in this country his prediction of an overgrowth of population did not take place. But these people forget that Malthus made a perfectly definite proviso. He said, "Provided that certain checks were not imposed." These checks he described as being chiefly of a moral nature in the form of restraint in connection with reproduction. These checks have been imposed in this country, and not only these but others which I think Malthus would probably have described as immoral rather than moral.

If you take other countries, countries like India, China, Japan, the laws that Malthus proposed are seen now in operation exactly in the manner in which he predicted that they would operate. It is for that reason that I think that all people who are interested in the welfare of Eastern countries ought to become students of Malthus, read him for themselves instead of reading the misrepresentations which are constantly appearing with regard to him.

This problem of population is an economic problem, as Professor Mukerjee has very ably and clearly shown. It is a public health problem, as I have been trying to show for the last twenty years or so. I personally believe that it is the very foundation of public health in the sense that all our efforts at preventing epidemics, at improving the health of the community, must inevitably be frustrated if the population is excessive when compared with the production of food and other necessities of life.

It is an agricultural problem. It is quite obvious that increased agricultural production will help to relieve the problem of pressure of population.

It is also strictly a biological problem, although, unfortunately, very few biologists, with the exception perhaps of Professor MacBride, have really taken an interest in the subject.

It is a historical problem. We can learn very much from the lessons of history. When we talk about the rate at which population has been increasing during the last hundred years in India, if we look at the history of other countries we see that the rate of increase is small compared with theirs.

Take Ireland, for example. Between 1800 and 1840 the population doubled itself, rising from four to eight millions. There I think we have a very definite lesson of history. We have been taking pride in the increase of the population in India. People might just as well have said of Ireland, "Look what a wonderful country this is. The population has gone up from four millions to eight millions." But what happened? Everybody knows. There is a lesson, I think, that we ought to meditate on.

The problem is an educational problem. It is only by teaching the subject of life planning that a remedy can be found for it.

It is a political problem. I do not mean a problem of party politics; it should be raised above that. It is a problem of real politics, politics which deal with the welfare of the community.

It is a very many-sided problem. The subject, in fact, is almost everybody's child, and therefore it has been treated more or less as nobody's child.

What can be done about it? Professor Mukerjee has said very little about that. I feel that the problem must be tackled not by public health people, not merely by economists; it must be tackled simultaneously by all those who can contribute to its solution. They must put their heads together and attempt to find a solution, and that solution, of course, will be found in education—the education not only of children but of the grown-up population.

The only difficulty is, what ought to be taught to the people? and that is where a combination of the best brains of men who have been studying these various subjects would be invaluable. A combination of these brains is the only way of reaching a decision as to what is the proper instruction that ought to be given to the community.

Then there is the question of how to get the message across. Nowadays with the cinema, and especially with broadcasting and the diffusion of the Press, it has become much easier to get these messages across to the people, not merely to the men but through the walls of the zenana to the women. You can get the message across, and if the instruction is conveyed in the form of a sugar-coated pill—mostly sugar and very little pill—I think an enormous amount could be done with a view to teaching the community how to live satisfactory lives. That, after all, is the aim of true education, not merely to teach people how to read and write and so on, but to teach them how to plan their lives so as to lead a satisfactory existence.

I have for long been pressing the necessity for holding an enquiry. I used the word "Commission," but that created a considerable amount of prejudice. I do not know why it should do so. A properly regulated

commission would have a very great propaganda value apart from everything else. But now supposing nothing is done, what is going to happen in India? The population goes on increasing by five millions a year, and if, when it has reached the saturation point mentioned by Professor Mukerjee, you then have a period of one or more failures of the monsoon with corresponding failures of the harvest, what is really going to happen? That is a question that I think ought to be kept prominently before us, and I hope that Professor Mukerjee's paper will help to arouse everybody who is interested in the subject or ought to be interested in the subject to the need for immediate and resolute action.

Mr. M. B. Cameron (late Vice-Chancellor of Lucknow University): My chief reason in coming here today was a personal one. I looked forward with the very greatest interest to meeting again my old friend Professor Mukerjee, especially when he was enjoying the honour of lecturing to a distinguished assembly like this, under the presidency of the right honourable and noble Chairman. As Principal of the Canning College I had some little to do with the foundation of the Lucknow University, the Canning College housing the faculties of art, science, commerce and law. Later on, for some six years as a Dean of the Faculty of Arts and latterly for over three years as Vice-Chancellor, I had the business of looking after its rapid growth.

Some six years ago old Father Time indicated to me that I had considerably overrun the normal duration of service and made it clear to me that it would not be advisable to accept the strong temptation held out to me to take another term of office. But I have kept the liveliest interest in the University since then. I get my daily *Pioneer*, and every year I have had the privilege of meeting one or more members of the staff at home here on leave, and so keeping myself in touch with all the internal politics of the University. I am very disappointed that I am not going to meet my old friend Dr. Mukerjee today.

However, the record of the University, I am glad to say, is one of steady progress. Only a short time ago our Professor of Botany became a Fellow of the Royal Society. I know good work is being done in the Department of Zoology, and one of its Readers has been entrusted by the Imperial Agricultural Council to undertake a scheme of research in the direction of animal husbandry which he had submitted to it. In Dr. Mukerjee's department he has effected a revolution in the study of economics. My recollection of economics in the old days was of the dismal science that dealt with hypothetical cases and shadowy abstractions, but when Dr. Mukerjee came to take charge of the department in Lucknow University he introduced a realistic element and showed his students that their business was dealing with the actual facts of the life around them and especially those matters that were most important for the social and economic welfare of the country. His staff and a succession of post-graduate students have accomplished quite a lot in the way of the collection and collation of important economic facts. One of his lecturers a few years ago got the Doctorate of Science at the London University for a work on the financial side

of economics. He is now a professor of economics at Dacca University and doing very valuable work on Government Commissions in Bengal.

With regard to the subject of the paper I have practically nothing to say. It only strikes me that if a lecture like this had taken place, say, a hundred and fifty years ago in this country, and the lecturer had been told to work on the hypothesis that the population would be three times what it was then, I should imagine that his conclusions would have been rather pessimistic. He would have looked forward to civilization and culture being pretty well forgotten in the desperate scramble for the means of subsistence on an overcrowded island. He could not have foreseen how the mind of man was capable of coping with the problems of economic and social life as and when they arose. I do not think that we need now despair or think that the mind of man is not still capable of handling such grave practical problems as arise in connection with the portentous increase of population in India. The merit of the paper today is to show us in a most realistic way what the actual situation is and how it is to be met.

Sir Alfred Chatterton: I should like to join Sir John Megaw in expressing my appreciation of the paper which Professor Mukerjee has presented to us this afternoon. It deals with a matter of the utmost importance and brings before us in broad outline one of the great problems which the administrators of the country will certainly have to face at no very distant date.

The idea of dealing with the problem of estimating the necessary food supply of the population on a basis of the heat units or calories required per man is ingenious, but before we can accept the validity of such a method there must be some certainty that the data upon which it is based are correct. As one who for medical reasons has had to study this matter somewhat closely I am not at all sure that the assumptions made by Professor Mukerjee can be accepted. The amount of food required to keep a man in a healthy state certainly varies with the temperature in which he lives and is less in a hot country than in the temperate regions. Again, it is roughly proportional to the body weight, and it is hardly likely to be disputed that the average weight of the rural population of India is considerably less than that of corresponding classes in Europe. I do not know that on this point exact figures are available, but from measurements which I have made in the South of India I think that the average weight does not exceed 120 lbs. and is probably less. It is generally accepted by medical authorities that 15 calories per lb. of body weight are required to keep an average working man in normal health. Multiplying these two figures together we arrive at the result that 1,800 calories per day are required as compared with the 2,600 assumed to be necessary by Professor Mukerjee. The statistics regarding the total food supply of India are not very reliable and any conclusions based upon them must be received with considerable reserve. Further, the estimate of the available heat units in the various items which go to make up that food supply is at best a very rough one and open to criticism on the ground that it is probably excessive. It would therefore be extremely unwise to accept the final conclusion that the present

number of average men estimated without food, assuming that others obtain their normal daily ration, is 48 millions or 12 per cent. of the present population.

The students of economics in India are now gathering valuable data by making local enquiries in villages, and it is possible that by collecting information regarding the dietary of small poverty-stricken villages and applying this method of dealing with the results some greater degree of exactness as to the extent to which under-nourishment occurs might be obtained. It seems essential that attention should be drawn to the importance of ascertaining fairly accurately the extent to which the people of India are suffering in health from want of sufficient food at the present time, and though we may not be able to agree with Professor Mukerjee as to the value of his calculations, he is to be congratulated on attempting to tackle the problem on new lines which if pursued with more care and in much greater detail may yield what is required.

Professor Mukerjee discusses the various suggestions which have been put forward for alleviating the situation, and his final conclusion seems to be stated in the following words: "As there is the desire for better food and higher standards of living, and for giving children better opportunity for advancement, as women gain in enlightenment and self-consciousness and as men rid themselves from the over-awing authority of religious injunctions of remote spacious times and which have now become obvious misfits, the prejudice against 'interference with nature' will yield to economic necessity." This is taking a very long view, as such changes in the mental outlook of the masses of India will only take place very slowly, if at all. In the meantime the numbers will increase till plagues or famines get the upper hand and ruthlessly reduce them. The only hope is that it may be possible to increase the production of foodstuffs to such an extent as to give time for the education of the people. It is certain that in this direction much can be done. There is considerable scope for the extension of irrigation, chiefly perhaps by the construction of large reservoirs and by the sinking of many additional wells. The waste of water on existing irrigated areas is very great and much can be done to diminish it.

The best prospect, however, lies in adequate measures to increase the fertility of the soil and steps should be taken to stop the loss of valuable fertilizing agents, some of which are exported and others used as fuel or neglected because of prejudices which grew up when the pressure of the population was scarcely felt. China and Japan can teach India many lessons in the conservation of soil fertility. Sir Albert Howard has done much, through his "Indore process" for making humus, to show what can be done to utilize material that is now wasted. The scale on which it should be worked is beyond the capacity of the average ryot, but there would appear to be a vast field for its application by village co-operation. As compared with India, Japan cultivates one-third as much land per head of the population and employs probably ten times as much manure. The Agricultural Departments in the last thirty years have studied the merits and defects of agricultural practice in India. It is obviously now time that means were provided to effect such changes as are practical and

possible. Special legislation may be required, and under the new régime it may encounter much less opposition than would certainly have been evinced under direct British rule. The time has come for demonstration work on a vast scale and on different lines to those which have hitherto been pursued. The village should be treated as the unit and co-operative working be encouraged.

I am not at all inclined to underestimate the difficulties which will be encountered. Much in this way was done in the past and it is necessary to revive for novel purposes the ancient custom of joint working. There is a popular cry for a large expenditure on sanitation and health, but what is the use of this if the people have not enough food? The cities and towns will make their voices heard and the rural areas will some day be faced with starvation after long years of scarcity. It will require statesmanship of the highest order to steer India safely through the next period of unfavourable seasons, and a very large annual expenditure seems justified to reduce the severity of the testing time. In each Province it would be well if local committees were appointed to study the problem, ascertain the facts and suggest definite lines of action. It is quite time that public interest was aroused. The East India Association is, I think, to be congratulated in taking the first step in this direction.

Mr. P. M. Lad (Indian Civil Service): Although I belong to the Service which once had the benefit of instruction from Malthus himself, I myself have not had that benefit. At the same time I have had some instruction in economics and I have always felt a certain amount of scepticism with regard to the cry of "over-population" in India. It is not for me to say that what Dr. Mukerjee has written is not substantially true. But I propose with your leave to place before you the other half of this truth. As Mill said, "The besetting danger is not so much of embracing falsehood for truth, as of mistaking part of the truth for the whole." I wish to lay before you one aspect of the problem which, if rightly appreciated, would lead a long way towards the proper understanding of this question.

In this country it is well known that Professor Carr-Saunders and Dr. Kuczynski are investigating the question of population, and since the day of Malthus great strides have been made in expert study of population, on the economic as well as on the demographic side. This paper deals solely with the relation of numbers to food, or numbers to means of subsistence. But what is more important is to understand the phenomenon of the numbers themselves in India, and by putting a few statistics which are taken entirely from official sources, the 1931 Census Report, I hope to make it apparent to you that the tendency of numbers in India is not such as to warrant a definite conclusion that numbers are rapidly increasing. For this purpose I propose to lay before you a few simple facts. The vital statistics in India today are not quite complete nor very reliable. As an official collector of figures in the 1931 Census I have some experience of the matter.

Recently for the first time an attempt was made to take a fertility census, and it was found that the average number of children born alive per

married woman was four, of which 2·9 survived. We thus found that every married woman contributed to the population 2·9 children.

Whatever may be the maladjustment between numbers and means of subsistence in India, it is not suggested that numbers should be cut down in such a way as ultimately to lead to a declining and vanishing population. So I take it for granted that we should at least have the ideal of stable numbers. For stable numbers it is absolutely necessary that one mother must replace herself—*i.e.*, if we have a thousand mothers today there must be a thousand women to carry on the work of reproduction. In India what is happening today is that undue attention is being paid to absolute numbers. We are concentrating entirely on the absolute numbers and crude figures of increase. Even here it is interesting to recall that during the last fifty years India's population increased only 39 per cent., whereas that of England and Wales increased 53·8 per cent. Although, therefore, the torrent of babies at first sight may appear terrific, if numbers are studied in their proper perspective I venture to say that they would not be so staggering. What I wish to point out is that the first thing is to ascertain whether the net reproduction rate is less than unity; if it is the population is bound to dwindle.

Taking the proportion of male to female births in India—viz., 108 to 100—every such marriage would contribute about 1·9 girls, out of whom 1·37 would be found surviving. Can it be said that all these girls go through the whole of the reproductive period? Consider the high maternal mortality particularly in the early reproductive age-groups; in India maternal mortality is six times what it is in this country. Consider the number of women who are withdrawn from the process of reproduction by widowhood. I do not think that it is possible to assert that one female is contributing more than one female to the population.

The same conclusion is indicated by a common-sense study of the available figures. It is well known that in India there is a great disparity between males and females. There are only 940 females to 1,000 males, which is one of the lowest figures in the world. During the census periods India has shown a progressive shortage of women. Similarly, we know that the average expectation of life of women in India has been steadily falling.

Professor Gini and Dr. Charles Enid are also of the opinion that the net reproduction rate in India is not more than unity. Therefore, before talking about the alarming increase of numbers, we must put the available statistics to stricter proof, and must also try to get more helpful and adequate figures.

Mr. Alexander Farquharson: I should like to begin by excusing myself; as I am no expert on population questions I cannot profess to reply as an expert should to the specific points that have been put forward.

It has been pleasant to know that every one of the speakers has been in agreement that Dr. Mukerjee has put forward in this paper a set of facts and a point of view which deserve serious consideration by all those interested in Indian, Imperial and world problems.

After studying the paper and after discussing similar questions with Dr. Mukerjee I am quite convinced that, in presenting this paper, Dr. Mukerjee has done us a remarkable service. I hope the paper will be widely read in India and in this country.

There is one minor point—a question of terminology—on which I am a little doubtful. I like to be careful and like other people to be careful in the use of such concepts as "optimum population" and "equilibrium population." These concepts are useful in thinking about population statistics and population questions, but it is quite obvious that none of us is able to say accurately what is or would be in future an optimum population for India, or for that matter what would be an optimum population in this country

"Optimum populations" and "equilibrium populations" are always relative. Any meanings we can attach to these terms depend on the large number of factors which affect the maintenance of a population at a certain standard of living. In using these terms Dr. Mukerjee, I am sure, does not intend to suggest numbers now definitely known, nor would any instructed student think that they could be so used.

In such a paper it is inevitable that the author should deal with some matters about which there is not yet sufficient assured knowledge. Dr. Mukerjee makes the point that a serious fall has taken place in the price of agricultural produce. He suggests that this may have very serious repercussions upon great numbers of agricultural workers and peasants in India.

The validity of that statement depends on how far the agriculturist uses his crops for his own subsistence, and how far he has to sell his crops in order to meet cash demands of some kind. I mention the point, not in criticism of Dr. Mukerjee, but to confirm what the last speaker and others have said, that on many of these questions our first requisite is further information. Even in this country, where we are apt to think that our statistical apparatus is a little further advanced than in India, there are big gaps still to be filled before we can deal suitably with similar questions.

On one matter I find myself in very earnest agreement with Dr. Mukerjee —namely, in his view of the relation between the population problem and the general problem of the condition or state in which a society finds itself. Dr. Mukerjee and I, as sociologists, are obliged to attribute the rise and growth of many of our modern problems to the great changes that have occurred, not only in European but also in Far Eastern society, owing to the commercial, industrial and other developments brought in by the Renaissance and becoming dominant in this country and elsewhere in the latter part of the eighteenth and throughout the nineteenth century. One main result of those changes has been an increasing break-up or disintegration of older, well-knit forms of society—forms that had the power of holding their members closely together and maintaining certain forms of family and social structure which tended on the whole to give them a stable and fixed character.

Further, I agree with Dr. Mukerjee that if we are looking at this problem from the point of view, not only of the students but also of the reformer, we have to face the question, How far can we assist the reintegration of

society into some new form which will be adequate for modern purposes, and yet have the stable qualities of these older forms?

I should like to close on that note, because I think that Dr. Mukerjee is doing immense service to India by calling attention to the integral forms of Indian society in the past and to the need for a close consideration by all students and reformers of the problems of future reintegration.

The CHAIRMAN: I am sure you will agree with me that we have had not only an interesting paper but a most interesting discussion. I neither have the time nor the technical knowledge to discuss the paper, but if you will spare me one minute there are one or two words which I would like to say.

Perhaps I might point out, following upon what Sir Alfred Chatterton said in regard to the figures, that in the figures given in this paper no account has been taken of the separation of India from Burma.

As one who has taken some part in the administration of Madras I was naturally perhaps most interested in that part of the paper which dealt with agriculture, Madras being chiefly an agricultural Province. I am sure we all hope that everything will be done, especially under the present Viceroy who is so interested in the villages, to encourage modern systems of agriculture.

I think it was Sir Alfred Chatterton who suggested that village by village should be taken for this purpose. In Madras we had an experiment which, I think, was interesting and which had some fruitful results. We sent round to the villages, on the days on which the markets were held, two motor-cars with a lecturer. In one car were carried the modern agricultural implements, and the ryot was shown these, the rice, and other crops which were grown from the best seed. The seed was shown, and the implement which had prepared the ground, and the manure which had been put on the ground to produce that seed. So he was able to see by an ocular demonstration all the processes and the implements. The lecturer in the evening lectured to the men of the villages on reforms and modern methods of agriculture, and magic lantern slides were shown from off the car, giving a demonstration of crops and so on.

We did find that the villagers became very interested in the matter. As the paper points out, there is a desire for better food and higher standards of living, and I think when the ryot saw that by using a better seed with the same amount of labour he got twice as good a crop, he began to think it might be advisable to employ that seed.

Time is getting on and I do not wish to keep you any longer, but perhaps as we are all friends of India here in this room I might be allowed one sentence outside the discussion which has taken place this afternoon.

I would like to say to you all that I am sure we have all seen with relief and with pleasure the decision which the Congress Party has come to to take office in those Provinces in which the Party is in the majority. (Applause.) We shall watch their future, I am certain, with interest in the hope that in the fulfilment of their new responsibilities they will bring to bear both a wide and broad statesmanship.

Sir MALCOLM SETON: I have very much pleasure in asking you for a vote of thanks to Professor Mukerjee for the interesting paper he has prepared, and to Mr. Farquharson for so kindly coming and reading it and offering the observations he has, and also to Lord Goschen for taking the chair. Lord Goschen has been a very good friend to the Association, and we appreciate his presence very highly, as well as the remarks he has made. This is hardly the hour to make many comments on the paper, but there are perhaps two remarks you will allow me to make.

One is, I was rather interested at the matter-of-fact way in which Professor Mukerjee states "famines have now lost their rigour." If anyone thinks what a failure of the monsoon meant forty years ago, and how very much less it means today, I think one reflects that that is not a phenomenon of nature; it is a result of concentrated effort, of the quiet, self-sacrificing work of generations of officials, British and Indian, and the applied energies of Government, and it is a very remarkable achievement. How far it is an earnest of the possible success of dealing with such dangers as Professor Mukerjee adumbrates it is not for me to say.

As for one possible alleviation of the population problem, he sees more possibilities in emigration than I imagine exist at present. Apart from the political difficulties, the world is getting very much filled up, and it seems to me very unlikely that emigration can afford much relief to India.

I was rather pleased to hear Sir John Megaw speaking so warmly of the name of Malthus, because sometimes I suspect that men of science hardly do full justice to Churchmen! It seems undoubted that the amazing neglect for years by biologists of the discoveries of Mendel was due to the fact that he was a monk, and monks could not be expected to know about these things. The fact that Malthus was a Church of England clergyman even if he was also a history professor to some extent helped to put him on the shelf.

It gives me very much pleasure to ask you to give this triple vote of thanks. (Cheers.)

Journal of the East India Association

October 1937

THE NEW GOVERNOR OF BOMBAY: FAREWELL LUNCHEON

A LUNCHEON, arranged by the East India Association, the Royal Empire Society, and the Society of Yorkshiremen in London, in honour of Mr. (now Sir) Roger Lumley, Governor-Designate of Bombay, was given at the Rooms of the Royal Empire Society on Wednesday, July 21, 1937, when 250 members and guests attended.

LORD HALIFAX presided, and on proposing the toast of Mr. and Mrs. Lumley conveyed the regrets of the Secretary of State for Foreign Affairs (Mr. Eden), with whom Mr. Lumley had worked in close partnership for many years, at his inability to be present owing to his being detained on urgent matters connected with his Department. In the course of further observations he said:

If I may for a moment remember that I am a Yorkshireman, speaking to Yorkshiremen, I might say that we Yorkshiremen the world over are famed among many things for one quality—our modesty. Therefore, it would be quite unbecoming and quite foreign to our Yorkshire temperament if I were to attempt, in what I hope others here present will forgive me for terming a "mixed company," to define to them what for Yorkshiremen are the qualities by which they hold themselves to be distinguished. (Laughter and cheers.) We, of course, know them very well, and the others who are here present will no doubt forgive me if I content myself with saying that whatever those qualities are Mr. Lumley possesses them in superlative degree.

I have had the honour of knowing Mr. Lumley in peace and war—because we served together during the War—for something like twenty-five years, and I might therefore be tempted to say that what I do not know about Mr. Lumley was hardly worth knowing. I like to think that still, although predominantly a man of peace, he does for one fortnight in each year turn the pen into the sword and resume his military career with my old, and his present, regiment. He beats his ploughshare into a sword for that brief interval, and then returns to the activities by which he is principally to be known. For many years he has achieved with distinction the great honour of representing the capital seat of York, and I do not think that any Yorkshireman can possibly demand a higher honour than being allowed to represent the capital seat of his county: that Mr. Lumley has done with such consummate success that when he abandoned his seat of York he was able by the power and influence of his appeal to enable that honour to pass to one quite untried—viz., my son.

For the rest, he has, as you know, served many years in the House of Commons, and has in that capacity been closely associated with our present Foreign Secretary, Mr. Eden, who has no doubt used him as all men, I

JOURNAL
OF THE
ROYAL SOCIETY OF ARTS

FOUNDED IN 1754

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LONDON
THE ROYAL SOCIETY OF ARTS, JOHN STREET, ADELPHI, W.C.2
G. BELL & SONS, LTD., YORK HOUSE, PORTUGAL STREET, W.C.2
PUBLISHED EVERY FRIDAY. PRICE ONE SHILLING

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4491 *FRIDAY, DECEMBER 16th*, 1938 Vol. LXXXVII

NOTICES

THE DR. MANN JUVENILE LECTURES

As announced in the *Journal* last week, Dr. L. G. H. Sarsfield, of the Research Department, Royal Arsenal, Woolwich, will deliver two Juvenile Lectures, under the Dr. Mann Trust, on "THE MAGIC OF INVISIBLE RAYS." These lectures have been arranged for Wednesday, January 4th and Wednesday, January 11th, at 3 p.m. They are suitable for children of twelve and over, and will be illustrated by lantern slides, models, demonstrations and experiments. At the end of each lecture a Christmas tea will be served in the Library.

Special tickets are required for these lectures and one only can be issued to each Fellow applying. Each ticket admits one adult and two children to both lectures. A sufficient number to fill the room will be issued to Fellows in the order in which applications are received and the issue will then be discontinued. Fellows desiring tickets are therefore advised to apply to the Secretary at once.

NEW LIST OF FELLOWS

A new edition of the List of Fellows, which has been prepared recently, will be available in the course of the next few days. It will contain the names of all present Fellows of the Society elected before November, 1938; that is, including Fellows elected by the October meeting of the Council, as reported in the last volume of the *Journal*, pp. 1147–1150. Copies of this new list of Fellows may be obtained upon application to the Secretary.

PROCEEDINGS OF THE SOCIETY

INDIA AND BURMA SECTION

FRIDAY, 2ND DECEMBER, 1938

SIR REGINALD GLANCY, K.C.S.I., K.C.I.E., Chairman of the India and Burma Section Committee, in the Chair

THE CHAIRMAN, in introducing the lecturer, said: Since the India Section of the Royal Society of Arts first came into existence, some hundreds of lectures have been delivered in this hall dealing with various Indian problems, but seldom can any subject have come up for discussion here of more vital importance to the people of India than that of the lecture this evening. Population problems, of course, are not confined to India; for the falling birth-rate in the West has long been a source of anxiety to European statesmen. In India the trend is in the other direction, a high and constant birth-rate, coupled with a steady fall in the death-rate; but what claims our special attention is that India, above all other countries in point of actual numbers, presents the problem of the greatest magnitude in the world to-day. The figures in this case are astronomical. For instance, in a recent work by Professor R. Mukerjee, it is taken for granted that in the near future the overworked soil of India will have to find sustenance for 400 million souls—but I must not trespass on the province of the lecturer.

My part to-day is to welcome him to the Society. Most of you already know that he is an authority on this subject, and that in all recent publications about India's population-problems you will find arguments based on facts and figures attributed to him. I must also tell you that he has served in no less than five of the major Provinces of India, an experience as exceptional as it is valuable; valuable because, as most of you know, between some Provinces the difference is almost as great as between Egypt and Scandinavia. Thus a wide range of service such as Sir John Megaw has seen is the best corrective of hasty generalisation.

Finally, Sir John Megaw has been in turn Director of the School of Tropical Medicine, Calcutta, and Director of the Medical Services in India, appointments which afford exceptional opportunities for the study of the subject of his lecture this afternoon.

The following paper was then read:—

PRESSURE OF POPULATION IN INDIA

By MAJOR-GENERAL SIR JOHN MEGAW, K.C.I.E., D.Sc., M.B., B.Ch., President of the India Office Medical Board and Medical Adviser to the Secretary of State for India

A few years ago I described the population problem as the "real problem of India." Lest you should suspect this description as being that of a faddist, let me quote from a recent speech by Lord Linlithgow, the Viceroy of India.

> "The population of India is expected to increase to 400 millions by the census of 1941, and it is increasing at the rate of about 4 millions a year.

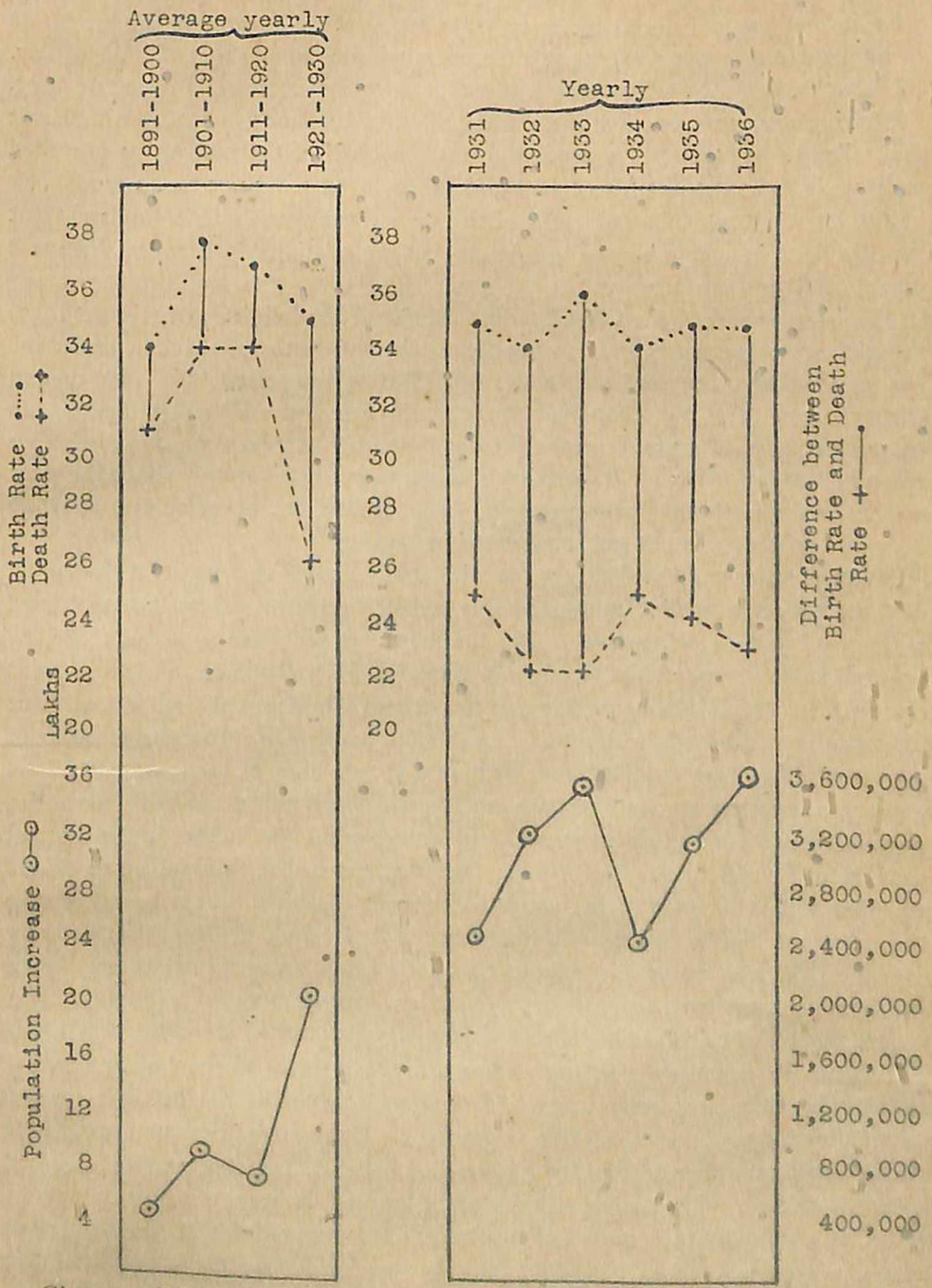

Chart 1.—Birth and death rates per 1,000 and yearly increases of population in India from 1891–1930 and 1931–1936.

India and England during the past sixty years or so. The vital statistics of India were incomplete and unreliable sixty years ago, but we know that the birth rate of England at that time was 35 per mille, or much the same as that of India to-day. The death rate in England was 21·4, as compared with the present Indian rate of 23.

Striking changes have taken place in the rates for England; in 1936, the birth rate had fallen to less than 15, a good deal less than half of the rate which prevailed sixty years ago; the death rate had also fallen to 12·1, or not much more than half of the old rate. The fall in the birth rate and the death rate in England went hand in hand in such a way as to suggest that the relationship between them was one of cause and effect.

The latest report of the Chief Medical Officer of the Ministry of Health (1937) contains an interesting table showing the number of deaths of children under the age of 5 between the years 1861 and 1936. During the period 1861–1870 no less than 300 out of every 1,000 children born in England and Wales died before reaching the age of 5 years; at the present time only 81 of every 1,000 die before reaching that age. The child mortality in England in 1861–1870 was much the same as it is in India to day; unfortunately, India is far from being able to show so dramatic an improvement as has occurred in England.

Many of you would probably agree with me if I were to argue that the lesson of these figures is clear: India need only reduce her birth rate to the same level as England and all will be well. But the matter is not quite so simple. Before we urge India to imitate the example of England, we ought in all fairness to point out the price which is being paid in this country for the spectacular fall in the infant mortality rate and total death rate. England and many other progressive countries are committing race suicide; the birth rate is not high enough to replace the parents, and unless a great change takes place in the trend of the birth curve the population will soon begin to shrink. In France and Austria, the deaths in 1936 were actually more than the births. An even more disquieting feature of the situation is that in most of the western countries the birth rate is lowest among the more intelligent classes of the community. In fact, evidence has recently been brought forward which suggests that the average level of intelligence among children is lower than it was twenty years ago. My reason for calling attention to this feature of the situation is that we must at the outset have clear ideas about our aims are when we propose to control the growth of the population. If the people of India were to imitate the cultured classes of England they would adopt a birth rate of something like 10 per mille. If this were done the standards of life in India would soon rise to unexampled heights, but it would be contrary to every instinct of the people to allow their families to become extinct.

A few public health experts believe that the recent rapid fall in the birth rates of western countries is a biological phenomenon which results from a lowering of the reproductive powers of the people caused by high standards of comfort and nourishment. Some support is actually found for this view in experiments which show that animals which are highly nourished have a lower degree of fertility

than those kept on a frugal diet. If it were really true that high standards of comfort must necessarily result in a great loss of reproductive power, the human race would indeed be faced with an unpleasant dilemma: they would have to choose between the two evils, low standards of civilisation and race extinction. It must be admitted that many western countries are acting as if these were the only alternatives, and they are showing no hesitation in preferring race suicide to discomfort. Despite the animal experiments which I have just mentioned, it is generally agreed that the fall in the birth rate is due chiefly to the deliberate action of the people concerned: they refuse to have children at the cost of accepting more modest standards of life. They are, in fact, presenting a good example of the way in which Nature gets her revenge when people interfere with her in a one-sided manner. The example of the French Canadians shows clearly that reasonable standards of comfort are quite compatible with a healthy growth of the population. All the evidence points to the value of struggle in developing the best physical, mental and moral qualities of a race. The sooner the people of the over-civilised communities realise that they are following false aims in attempting to shelter themselves and their children from the necessity for making an effort, the better it will be for themselves and their race. The democracies of the world are on their trial. If they refuse to discipline themselves, they must inevitably go under in the competition with nations which have discipline imposed on them by their rulers.

It is unnecessary for the people of India to jump from the frying-pan of hopeless poverty into the fire of race suicide; there are many countries and communities which have succeeded in following the "middle way" by being content with reasonable standards of comfort and compelling themselves to engage in a stimulating struggle for better conditions of life. The condition of many millions of people in India, on the other hand, seems to be such as has been described by Malthus in the words which I have already quoted:—

> "Great privation depresses man below the very capacity for improvement; comfort must reach a certain height before the desire for a civilised life can come into being at all."

The average duration of life in India is much less than half what it is in England; vast numbers of babies are being brought into the world at the cost of great risk to the child mothers and of much hardship to all the members of the families concerned. Half of these babies are doomed to die before they reach adult life.

There is no need to enter into a controversy whether the economic standards of the people of India are higher or lower than they were fifty years ago; the important matter is that they are far too low at present, and that they are not likely to rise unless a well-planned effort is made for their improvement.

A few years ago I made an attempt to find out the actual facts, and with the co-operation of 571 Indian doctors working in typical agricultural villages, a rough and ready survey was made of the conditions of life in these villages. In

the opinion of the doctors, less than 40 per cent. of the people were well nourished, while more than 60 per cent. were poorly or badly nourished. The chief cause of this unsatisfactory state of affairs is shortage of certain articles of diet, especially milk and vegetables which are essential to proper nutrition. For the purpose of satisfying their hunger the people are compelled to live chiefly on cereals and pulses, while, except in the Punjab, the average daily consumption of milk was estimated as being 5 ounces or less for each person. The survey was not claimed as having scientific accuracy; it was undertaken with the object of calling attention to the unsatisfactory conditions existing in the villages, and to the need for an accurate survey as a preliminary to the formation of a plan for improving these conditions.

During the six years since this survey was made, there has been great activity in the investigation of the nutritional condition of the people of certain parts of India, and the results which have been obtained so far go to show that the picture obtained by my survey was substantially accurate. A troublesome feature of the situation is that a much larger acreage of land is required to produce a ration of an adequate and well-balanced diet than is needed for the production of enough cereals and pulses to satisfy hunger. If the people are to get a proper quantity of milk and vegetables, they must either have larger plots of land or increase greatly the productivity of their present holdings so that part of the land may be used for keeping cows and growing vegetables. Doubtless a good deal can be done to improve the dietary of the existing population, but it will be necessary to keep in mind the following significant words which are quoted from the Report of the Royal Commission on Agriculture—"everything which we have advocated for the material advancement of the people will merely postpone the effects of the growing pressure of population on the soil." Unless this aspect of the problem can be tackled with energy and success, the result of increased production will merely be that a larger number of people will be able to wrest a bare subsistence from the soil. One of the most remarkable phenomena of recent times is the way in which the doubled population of India has been able not only to exist, but even to show an ever-increasing capacity for increasing its numbers. This remarkable happening seems at first sight to be a direct refutation of the gloomy predictions which many people, including myself, have been making for the past twenty years. If India were really threatened with a crisis, how is it possible for the population to go on increasing more and more rapidly? The continued increase in numbers shows that the people as a whole are still living above the subsistence level, for once they fall right down to that level the number of deaths will be as great as the number of births, the people will just be able to keep body and soul together by eating the whole of the food which they produce, and no surplus production will be available for maintaining the structure of civilisation. Schools, hospitals, public health, police, law courts, armies and so forth will become unattainable luxuries. In such conditions a vicious circle will be established and drastic economies will be inevitable; these will involve not merely a curtailment of the amenities of life, but also a weakening of the forces which maintain internal and external

security, the production of food will then fall sharply, and Nature will be allowed once more to assert her sway as the cruel arbiter of the destinies of the people. If the production of food and other necessities of life is actually keeping pace with the increase in the population, there is no reason to fear so great a disaster for India; on the other hand, there are some acute observers who maintain that production is not increasing so rapidly as reproduction. If they are right, the prospect is indeed gloomy.

There are two circumstances which cause added anxiety with regard to this question. One is that India during the last economic crisis weathered the storm by throwing overboard a large proportion of her hoard of gold, and thereby depriving herself of a valuable reserve against another period of depression. The other is that India has had no major failure of the rains since the population began to increase at so portentous a rate; the real test of her condition will come if there should be a succession of bad seasons such as have been experienced in the past, and therefore must be regarded as likely to occur in future. While there is still time, the wise course is to make a careful survey of the situation to find out whether or not India is in a sound condition to weather the storms which must come sooner or later.

The Bright Side of the Picture

So far I have been dealing with the gloomy side of the picture. The brighter side exists in the possibilities for future improvements rather than in actual achievements, substantial though these have been. There is still great scope for an increase in the produce of the land by such means as improved methods of agriculture, the introduction of better breeds of cattle, and the further development of irrigation. The Indian peasant can also effect great economies by cutting down his luxury expenditure, the chief item of which is the maintenance of 25,000,000 diseased and useless cattle; if the fodder which is wasted on these were available for feeding productive cattle, the milk supply would be greatly increased and a substantial improvement be effected in the standards of life of the people. The origin of the prejudice against the slaughter of useless cattle is somewhat obscure; it does not seem to have existed in ancient times, and one can only surmise that during some great famine nearly all the cattle were killed off so that when the rains returned there was a serious shortage of livestock for carrying on the work of cultivation. After such an experience, it would be quite natural for the rulers of the people to issue a decree forbidding the slaughter of cattle in any circumstances.

The custom of child marriage is another heavy burden which the people have imposed on themselves. This, also, does not seem to have any sanction in the ancient religious writings, and its origin may have been the necessity for having a surplus of infants so that there might be some survivors to keep the family from becoming extinct during periods when epidemics carried off large numbers of the children. Conditions of this kind actually existed in London three hundred years ago, when only one out of every four children survived to reach adult life. It

looks, therefore, as if India is suffering from a tenacious adherence to customs which were suitable or even necessary at the time when they were introduced, but have now become an intolerable burden in the changed conditions of modern times. Reform in these matters can only be effected by the leaders of public opinion in India. With the spread of education it is to be hoped that a new outlook will come into existence.

These are examples of the potential means of improving the condition of the people of India, but it must be reiterated that they do not form a complete solution of the problem, for if the greatest possible increase is brought about in production and if at the same time the wastage from preventible disease is stopped, the increase in the population will very soon catch up with any conceivable increase in the food supply; and the final result, as pointed out by the Royal Commission on Agriculture, will be a much larger population living on the margin of subsistence. If we remove the natural checks of disease and starvation, we must impose some artificial checks and we must choose between celibacy, delayed marriage, continence, infanticide, abortion and the use of contraceptives. Infanticide and abortion are illegal, so they may be left out of account. For practical purposes, the choice lies between the moral check of Malthus, restraint, and the modern check, contraception. It must be emphasised that no Government can dictate to the people which kind of population control they are to adopt. The choice must be left to the individual. What can be done, and ought to be done, is to instruct the people in the biological facts of the situation so that they may have a clear understanding of the principles which govern human existence. When this has been accomplished, the people can be trusted to find a way out of their difficulties. Experience all the world over shows that when people reach the stage of becoming conscious of a desire for better standards of life, and can see a means of securing these standards, they never fail to circumvent any sentimental or other obstacles which stand in their way.

The Importance of the Birth Rate in Public Health

Chart 2 shows the relationship between birth, death and infant mortality rates, which are shown for all countries with populations of more than ten millions for which records are available. If all the smaller countries had been included, the trend of the curves would have been quite similar. In spite of one or two irregularities, the correspondence between the trends of the three rates is remarkably close. All the seven countries which have a birth-rate of more than 25 show an infant mortality rate of more than 100 per mille of births. On the other hand, five of the six countries with a birth rate of 20 or less have an infant mortality lower than 70 per mille. The exceptional case is Czecho-slovakia, where there must be some exceptional conditions. The graph shows clearly the rate of increase of the population for each country. This is indicated by the length of the line drawn between the symbol for the birth rate and that for the death rate. It will be noticed that the increase in population tends to be greater in the countries which have

high birth rates, in spite of their high infant mortality and total death rates. In an under-populated country there is no reason why high birth rates should necessarily be accompanied by high infant mortality rates, but what actually happens is very surprising. The League of Nations *Epidemiological Report* for 1936 records that 11 reporting countries had a birth rate of more than 30, the average infant mortality

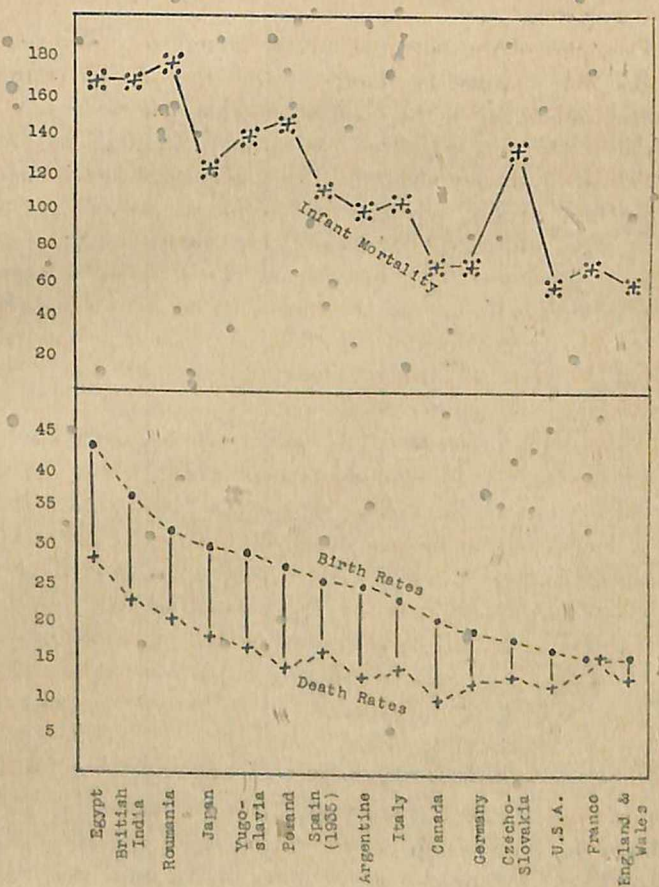

Chart 2.—Birth, death and infant mortality rates for all reporting countries having a population of more than 10 millions in 1936.

in these countries being 165. This figure is in striking contrast to an average infant mortality of less than 68 in the 20 countries with a birth rate of 20 or less. Evidently an abnormally high birth rate is always accompanied by a wastage of infant lives. When the population is pressing hard on the available resources of life, this is natural, because the parents cannot provide adequate care and nourishment for large families. There are no figures to show the influence of delayed marriages on the infant mortality rate, but it would certainly be found that the children of later marriages have a better chance, both of health and survival,

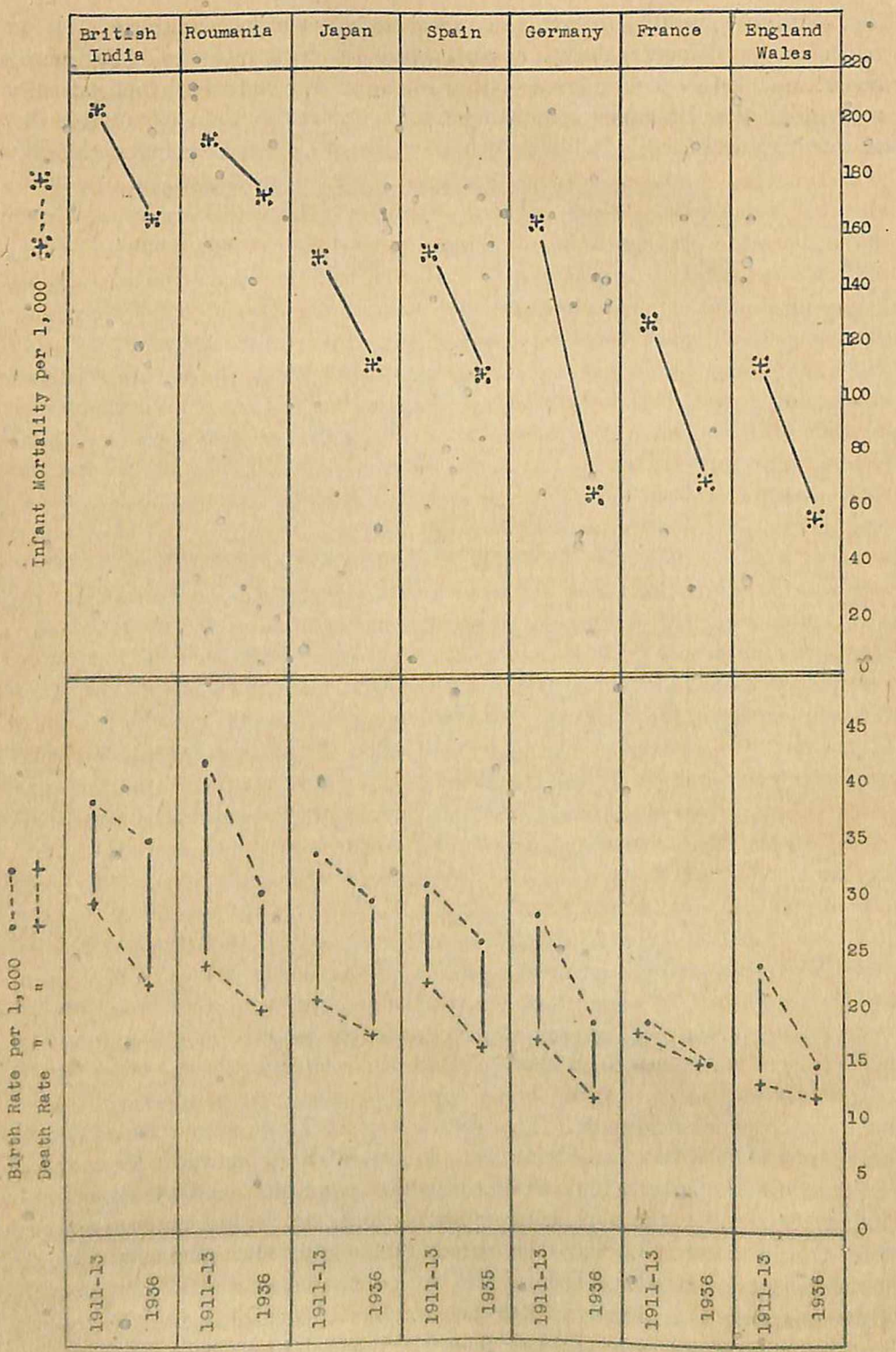

Chart 3.

as the parents would have had greater opportunities for making provision for the children. Chart 3 shows the changes which have occurred in the birth, death and infant mortality rates between 1911–13 and 1936 in all the countries with populations of ten millions and over for which records are available. The chart tells its own story.

You may have doubts about the value of statistical evidence such as I have given; if so, just consider the case of a single family unit. Take a typical young couple of Indian peasants who marry on an income of less than a shilling a day. It is quite usual for the girl wife to have her first baby at the age of 15 or 16, and to give birth to six infants before she reaches the age of 30. There is little reason for surprise if three of the children die before they reach the age of ten years. If all of them were to survive, what chance would they have of getting proper nourishment? If, on the other hand, the parents had waited till they were 25 years old, they would already have built up a reserve of physical strength and material resources, so that even if six children were born they would have a much better chance of reaching healthy maturity. If only four children were brought into the world in these conditions, the chances are that three of them would survive; and that they would have a much better start in life than the three survivors of the six infants born to the child mother to whom I have just referred.

In considering such matters, it is better to take typical examples of this kind and then multiply by millions, rather than to attempt to estimate the total food supply of a country and divide this by the number of mouths which have to be fed. It seems obvious that when child marriage and unrestricted reproduction are the order of the day, the efforts of the public health workers must be a solemn mockery, for the babies who are saved will be so badly nourished that they will merely be preserved to become victims of child sacrifice instead of being allowed to die in infancy. When the choice lies between infant mortality and child mortality the former is the lesser evil; the agony in that case is not so prolonged and the resources of the family are not so greatly taxed. But surely it is better to exercise foresight in the matter of reproduction and to bring children into the world only when it is possible to give them a reasonable chance of securing a healthy existence. What it comes to is this; human beings must choose between Nature's methods, unrestricted reproduction accompanied by a heavy toll of enfeeblement and death, or intelligent restriction of births, so that every infant is given a fair chance of health and strength. Curiously enough, there are public health workers who sharply oppose this view of the situation. I have actually been attacked by a known expert, who accused me of striking at the roots of public health when I called attention to the necessity for a study of the population problem. He argued that if people came to think that public health must fail unless the number of births is restricted, the obvious reaction would be that efforts to prevent disease are futile. This attitude would be quite reasonable if the only choice lay between death from epidemics and death from starvation, but these are not the only alternatives. It is possible by a suitable regulation of

the population to abolish preventible disease and at the same time to maintain a well-nourished community. The only safe foundation for public health is a sound economic condition of the people, and to build up this foundation ought to be one of the chief objects of public health work. Here, in England, the people have attended to this matter themselves. They have deliberately restricted the birth rate by various means, so that public health workers have been able to concentrate their efforts on the prevention of disease and to achieve remarkable success. In Japan, on the other hand, the public health workers have put forth equally strenuous and equally intelligent efforts, but the average duration of life is rather less than it was fifty years ago—whereas in England it has risen by fifteen years during the past half-century. Why have the Japanese public health workers failed while the British have succeeded? The most obvious explanation seems to be that the birth rate in Japan has remained unduly high, whereas in England it has fallen greatly. There is little reason to hope that public health will show any greater improvement in India than it has in Japan unless steps are taken to regulate the population in accordance with the available resources of the country.

Views of Experts on the Population Problem

For several years, Colonel Russell, the Public Health Commissioner with the Government of India, has been calling pointed attention to the population question in his valuable annual reports. He says rightly that the matter is of paramount importance to the health and well-being of the nation, and he expresses the hope that the educated public will be brought to realise the magnitude and urgency of the problem, and will give it the studious thought which it undoubtedly deserves. I may also quote from an address recently given at Lucknow by Professor R. A. Fisher, Galton Professor of Eugenics at the University of London. "The menace of over-population is the basic issue in India to which problems of removal of illiteracy, rural reconstruction, and improvement of public health are subsidiary. For all such programmes are deferred or frustrated as population outruns the capacity of education, sanitation and rural recovery. Economic adjustment seems to lie more in the direction of a judicious combination of food and industrial cropping than in subsistence farming, more in agricultural than in general industrialization and, above all, more in the control of population increase than in the diversification of employment." I could quote the words of numbers of distinguished Indians and Englishmen who have called pointed attention to the gravity of the situation, these include Earl Baldwin, the Viceroy, Lord Eustace Percy, Sir Jehangir Coyajee, Professor P. N. Banerjee, Professor B. K. Sarkar and many others. Yet public opinion has not yet been roused to such an extent as to create a popular demand for a serious enquiry. It is not surprising, therefore, that my repeated appeals for the appointment of a Committee to investigate the problem have not been successful. The problem, indeed, has its psychological aspects; there is an inhibition in the minds of most people which forms a solid obstacle to action. Let me give you two examples which throw some

light on this point. Some time ago, I had an opportunity of asking two distinguished medical men what they thought of the population problem of India? Both of them had just returned from a tour of India. One of them, a leading authority on Public Health in the United States of America, replied, "we are inclined to think that these things have a way of righting themselves." The other, a very able Scotsman, said, "I have always been an optimist!" The explanation for such replies was by no means lack of intelligence; it must have been that they had never given a moment's thought to the problem. As for those who have seriously considered the matter, the usual reaction to the problem seems to be a clear realisation of its immensity and importance, combined with a feeling of hopelessness about the possibility of finding a remedy. But surely we have no right to declare that there is no remedy until we have made a serious study of the disease and tried to find a cure.

The Remedy

In my opinion, all that is needed is to tackle the problem with courage, intelligence and determination. If this is done, the remedy will be found and inevitably it will consist in *Education*. I do not mean the kind of education which is given to the school-children to-day, but an education of the whole community in life-planning. The people must be made to realise what they are up against, and how they can control the forces of nature to their own advantage. We have plenty of examples of what can be done by education of the masses: in Russia, Italy and Germany the entire psychology of the people have been changed by insistent propaganda. There is no reason why propaganda should not be employed in a good cause like the uplift of the people. Let me dispel at once the idea that the people of India resent discussion of the biological aspects of the problem. I have discussed the matter with many Indians, and never once have I found anything but the greatest willingness to engage in a frank discussion of the various implications of the subject; always, too, there has been a clear appreciation of the extreme importance of the problem. There must be no illusions about the difficulty of applying the remedy to which I have referred. It may sound very simple to invoke the blessed word "education," but in reality the best brains of India helped by the best brains of the outside world will be needed. Experts in agriculture, education, public health, economics and industry must co-operate in deciding what should be taught, and then the subject matter must be prepared in a form which will be palatable to the masses. We must find people who know how to tickle the ears of the audiences and attract the eyes of readers. The press, the cinema, the wireless stations, the schools, pamphlets, posters and all the resources of the expert advertiser must be brought into play. But before anything can be done, the educated community must be made to realise that it is a matter of life and death that early action should be taken; and I can think of no better way to bring this truth forcibly to the notice of the public than to set up a committee of enquiry.

DISCUSSION

SIR EDWARD A. GAIT, K.C.S.I., C.I.E., said: I should like to congratulate Sir John Megaw very heartily on his admirable paper and on the clear and cogent way in which he has marshalled his facts.

In the early days of British rule, people regarded the increase in population with complacency. They thought it a proof of the beneficial effects of British administration—such as the establishment of law and order, the improvement of communications, the provision of irrigation, and the great success of the measures taken to cope with crop failure which prevented the terrible mortality that often resulted in earlier times. But as years went by and the population continued to increase, people became more thoughtful. So far back as 1911, it was pointed out that there are many purely agricultural tracts with more than twice the population per square mile which agriculture can support in Europe. After the census of 1931, it was stated that the tendency of the population to increase up to the limit was the main cause of poverty in India. It is therefore urgently necessary to take every possible step to indicate the vital importance of the matter to the people of India, and urge them to keep their families within the limit they are able to bring up in reasonable comfort.

The measures which the lecturer proposes are very suitable. A committee of enquiry would be useful in bringing the matter prominently to the notice of the educated people. Intensive propaganda is also very necessary, so as to bring home to the masses of the people the importance of birth control both in their own interest and in that of their descendants.

MAJOR-GENERAL SIR CUTHBERT A. SPRAWSON, C.I.E., M.D., F.R.C.P., said: I think that one may divide the people who have opinions upon this important subject more or less into three classes. First, there are those who, like the American hygienist Sir John has mentioned, say that nature will right this matter herself and therefore we should not bother about it. Then there are those who think that it is an important subject but that we can do nothing about it. Lastly, there are those who say that at any rate we must consider it, because the mere consideration of the facts will be of benefit. Every thinking person ought to take this line. Although it would be a difficult thing to propose measures that are going to make a great difference in the near future, it is highly necessary to consider this problem from every aspect. Mere consideration itself will produce a publicity which is what is wanted more than anything else. That will give rise to propaganda amongst the people in its turn.

In the past I regarded this problem with complacency because I used to think that if these people multiplied so much as to be ill-nourished, then they would not have the energy to multiply further. But that is a fallacy; and it is only in the last few years that people have realised how ill-nourished the population of India is. This recognition has come from the work of health services and reports of experts on nutrition. When people are ill-nourished, they may be feeble and weak, but the power of multiplication is the last thing which Nature withdraws.

KHAN BAHADUR SHEIKH SIR ABDUL QADIR said: I must associate myself with the words of the two previous speakers as regards the appreciation of the lecturer and the importance of the subject with which he has dealt.

His grievance was that many people agree with his conclusions, but that nothing practical is done and no practical criticism is advanced. I have not much adverse criticism to offer on the points which he raised, except to say that the difficulties are so great in a country like India that, I am afraid, nothing practical can be done about them in the near future. It is, however, worth while bringing this problem

before the public in the country itself, so that after some time it may be possible to find means of solving it.

We have been told that education is wanted to make India realise the need of population-control. A beginning has been made by the educated community, and especially by the women of the country, in recent years. Resolutions have been passed at important annual gatherings of Women's conferences in India in favour of such control. This important step has been taken, so far as the people themselves are concerned, in the direction which Sir John Megaw has emphasised. Nevertheless, year by year they bring up this subject for discussion and carry on propaganda in its favour, but the class that listens with any appreciation, or with any desire to adopt the suggestions, is that class which in many ways is least in need of such restriction. This class has no easy means of approach to the masses. So far as the latter are concerned, the immediate effect of such propaganda is unlikely.

I cannot agree with the lecturer when he says that the people of India do not resent discussion of this problem. He may have met intelligent and educated people who talked frankly with him, but if he had tried to discuss it with the villagers—and it is with that class of people that we are concerned if we want to make any change in the existing conditions—they would not be prepared even to discuss such proposals. Furthermore, if you tell them that their economic troubles result from over-population, they will tell you that to restrict population is against their religious beliefs and sentiments. They will also say that you must take measures to increase their means of production and nutrition. Instead of improving their standard of living, they will say, you are putting the blame on them and trying to rob them even of the one little pleasure of their family life.

The way of approach should be that those in authority, whether members of the British Government or the Congress and other Ministries, who may be interested in this kind of adjustment and reform, should first do everything possible to secure more widespread education, better means of production from agriculture, and an improved standard of life, which may gradually work towards the desired end. Population-control cannot be brought about simply by preaching.

Sir Ernest Hotson, K.C.S.I., said: I very much hope that a remedy for this great problem will be found, but at the same time I cannot help thinking that Sir Abdul Qadir has pointed to a real danger. We see already in some of the better-educated and wealthier classes of Indians a distinct tendency to what is going on in this county, namely, race suicide. As Sir Abdul Qadir said, the more the subject is talked about, the more these particular people will continue to limit their families and the country will thereby be impoverished. It is certainly the poorer classes which we must educate. Religious difficulties have to be met, and it is not easy for Europeans to touch on religious questions. Furthermore, it is almost impossible for the poor people of India to adopt either of the two alternatives Sir John Megaw mentioned. I do not think it is really practical, for economic reasons, to talk of the use of contraceptives; and therefore, until the problem of poverty is conquered, there remains only self-restraint. Can we hope that, perhaps for many years to come, we shall have any effect in that direction? It is certainly desirable that it should be so, but can anybody point out the means by which that result can be obtained?

Mrs. Edith How-Martyn, M.Sc., said: I have spent the last four winters in India carrying on birth-control tours in connection partly with the All-India Women's Conferences, but in every case with some Indian Society which is anxious not only to discuss this question in all its aspects, but really to do something about it.

Sir Abdul Qadir has already drawn attention to the fact that important work is done by women's organisations in India. The most important of these is the All-India Women's Conference, which represents all the women of India. They have for the last seven years passed a resolution in favour of birth control. They have not only expressed their agreement with it, but have pointed out the way they would like to see it done. The organisation of the All-India Women's Conference extends not only to British India but to the Indian States. Unfortunately, nothing is done by the powers that be to implement those resolutions. In 1935, the All-India Medical Conference, meeting in Nagpur, carried a resolution that contraception should be an integral part of the training of every medical school in India. Nothing has been done so far. I claim that there is a demand among the people of India themselves, and I do so more boldly because last year I spent two months in the villages and smaller places in the Bombay Presidency, where I spoke on birth control, as part of the public service in connection with maternal and child welfare, in 23 towns and villages under the auspices of the Society which co-ordinates the work of maternal welfare for the whole province. I met with practically no opposition at all.

Birth control information could also be introduced through the trained midwives. There is no village in the whole of India without its midwife. There are many organisations trying to train these women and to put fully-trained midwives all over India, and I suggest that if every one of those midwives were given some training in this way she could carry on the propaganda better than any one else.

I agree with Sir John Megaw's paper, but I hope that the educational efforts will include the education of members of the Government of India, and of those who run the hospitals and the medical schools, because the demand is there and the people at the top are failing to meet that demand and to do what they can to bring these necessary services within the reach of the masses of whom Sir John spoke.

DIWAN BAHADUR SIR A. RAMASWAMI MUDALIAR, C.I.E., said: My latest information is that on the 11th November of this year a resolution was moved in the Bombay Legislative Council for introducing contraception, but only ten members voted for it. The Minister in Charge, himself a medical man and presumably well-educated on this question, was one of the sternest opponents.

What exactly is behind this opposition of educated intelligent Indians to contraceptive methods? You, Sir, referred to the population of India reaching almost astronomical figures. That fact unfortunately prejudices a balanced consideration of the question. When you see the population increase from 320 million to 360 million during the last decade, and the limit of 400 million about to be reached in 1940, you certainly are faced with a serious situation. But is it over-population? I do not want you to consider the question now in connection with the resources of the country. But is the growth in population in itself abnormal? What is the rate of population normally in a civilised country? I have been told that 1 per cent. annually is a reasonable increase. Before the War that was the normal increase, that is to say 10 per cent. in a decade. In these matters it is useless to look at the rate of birth or death. What counts is the effective increase in population from year to year, and decade to decade. If you take that as the normal basis in a civilised country, I venture to submit that little beyond that increase has taken place in India during the last two decades; so that the suggestion that there is a large increase in the population is to my mind based on incorrect hypotheses. I agree that the vast birth-rates and death-rates are calamitous. They result in suffering and a great deal of sorrow which has to be mitigated, but those are different problems. You are thinking of the increasing population, and the subject should be confined

to that question. You must know the habits and conditions of the people, their way of living, their thoughts and their fundamental concepts before you can appreciate this problem or find a remedy for it if it is as acute as it is described to be.

In India, it is a matter of common knowledge that marriage, particularly of women, is a normal feature of life; so normal in fact that it would look abnormal if any girl were unmarried after the age of 25, and certainly after 30. It is estimated that 98 per cent. of Indian women are married. Therefore, when you consider the growth in the increase of population, you must take that factor into consideration. Are we, because we want to lower the birth rate or lessen the increase in the rate of population, going to introduce ideas in that country of the advantages of spinsterhood? Some people think that this is a good idea, and that therein lies the salvation of the country.

There are also other factors to be considered. Families will be restricted only by that class of people who least need education in these matters, and among whom starvation or want of resources is not to be found. It is the preaching of contraceptive methods that started the downward trend of population in this country, and you are to-day regretting the fact more than ever that the population rate is falling. My belief is that it is falling much more rapidly amongst that class from which come generally the leaders of society, and much less among the working classes. This maladjustment of birth-rates in classes of society will be even worse in India. That is to say in India the very class of people whom you want to lead public life in the learned professions, men and women you can least spare—these will be the people who will commit race suicide, and the results will be known in the years to come. We must avoid that if possible. The opposition to contraceptive methods is not to be attributed to original sin on the part of the opponents. It is not because they believe that it is opposed to religion, but merely because they feel that only a few and those who ought not to resent it except on medical grounds will practise it to the detriment of the general weal.

Let us take it that there is an increase in the rate of population, and that 10 per cent. per decade is the proper figure. If the birth-rate comes down from 35 per cent. to 20 per cent. and the death-rate comes down to 10 per cent., as in this country, would those who abhor the growth in poulation be satisfied? The pressure on the soil will still be there, and the problem will be equally acute. Again, it has been pointed out in census reports that the children per family in India number 4·2. The surviving rate is 2·9. Who will say that four children per family are far too many, or that 2·9 children are far too many? This problem acquires a new light when you look at it not from the point of view of astronomical figures, but as it ought to be from the point of view of individual families.

Then there is the question whether the capacity for nourishment is sufficient for a growing population. I think that there is a great deal which requires to be done by way of accurate statistics. I have come across statements which are contradictory to each other. One set of economists say that the utmost has been done on the soil and that nothing more can be produced out of it. I have also heard people say that that is not accurate. In the census of 1931, there is an interesting note in regard to the population of Bengal. In 1931, the population of Bengal was 50 million. It was calculated that in Bengal there is 30 per cent. of land still to be brought under cultivation. As agriculture to-day is on a scientific basis more can be produced from the land than formerly, and it is estimated that crops can be increased by a third. Therefore, with a 30 per cent. uncultivated area and a 33⅓ per cent. bigger yield from the land there is enough to keep up double the population of Bengal. I am not prepared to accept these statements, but I would suggest that there is a case

for investigation, as Sir John Megaw has suggested. One should not be frightened by the population, but there is a case for enquiry, and I should be glad if that enquiry were to discover whether the resources of the country could be increased and developed. I think the birth rate will fall, but by those methods which are not quite so revolutionary as contraception and which are more in keeping with the traditions of the people—in fact by raising the standard of living. I think that is how the problem can be solved.

PROFESSOR R. RUGGLES GATES, M.A., Ph.D., D.Sc., LL.D., F.R.S., said: As a biologist I am always interested in problems of population, and last winter I had the privilege of spending some three months in India. I travelled rather widely and saw a great deal. One of the conclusions which I reached was that the population problem was one of the greatest in India, and undoubtedly one of the most difficult. I feel very much in agreement with what the lecturer said in his address, and I hope that a commission may be formed to investigate the subject. At the same time one recognises the extraordinary difficulties, perhaps greater in India than in any other country. Undoubtedly it will take a long time to get these things adjusted, but we have to face the fact that the population will tend to increase up to the level of subsistence unless some adjustments are made to get the bottom level "off the ground."

As a botanist I am interested in food supplies, and I noticed how methods of genetics are being applied all over India for the improvement of varieties and the increase of food production. One has to recognise that, however much food supplies are increased by the application of scientific methods, if there is no other sort of adjustment the population itself simply increases up to the new limits, and the level of subsistence is the same as before.

DR. R. R. KUCZYNSKI said: I should like to support the opinion that it is a myth that India has such a large population increase. Even the statistics give no evidence whatsoever in this direction, and the available statistics are so inadequate that I cannot see what a commission could do. Both according to the census statistics and the registration statistics, the yearly increase would seem to be 1 per cent., which is not very much; and the increase may actually be smaller. The census is inaccurate, and registration is incomplete. If the official life-tables are correct the crude death-rate would be at least 35 per 1,000. It is possible, of course, that the crude birth-rate is something like 45 per 1,000, but the sample surveys made in connexion with the 1931 census indicate that fertility in India is by no means extraordinarily high. Yet, even if the yearly increase is 1 per cent., this may result from an age composition which tends to swell the number of births and to reduce the number of deaths. So the genuine population growth may after all be very slight. What we ought to have is a much better knowledge of the facts, and the 1941 census would certainly be the best way of learning those facts which are indispensable to any commission.

MRS. ALICE JENKINS said: We have heard much about death-rate and birth-rate, but we have not heard anything about the maternal mortality. As many Indian women die in child-birth every generation as men died for the Allies during the four years of the Great War. That number should be reduced. Tacitly to accept the fact that in India only two out of four children grow up to maturity is a terrible thing. When I think of the human suffering entailed in bringing doomed life into conditions which cannot support it, I am convinced that we should do everything in our power to reduce the birth-rate.

THE LECTURER replied: It is perfectly obvious that I cannot go over all the points which have been raised; moreover, many of the remarks which professed to be criticisms really emphasised the points which I myself had already made. With regard to Sir Abdul Qadir's remark that Indian villagers do resent discussion of the limitation of families, I must make it clear that I was referring to educated Indians, and I have never met one of them who was not prepared to discuss the subject frankly and freely. Obviously, the villagers must be educated in the acquirement of a new outlook. One speaker said that it was the business of Government to press on with the encouragement of birth control. I must disagree, as contraception is a controversial subject which offends the religious beliefs of a large section of the community. My view is that it is not the business of Government to insist on people limiting their families in any particular way, nor is it their business even to insist that families should be limited at all: it is for the people themselves to decide what steps they should take. Government can provide education which would enable the people to judge for themselves how they can regulate their lives so as to obtain the kind of existence which they desire after having obtained the broad general knowledge of the biological facts.

With regard to Sir Ramaswami Mudaliar's suggestion that the annual increase in the population of 1 per cent. is normal, I would ask him whether the present condition of nourishment of the people is satisfactory, and if so whether there will also be an increase in the production of food at the rate of 1 per cent. yearly? I do not refer to a potential increase in production, but to an actual increase; when we remember that the increase in population tends to be by geometrical progression, whereas the increase in production tends to be by arithmetical progression, my fear is that the breaking point must be reached sooner or later.

In conclusion, I thank those who have praised my paper, and I equally thank those who have criticised it, because one cannot have too much criticism.

THE CHAIRMAN said: We have all listened with very great interest to the lecture and to the discussion which followed. At this late hour of the evening I will not attempt to pronounce judgment between the different views expressed by different speakers. I will, however, with your permission attempt in the light of the discussion to sum up what I take to be the general sense of this meeting. I should say that, without committing themselves to any particular remedy, the majority would endorse Sir John Megaw's view that matters should not be allowed to drift and that the time has come for a scientific investigation of the subject. Beyond that, few of us would be prepared to go. I am sure you will all agree with me that Sir John has given us a masterly exposition of the subject. He has the scientist's scrupulous regard for truth and abhorrence of exaggeration. As Chairman, however, I am glad that he did not provoke the very heated controversy he seemed to advocate at the beginning of his lecture. As a result of his charm of manner or of the staid traditions of this learned Society, the temperature, I am happy to record, has never approached boiling point.

I will now ask you to accord a hearty vote of thanks to the lecturer for his excellent paper.

THE RT. HON. LORD AMULREE (Chairman of the Council), said: I have much pleasure in seconding the vote of thanks. It is obvious that Sir John Megaw has given much thought and study to the subject and his masterly analysis is very convincing. It has been the subject of much controversy and the speculations thereon have often fallen wide of the mark. This, doubtless, is largely due to the human

factor, which is always incalculable. The falling birth-rate throughout Western Europe is, to some of us, a matter of deep concern, and the situation in England is not one about which we can be over-happy. We are greatly indebted to Sir John for bringing this subject before the Society. He has given us much material for reflection.

I should also like to propose a vote of thanks to Sir Reginald Glancy, our Chairman. Sir Reginald has only recently been appointed Chairman of the India and Burma Section of the Society and this is the first meeting of the Section over which he has presided in this capacity. He brings to this important office a very varied and wide experience and we wish him a long and successful term as Chairman.

The following written communication has been received from SIR ALFRED CHATTERTON, C.I.E., F.C.G.I. :—

In view of the adverse criticism to which the British administration of India is subject in many parts of the world, and especially in India itself, there can be no doubt that Sir John Megaw's paper on " the pressure of population in India " is a very valuable preliminary examination of a problem, which, if not solved in time, may have very disastrous consequences. The contributions to the discussion from the Indian members of the audience emphasised the difficulties which will be experienced in devising remedial measures to reduce the natural rate of increase of nearly 400,000,000 people, protected in a large measure as they now are from the incidence of those factors which in the past have prevented an undue increase in the population. In the last century and a half, the number of people living in India has probably trebled, and all our efforts, by developing the resources of the country, to raise the standard of living in the rural areas have been frustrated by the fecundity of their inhabitants. It is still possible to introduce substantial improvements in agriculture, to extend further the area under irrigation and to find employment for more people in industry; but the experience of the past offers no hope that such measures will to any sensible extent alleviate the position. The population will go on increasing at probably an even greater rate than the augmentation of the food supply. The only solution of the problem lies in the adoption, by the people of India, of a new attitude towards life and the creation of an effective will to achieve a much better standard of living. This has long been recognised, and here and there valiant efforts have been made to bring about this result. It would seem that a very critical review of this work should be made and in so far as it is found to be based on sound lines and not upon the enthusiastic and altruistic labours of individuals, it should receive official support. Arrangements should be made to extend the field of operations till it covers the whole country. It would undoubtedly require the enlistment and training of tens of thousands of, in the main, honorary workers. The intelligentsia of India are seeking an outlet for their services. Here is one which will give full scope to their patriotic ardour and give them an opportunity to render service to their motherland.

Partly as propaganda and as a method of evoking interest in the subject of his paper, Sir John advocates that a Commission should be appointed to make a detailed investigation of the multifarious aspects of the threatened danger to the welfare of the people of India. But before such a Commission is appointed it would, I think, be desirable that official action should be taken to gather information. There are conflicting views on the imminence of the danger and still more on the efficacy of any remedies which have so far been suggested. There are features of

the problem common to all India, others which are of a Provincial nature. In some areas the monsoon seldom, if ever, fails, in others there is a large degree of protection due to extensive irrigation from unfailing sources of supply, whilst in others the irrigation is of a precarious nature and in the past they have been subject to frequent and severe famines. Obviously in each of these regions over-population presents very different problems. Again, as between Hindus and Moslems, there are likely to be serious differences of opinion on the subject of propaganda and the dissemination of ideas in any way running contrary to the generally accepted freedom from restraint of any kind in marital relations. The Provincial aspects will therefore be very important, and it would seem desirable that in each administrative unit a special officer, with the necessary qualifications, should in the first instance be appointed to review the situation in the light of existing information. Further, it might be of advantage if he were assisted by a local committee composed of men interested in the welfare of the people and each with special expert knowledge of some of the many factors which must be taken into account in proposing remedial measures. When these men have completed their surveys and are in a position to tender reliable evidence, it will be time for a commission to examine the results and if possible to frame a comprehensive policy. Sir John declined to discuss whether the economic standards of the people of India are higher or lower than they were fifty years ago, on the ground that the important matter was that they are far too low at present, and that they are not likely to improve unless a well-planned effort is made for their improvement. Some years ago I read a paper before the East India Association, on " India's progress and poverty," and in reply to the subsequent discussion, challenging what was termed my somewhat pessimistic outlook, I stated that, as the result of modern industrial enterprise, the improvement of agriculture and the spread of education, there were about 10 million people dependant on modern industries who were comparatively wealthy, and another 25 to 30 million people dependant on agriculture who were distinctly better off. Further, that from 20 to 25 per cent. of the total population had made great advances in their material condition, but that the remaining 75 per cent. had made little or no progress and that most of them were still living near the margin of subsistence. Sir John's estimate that about 60 per cent. of the rural population are poorly or badly nourished seems to come very close to my estimate. This is the basic fact that we have to deal with, and as it concerns roughly 200 million people it is a very staggering one.

THE NETHERLANDS EAST INDIES TO-DAY

In the article on " Holland To-day " no mention was made of the Netherlands East Indies. The budgets of the two countries are rigidly separated, and credit balances are no longer transferred from the colonial to the home exchequer, while in foreign trading policy the N.E.I. follow a course that is not necessarily identical with one based on the home country's domestic interests. There is, consequently, a justification for dealing with the N.E.I. separately. But the influence of the East Indies upon the position of the Netherlands people as a whole is so important that, without taking this factor into account, any survey of the Netherlands must remain incomplete.

Professor Neytzell de Wilde, the well-known Dutch colonial expert, recently estimated* that in 1929 at least 40,000 Hollanders gained their livelihood in the East

* *Asiatic Review*, Oct. 1938, p. 713.

Indies, and that in addition " thanks to the Indies, some 150,000 people, viz., one-tenth of all the Dutch workers, found regular employment in the Netherlands." This, however, by no means exhausts the full tale of those living in Holland who derive their means of livelihood from the connection with the East Indies. It is generally estimated that the total capital invested in the Indies in plantations and industries established there, and in railways, shipping companies, banks, insurance offices and trading concerns operating there wholly or in part, is in the neighbourhood of four thousand million guilders. About two-thirds of this has been supplied by Holland, and the remainder by other countries. By way of returns on this investment, and in the form of pensions to men and women settled in Holland, but payable by the N.E.I. Government or colonial companies, large sums find their way into Holland every year, the aggregate being, in prosperous times, not far short of fl.400 millions per annum. This sum should be added to the salaries and wages bill implicit in Professor Neytzell de Wilde's employment figures.

Furthermore the general prosperity and direct trade brought to Holland by N.E.I. activities has played, and still plays, an important part in building up and stabilising the business done in the home country by banking, shipping, warehousing, insurance and general transport and trading concerns. It also provides a far from negligible slice of Holland's investments in foreign countries. Without attempting to assess all these items specifically, it is safe to assert that but for the East Indian connection, the standard of living of the population of the Netherlands would be substantially lower than it is.

* * * * *

Without doubt the most momentous development in the N.E.I. during Queen Wilhelmina's reign was the final pacification of Acheh, after decades of desultory warfare, by General J. B. van Heutsz, energetically backed by *Jonkheer* Carel van der Wijck (who was Governor General from 1893 to 1899), and the establishment, first in Acheh, and then in all parts of the Outer Possessions, of effective Dutch authority; the latter mainly during Van Heutsz's own term as Governor General (1904–1909). On the military side the success was due, not to any expansion of the forces employed, but rather to more effective armament, more appropriate tactics, and above all else, to the re-creating of the fighting spirit among the troops, and a sense of self-confidence among their leaders and in the Government itself. On the administrative side the success was consolidated by introducing measures designed to enable the subjected populations to live peaceably and thrivingly on the basis of as much of their own customs and institutions as could be reconciled with European views of public morality and general decency. The erudition of Dr. C. Snouck Hurgronje, the Islamic expert, proved of paramount value on this side of the work. When it came to turning the theories and desires of Government into a solid body of administrative policy and practice, it was the present Prime Minister of Holland, then still Major H. Colijn, and Van Heutsz's right-hand man, whose vision and grasp of realities, made the outstanding contribution. On the solid foundations laid by him and his successors the economic and social development of the Archipelago with its sixty millions of people, varying in degree of civilisation from the highly cultured races of Java and Sumatra, to head-hunters and stone-age aborigines, was built up in a manner which aimed at reconciling the reasonable requirements of large-scale, capitalist European enterprise with the rights and needs of the indigenous populations. This dual concern led on the one hand to the perfection of the research organisation for large-scale agriculture, and the encouragement of the great plantations, and on the other hand to the establishment of a Department of Agriculture which studied and fostered by every possible means the production of crops

by the indigenous population on its own. In addition, increasing attention has been paid to the possibility of stimulating small native industries, and the village home crafts, as an adjunct to agricultural employment and a means towards greater self-sufficiency among the natives.

The practical utility of this far-sighted work was demonstrated when the world-wide slump of 1930 and the international tariff war which it stimulated, not only closed or crippled a large part of the normal markets for N.E.I. produce, but also brought world prices down to unknown depths. The sudden, severe and prolonged set-back in prosperity which this entailed, created extreme hardship on a wide scale among the European population which their power of resistance was hardly able to overcome. In so far as the native population relied on European enterprise it might have broken altogether under the strain, had not the Government's wise policy enabled it to re-adjust the basis of its existence by replacing the growing of high-grade export crops by that of foodstuffs intended for internal, even for local consumption. Even so, its severely reduced purchasing power might have depressed its standard of living much more, had not the N.E.I. Government not only tolerated, but at first actively encouraged, the importation of low-priced Japanese wares, even against the interests of Dutch manufacturers in the home country, and foreign manufacturers in other countries with which N.E.I. was anxious to remain on terms that would secure markets for its exports. The storm having now been mainly weathered, and natural forces being in operation again, the last two years show a drop in Japan's relative position, and the Government is able once again to foster reciprocal trade relations with both Holland and other Western countries on a basis more satisfactory to both sides.

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In this connexion it is important to note that although Great Britain's share in the markets of Insulinde is not so great as it could be, if British prices were more competitive compared to those of other exporting countries, the aggregate trade done between all parts of the British Empire and the N.E.I. is, among European countries, second only to that of Holland herself; and in several sections exceeds that of the Dutch home country.

Taking investments first, it is estimated that out of the total of fl.4,000 millions invested in N.E.I. enterprise about fl.1,200 to fl.1,300 millions are derived from countries other than Holland. Of this sum about fl.800 to fl.900 millions is British capital, making at present rates of exchange an aggregate of between £90 and £100 millions of British capital invested in N.E.I. Around £60 to £70 millions of this sum represent direct British investments in plantations, mining companies, oil concerns and other locally established companies. The remainder is made up—so far as one can get at the figures—of capital engaged by British firms or companies in trading with, or in, the East Indies, and in shipping, insurance, import and export trade and local branch establishments.

Exports from British Empire countries to N.E.I., in so far as they are shown as having been shipped direct from the countries of origin, grew recently from fl.41 million in 1935 to fl.65 millions last year; representing about 13 per cent. of the total imports into N.E.I. But the British entrepôt ports of Singapore, Penang and Hongkong do not specify the origin of the goods they ship to N.E.I., which, therefore, are entered under those ports only. These shipments include a major portion of goods that are either British-made or British-owned, and in almost all instances represent a British trading, shipping and insurance interest. The aggregate of fl.48 millions so shipped to N.E.I. last year therefore includes a further substantial direct British interest in N.E.I. markets.

In fact, in many instances British Empire countries occupy a preponderating place in these markets. Of 1½ million guilders which N.E.I. paid for its biscuits last year, Great Britain and Australia between them acquired nearly one million guilders. More than one-third of all the butter eaten in N.E.I., all but a fraction of the flour it consumes, three-fifths of its imported hams, and more than half of the fresh apples it eats, come from Australia. Canada leads in the supply of newsprint by shipping 27 per cent. of the total. Over two-thirds of all tinplates come from Wales, and British East Africa has the curious honour of providing for 2·5 out of 2·7 million guilders' worth of the cloves which the N.E.I. imported last year. After the war, and again more recently, the establishment by the Dutch of regular shipping lines between N.E.I. and (1) India and Burma, (2) Australia and New Zealand, and (3) East Africa, South Africa and Madagascar, have intensified the personal and trading connexions between the countries that fringe the Indian Ocean, and the tendency is for this mutual intercourse to grow. The exchange of Trade Commissioners between the Government of N.E.I. and those of Australia and South Africa is but one symptom in this new development, while there is no doubt that the centuries' old mutual trading relations between India and the Archipelago will likewise grow, as India develops a foreign trading policy of her own.

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This growing community of trading interests among the countries on the Indian Ocean is not without its counterpart in the sphere of defence. The incubus of potential foreign aggression which, under the cryptic initials of "B.V." (external enemy), began to intrude itself into the Dutch East Indian policy after the Sino-Japanese and the Russo-Japanese wars, has in recent years assumed a more pressing gravity. Nor does the vision perturb the East Indies alone. The position of these islands in regard to the British Empire in the East is similar to that which the Low Countries occupy opposite Great Britain. "Only more so," one might be tempted to add, ungrammatically, but with truth. This is not the place to develop the strategic and political implications of this statement. It may, however, be useful to quote some remarks recently made by a New Zealand writer who has specially studied the inter-relations between Australasia and N.E.I.*

> "It may be said," he writes, "that the interests of the East Indies and of Australia and New Zealand are identical. . . . They both face the same potential enemies. In one case a bold and militant European power has clamoured for the return of its former Pacific colonies, directly adjacent to the East Indies, Australia and New Zealand. In the other case, a bold and militant Oriental power has cast envious eyes and even said envious words about the great territorial possessions of the Indies and Australasia. . . . Fate has thrown the Dutch and the British together in the South Pacific, and increasingly effective collaboration between the two peoples should certainly be worked for."

Those who, from a long knowledge of Eastern developments, thoroughly agree with these views, will welcome the fact that in recent years learned societies in this country have afforded increasing opportunities to British and Dutch experts to discuss together Eastern problems of joint concern, and that in periodicals such as those from which I have quoted the English reading public can now regularly obtain first hand information on a sphere of activities which is steadily growing of greater importance to the British Empire as a whole.

JOHN DE LA VALETTE.

* "The Mutual Relations of the N.E.I. and Australia," by Donald Cowie. *Bulletin of the Colonial Institute of Amsterdam*, May, 1938, p. 219.

NOTES ON BOOKS

ART IN ENGLAND. By R. S. Lambert. DESIGN. By Anthony Bertram. Pelican Books. 6*d*. each.

The first of these two Pelican Books is a symposium selected and edited by R. S. Lambert which includes essays by Sir Kenneth Clark, Sir Reginald Blomfield, Mr. Clive Bell, Mr. Jack Beddington, Mr. Herbert Read and other experts. Most of these essays were contributed in the first instance to *The Listener*, and they form a valuable introduction to modern developments in art for the general reader. "Official art" is explained by the Secretary to the Royal Academy, but the experimentalists and revolutionaries have a fair show as well. Mr. Herbert Read draws attention to the importance of Miss Marion Richardson's methods of teaching art to children, emphasising that rhythm is her business. He also writes a provocative section with the uncompromising title "Why the English have no taste." But Mr. Beddington argues that a public which appreciates McKnight Kauffer and Edward Bowden is not so bad after all.

Mr. Bertram's new Hints on Household Taste (to quote the title of a Victorian book) is on the whole a satisfactory piece of work. "Good Design," he says, "is not a matter of wealth, much less of the chic, the latest thing. It is not a matter of novelty for the sake of novelty, but of the production of cities and houses and goods which will best satisfy the needs of the people ; their need of practical honest, cheap, lasting and beautiful things to use and see in their everyday lives." Justifiably intolerant of the average provincial town, its arrangement and its architecture, he naturally praises the Cardiff civic centre. The section on "Design in the House" is well-written, but the last part of the book, namely, "What is being done for Design ?" is almost valueless. Here the author simply does not know his facts. Both these books have excellent illustrations.

NICOLA PISANO : THE REVIVAL OF SCULPTURE IN ITALY. By G. H. and E. R. Crichton. Cambridge University Press. 15*s*.

The works of art for which our excessively prosperous Victorians were indirectly responsible evoke a mood of gentle melancholy in our modern breasts. It is comforting to remember that maritime supremacy and commercial enterprise have not always had such an unfortunate influence on art. One thinks, for instance, of the city of Pisa, a great power in northern Italy during the eleventh and twelfth centuries. Her ships traded everywhere in the Mediterranean and beyond ; her citizens grew fat and wealthy, at home and abroad. Not for another two hundred years was Pisa doomed to fall into the maw of Florence.

About 1250, there came to the city the sculptor we know as Nicola Pisano. New ideas were in the air. The rigid fetters imposed on the Arts by the Church were clearly slackening. In the local sculpture, Nicola found vigorous offshoots of the Roman, Gothic, Byzantine and Lombardian schools. He also found the prosperous Pisans ready to spend money on works of art. Everything favoured the development of his own original talent and the exciting ideas he had absorbed from the South.

Nicola was great enough to take advantage of the situation. By 1260 he had completed the pulpit in the Baptistery at Pisa. The authors of this book call it "the beginning of the renaissance of sculpture in Italy." A somewhat generous tribute, but with much to commend it. Nicola's new treatment of space, groupings and drapery, his individualization of each sculptured figure, undoubtedly helped to make Michelangelo's achievements possible.

The 114 pages of text in this little book contain a remarkable amount of information. Apart from three or four facts which are unnecessarily repeated, the book is written with admirable conciseness, lucidity and authoritativeness.

After outlining the important economic and political conditions under which Nicola lived, the authors trace the sculptural influences on his style—the Byzantine ivories and bronze doors, the sarcophagi of Roman date, the Lombardian lion-supports, French mannerisms, etc. They follow this with a detailed examination of Nicola's three major works—the hexagonal pulpit in the Baptistery at Pisa, the octagonal pulpit in the Duomo of Siena, and the polygonal fountain at Perugia. (Though it is probable that much of the fountain came from the hands of Giovanni, Nicola's son). The authors state modestly that they have approached Nicola's work "from the descriptive and iconographical point of view rather than that of art criticism." Extensive references to analogous structures make their examination much more than mere straightforward description. There are seventy-nine very clear illustrations.

A chapter on doubtful works, a careful survey of the evidence assembled by Vasari and Venturi, and a bibliography round off a book which is essential to all those who would know something of the real beginnings of Italian sculpture, but who cannot bring themselves to study the Italian, French and German works on Nicola Pisano.

For those who take delight in watching distinguished scholars arguing over what are relatively unimportant problems, there is an amusing appendix on the origins of Nicola. When was he born? When did he die? Where did he come from? What of his early life? Nobody knows. Vasari gives the most detailed account—and possibly the most dubious.

R. H. HILBORNE.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK

MONDAY, DECEMBER 19..Automobile Engineers, Institution of, at the Rolls-Royce Canteen, **Derby.** 7.30 p.m. F. R. Banks, "**Valves and Valve-Seat Technique for Automobile and Aero-Engines.**"

At 39 Elmbank Crescent, **Glasgow.** 7.45 p.m. J. Shearman, "**Commercial Motor Vehicles for Short Mileage Work: their Design and Maintenance.**"

British Museum (Natural History), at the Imperial College, Exhibition Road, S.W. 5.30 p.m. Dr. F. Walker, "**The Evolution of Scenery.**" (Lecture X).

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. Discussion on "**Poynting's Law and the Transmission of Energy.**" Opened by Prof. Dr. W. M. Thornton.

Geographical Society, Royal, Kensington Gore, S.W. 5.30 p.m. Dr. J. H. Furbay, "**Monrovia and the Hinterland of Siberia.**"

Illuminating Engineering Society, at 2 Savoy Hill, W.C. 7 p.m. T. E. Catten, "**Light in Relation to Production.**"

TUESDAY, DECEMBER 20..Eugenics Society, at the Royal Society, Burlington House, W. 5.15 p.m. R. S. Walshaw, "**External Migration.**"

Metals, Institute of, at **Scotland.** A. B. Graham, "**Developments in Alloy Sections and Tubes for Marine Engineering.**"

Physical Society, at the Imperial College of Science and Technology, South Kensington, S.W. 5.15 p.m. Dr. I. Langmuir, "**The Structure of Proteins.**"

Statistical Society, Royal, at the Royal Society of Arts. 5.15 p.m. M. G. Kendall, "**The Geographical Distribution of Crop Productivity in England.**"

WEDNESDAY, DECEMBER 21..British Museum (Natural History), at the Imperial College, Exhibition Road, S.W. 5.30 p.m. Dr. F. Walker, "**The Evolution of Scenery.**" (Lecture XI).

Geological Society, Burlington House, W. 5.30 p.m. Prof. Dr. H. L. Hawkins, "**The Geological Structure of the Kingsclere Pericline. Part I. The Eocene Succession between Kingsclere and Ecchinswell.**"

FRIDAY, DECEMBER 23..British Museum (Natural History), at the Imperial College, Exhibition Road, S.W. 5.30 p.m. Dr. F. Walker, "**The Evolution of Scenery.**" (Lecture XII).

Engineers, Institution of, 39 Victoria Street, S.W. 7.30 p.m. G. L. E. Metz, "**Electro-Magnetic Ship Couplings for Use with Geared Diesel Engines for Ship Propulsion.**"

EXHIBITIONS DURING THE ENSUING WEEK

MONDAY, DECEMBER 19..(TO JANUARY 2) **Century of Canadian Art Exhibition,** Tate Gallery, S.W.

(TO DECEMBER 31) **Woven and Printed Furnishing Textiles Exhibition,** Victoria and Albert Museum, South Kensington, S.W.

SOME CANTOR AND OTHER LECTURES

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The Growth of Plants in Relation to Cultivation. Three Lectures. By M. A. H. TINCKER, M.A., D.Sc. (1938). Price 2s. 6d.

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London: Printed by GEO. BARBER & SON LTD., 23 Furnival Street, E.C.4, and published for the ROYAL SOCIETY OF ARTS by G. BELL & SONS, LTD., York House, Portugal Street, W.C.2, in the Parish of St. Clement Danes, in the City of Westminster, 16 December, 1938. Registered as a Newspaper.