THE FALLING BIRTH RATE.*

I.—THE BIOLOGICAL ASPECT.

BY

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THE birth rate of this country has fallen and is still falling. That this is so is a matter of very grave concern to those who choose to envisage the overwhelming of our prized culture by hordes of barbarians of this or of that particular hue, but all equally and amazingly fertile. To the biologist, however, there is nothing remarkable and nothing necessarily ominous in this decline. Had the conclusions which have emerged from the work of Pearl and his associates, and of Elton and others, been known at the time when the birth rate was soaring this present fall would have been foreseen and accurately predicted. To the biologist a falling birth rate is nothing but the sign of the approaching end, not of a people or of a culture, but merely of a population growth-cycle.

All living things, be they pumpkins or peoples, exhibit in common the quality of growth. The growth of every living thing—an individual animal or plant; unicellular or multicellular; a congregation of cells or of multicellular individuals—follows the same scientific law. In the absence of appropriate external conditions there is no growth. Growth, due to the production of new living material or of new individuals, is encouraged, permitted, embarrassed, or prevented by conditions incident to development. The beginning of an individual, or of a congregation of living units, is small, but, in virtue of this inherent developmental impulse to grow, increase in size of the whole, and in size and number of its component parts, occurs.

The law of population growth, as enunciated by Pearl, states that the population at first grows slowly but gains impetus as it proceeds, passing gradually into a stage of rapid growth, which finally reaches a maximum rapidity; and that after this stage of most rapid growth is passed the population increases ever more and more slowly until, finally, there is no more perceptible growth at all. Such is the history of a single population growth-cycle. Stated somewhat differently, the law postulates that, within one and the same cycle and in a spatially limited area, growth in the first half of the cycle starts slowly, but the actual increment per unit of time increases steadily until the mid-point of the cycle is reached. After that point the increment per unit of time becomes steadily smaller until the end of the cycle. In a spatially limited area the amount of increase which occurs in any particular unit of time at any part of the single cycle of growth is proportional to (a) the absolute size already attained at the beginning of the unit interval under consideration, and (b) the amount of unused or unexpended actual and potential resources for the support of growth in the given area. (In the case of human populations (b) includes such things as the amount of agricultural land still untitled or imperfectly cultivated, and new discoveries relating to production, manufacture, and distribution).

If the birth rate of a population living in a spatially limited area remained constantly higher than the death rate, growth would continue according to an exponential curve to infinity, and no pause, and no fall, would be discernible. The result would be an ever-increasing density of population, leading ultimately to complete saturation. If, at the same time, the increase in available food did not parallel the increase in the needs for it, there would be ever-increasing insufficiency, leading ultimately to famine. The problems of increasing density and deficient food supply could be solved temporarily, and from time to time, by migration into less favourable regions, and by modifying the dietary. But it may be assumed that to both of these expediences there must be limits, and that ultimately, if harmony between container and contents is to be preserved or restored, the population must needs become stationary or reduced. The quart in the pint pot

must overflow, and a part be spilt and lost. This reduction in population could be achieved by removing the surplus or by reducing the rate of growth.

The first method of population reduction is the catastrophic, and is exemplified by the work of Elton on wild rabbit, field mouse, and lemming populations, and of McKendrick on human populations. It would seem to be the case that as soon as population density reaches a certain level, epidemics, which otherwise would fade out, race through the whole population. The establishment of a harmonious relation between the density of a population and the habitat, by the removal by death of a proportion of the individuals, is to be observed in the case of the litters of polytocous mammals. Corner, Hammond, and others have shown that in the pig, for example, there is a considerable reduction in the number of the embryos resulting from conception, and an orderly spacing of those that remain, the actual size of the litter being determined in great part by the abundance and quality of the food supply. The instruments that play their parts in this catastrophic increasing of the death rate are war, pestilence, and famine.

The second method, that of reducing the birth rate, is revealed in the work of Pearl on *Drosophila*, where the primary cause limiting population growth is a fall of fecundity and fertility with increasing density. In this it is seen that the process is relatively gentle and orderly. It would seem that the conditions incident to overcrowding provoke a reaction on the part of the living organism, which takes the form of a depressed fecundity. In the case of the mouse, it is the male which first reacts in this way to overcrowding. In the case of human populations this passive response to environmental discomfort can be replaced by a deliberate and conscious control of the reproductive rate (birth control). The end-result in all cases is the same; the rate of population growth is checked. It is for human societies to compare the different methods and to decide which shall operate—the catastrophic or the orderly, the overwhelming or the controlled. Is it not the case that if there is food scarcity and overcrowding in a spatially limited area then, by this method or by that, there follows a reduction in the population, and a re-establishment of the harmony that must exist between the life-supporting capacity of the area and the sum of the living? It may be that mankind can adapt itself so that it will be able to flourish in circumstances which now are impossible. For the present, however, a generous amount and quality of food, and a certain amount of elbow-room, are prerequisites to normal development.

Mankind can not only adapt itself to a changing environment, but can also modify the conditions of its habitat. Every advance in the application of knowledge which amplifies man's power to derive more fully from his physical environment things conducive to his material welfare increases the potentialities for population growth in a given area. Any discovery relating to the production, manufacture, or distribution of food may quickly be followed by changes in habits, and then either the upper limiting value of the population attainable in the cycle of growth then current is moved up, or else a new cycle of growth starts from a base line of the population already attained at the end of the previous cycle. That which an implant of anterior pituitary can do for the individual, industrialism can do for an agricultural population.

A rising birth rate heralds an extension of the conquest by man over his environment or over himself; a falling birth rate is an indication that mankind in a particular area is temporarily or permanently imprisoned. Man, like certain other animals, does not breed freely in captivity, even though this is picturesque and apparently comfortable.

The birth rate is falling now because this is the end of a population growth-cycle, and it will not rise again until those factors which are at present overriding the inherent tendency to increase are recognized and removed. When this has been done a new growth-cycle will be initiated and the birth rate will rise.

Most of these factors are, without doubt, social and economic, but, whatever they may be, they must produce

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their effects because they condition the action of the forces of natality, mortality, and migration. The birth rate is the reflection of the operation of those agencies which raise or reduce fecundity, render fertilization more or less sure, and which do not, or do, interfere with the development of the products of conception.

Fecundity, the power of elaborating functional gametes, is affected by inborn and environmental factors which determine: (1) the number of ova available for fertilization; (2) the frequency of ovulation; (3) the functional ability of the gametes.

Fertilization, the fusion of the gametes to form the zygote, is influenced by inborn and environmental factors which affect: (1) sexual congress; (2) the actual union of ovum and sperm.

Pregnancy is influenced by inborn and environmental factors which affect the processes of development of the embryo and foetus.

Difficult as it is to disentangle the environmental factors, which profoundly influence the reproductive functioning of the individual, from the inborn, an effort to do this must be made, even though the result may be useful only in serving to emphasize the depth of our present ignorance and the urgency of the need for ardent experimentation. Much of what is known has emerged from the study of experimental material other than man, and this fact must be remembered in any discussion concerning human populations. It is not safe to transfer, by simple inference, conclusions derived from the study of less complex forms to the case of man; it has to be shown that that which holds for one form holds also for another. Moreover, even though the same phenomena are presented by two different forms, it does not necessarily follow that the causes have been the same in the two cases. But natality and mortality are not the peculiar possessions of humanity, and, therefore, it is highly possible that the conclusions reached in experimentations with mice, for example, may at least suggest lines of profitable inquiry into problems of human population.

Biological inquiry in the past has concerned itself mainly with problems that relate to the individual; the group has seldom been studied. It is established, however, that a congregation of individuals is biologically different from the sum total of the individuals comprising it; the whole in the organic world is something more than the sum of the parts. An intimate knowledge of a great number of individual bees could not explain the hive; a thorough understanding of the biology of the individual human subject does not comprehend the State with qualities and attributes peculiar to itself. But at long last the science of group-biology has come into being, and its contributions, though as yet but few, are important in themselves, and in that they point the way to a clearer understanding of the work that must be done before policies can be soundly based and brought into harmony with established biological fact.

The ability of a pair to beget offspring is conditioned by the ability of the individuals concerned to elaborate functional gametes. Though fecundity is influenced very directly by environmental agencies, including food (vitamins B and E, for example), yet it can be demonstrated that different races, stocks, and individuals are to be distinguished one from the other by true-breeding differences in fecundity. In the human subject the tendency to multiple births is faithfully transmitted through both male and female. This being the case, it follows that the birth rate of a population is affected by the proportion of "multiple birth" stocks present in that population. The King's Bounty is one method of making this true-breeding character socially worthy; the jokes of the music-hall are but modern versions of older taboos.

The reproductive rate of a pair, or of a community, is controlled by the frequency of the opportunities for effective fertilization. In a general way it may be accepted that the frequency of menstruation is an indication of the frequency of ovulation. Thus the reproductive rate is proportionately higher in those races, stocks, and families in which puberty is attained relatively early, menstruation is more frequent, the climacteric later, and the length of life greater. The relative time of onset of puberty is a true-

breeding character, so also are the relative time of onset of the climacteric, and longevity. It is possible that in the past the inherently longer-lived contributed disproportionately to the population, since the others were wiped out more quickly, and therefore had but few offspring, and that under modern conditions the latter live longer and transmit to their progeny this lowered fecundity. This would be a reasonable explanation of a lowered birth rate if it could be shown that there exists a high correlation between longevity and high reproductive rate. The frequency and intensity of menstruation, like all the other phenomena, are largely conditioned by environmental agencies, but, when all due allowances have been made for these, it still remains a fact that race can be distinguished from race, and stock from stock, by differences that are faithfully transmitted. In certain human females the *mittelschmerz*, the interval pain, may possibly be an indication of a secondary menstrual rhythm superimposed upon the main one, and it may be that such females ovulate more frequently.

Since the population has increased disproportionately to the accommodation and food supply, this country is now relatively overcrowded. There is a fundamental law by which the growth of a population is regulated by its own density. When the density reaches a certain point the death rate rises and the birth rate falls. Density applies not only to a country but also to its apartments. Lack of houses is an indication of a relative regional overpopulation; if, and when, the builders fail to keep pace with the babies, the birth rate will fall. The present housing shortage not only affects the birth rate indirectly through the marriage rate, but also directly through increasing density. How density provokes its results is not known, but the work of Pitt-Rivers perhaps suggests that sheer discouragement is enough to destroy a people. In the case of the vanishing peoples of the South Seas observed by him, coitus occurs, and there is no attempted contraception, yet the birth rate is steadily falling. The clash of cultures has made these peoples discontented and discouraged, and they are dying out. They cannot, or will not, adapt themselves to changing circumstances, and, therefore, they must perish.

There must be joyousness, eagerness, roominess for potential parents, or else the babies will not come. The birds when they mate build nests, but for human lovers the tenement is built by those who are ignorant of the relation that exists between population density and reproductive rate. The birth rate is falling because among other things this country is not fit for parents to live in; we await the coming of a new discovery, scientific or political, that will raise the level of the optimum density endured by mankind or increase and further democratize material prosperity.

The opportunities for fertilization are determined by the proportion of women of fertile age in the population, by the proportion of these who are married, and by the fertility of the marriages. The nature of the sex-ratio, the system of marriage, and the sexually selective catastrophic death rate of the late war condemn a great number of women to permanent yet undesired virginity. The sex-ratio cannot as yet be controlled. This is not the occasion for a discussion on the biological aspects of the prevailing marriage system, and the effects of the war are too manifest to require argument; but the fact that many women cannot become mothers cannot explain the falling birth rate. A high marriage rate associated with a low per-reproductive-woman birth rate can yield the same reproductive rate as can a low marriage rate associated with a high per-reproductive-married-woman birth rate. It would seem that in an inelastic habitat many marriages mean small families, whereas few marriages mean larger families. It is indeed probable that there is an inverse correlation between marriage rate and birth rate per reproductive married women. Again, the controlling factor would seem to be density. Few marriages and larger families may yield a high reproductive rate, but it may be expected that among the offspring of relatively few couples there will be less variety, and variety surely is to be desired.

There can be no doubt that the present low birth rate is in part due to the incidence of sterile marriages. In certain cases it would seem that the ovum and the sperm

are as mutually antagonistic physico-chemically as are the blood serum and corpuscles of individuals belonging to different blood groups. There is no doubt that two individuals, mutually sterile, can yet be fruitful in other matings. But even the presence of mutually sterile couples in the population cannot account for the fact that the number of children per mutually fertile couple has also fallen. Perhaps the social and economic developments during recent times have permitted, or even encouraged, the survival of stocks which were, and are, relatively infecund, or which react more readily to the disharmonies attendant upon industrialism.

The peak of sexual activity, as established by the frequency of sexual intercourse, is about 29 in the male, while a woman's reproductive power drops sharply after 30. It follows, therefore, that those who marry late tend to have fewer children. The relatively and highly fertile are such as reach full earning power early, and marry at a younger age. Prosperity implies plentiful food and comforts, and an adequate medical service and, therefore, a lowered death rate and a rising birth rate. But if such prosperity is associated with an unequal distribution there will be a differential fertility among the social grades created by this prosperity. Possibly Bernard Shaw's scheme of equal distribution would be followed by an equalized fertility rate throughout the community. If a large section of the community which is, socially, relatively unsuccessful, though by no means necessarily relatively unsound in the biological sense, is left with no other mode of nervous release save that which excessive drinking and sexual over-indulgence can give, then there will be a higher reproductive rate among these than among the community as a whole. Social advancement implies a lowered reproductive rate, for the reason that those who can, and do, advance socially are presented with a greater variety of modes of self-expression and of self-indulgence.

In one sense children are commodities subject to the law of supply and demand. There was a time when children could be regarded as commercial assets, but the Factory Acts have greatly depreciated their value as wage earners. One could assume that in these days, when it would seem that everyone must be acquainted with methods of preventing fertilization, only those children are born whose coming is desired. Is not the fall in the birth rate due, in the main, to the spread of a deliberate and conscious limitation of fertility? It is undoubtedly the case that among the middle and upper social classes contraception is widely attempted. This being so, the conclusion that these methods attain the end desired by those who employ them is inherently probable. But, unless it can be shown beyond all reasonable doubt that the methods employed are actually effectual, it cannot be accepted that birth control is largely responsible for the fall in the birth rate. It certainly has affected the marriage rate, in that a faith in contraceptive methods has caused this to rise. But such records as there are certainly seem to show that this faith is too often misplaced. Of course, birth control has undoubtedly prevented the birth of a great many individual babies, and it is probable that many of the methods now in vogue lead indirectly to later and permanent infecundity. But it is very doubtful indeed if birth control has affected the population growth-cycle—the crude birth rate. The fall in the birth rate has been too gentle; it has proceeded with evolutionary steadiness, and it has been universal. It would seem, therefore, that the fall must be the expression of some biological factors, and not due directly to some local social disturbance which produced repercussions throughout the world. Birth control, like migration, does not put waves into the curve of growth of a population already of a certain absolute size; it merely alters a population by altering the proportions of the different sections. It can be argued that the same total number of babies have been born as would have been born had birth control not been heard of; birth control has played its part no doubt, but may it not be that all that it has done has been to slam the doors of suburban houses and to open those of a slum? It would seem to be the case that conscious and deliberate limitation of fertility has been, and is, practised mainly by the

socially relatively successful—that is, by the inherently relatively infecund. If this is so, then it has prevented fewer conceptions than it would have done had it been employed by the socially relatively unsuccessful. The problem thus becomes that of determining the relative biological worthiness of the social grades. Is the present social structure one that encourages and rewards biological worthiness? And what is fitness? There is no reason to assume that, whatever this may be, it is linked with high-grade fecundity. The elephant is fit, and so also is the earwig, yet their reproductive rates are mightily different. Is the standard for humanity to be good physique, good brain, and low-grade fecundity? If so, then the ideal can be found abundantly among all social grades.

The suggestion that the relatively unfit are more abundant among the socially submerged is not necessarily true, for it must not be forgotten that it is far easier for a good man to climb out of the gutter than for a socially and biologically unworthy scion of an established family to descend to its depths. Many are those who float gaily in the mid-stream of social life, buoyed up, not by their own intrinsic worth, but by the efforts of their more worthy associates.

However, even though birth control may not have played any considerable part in the production of this fall in the birth rate, it would have been well for humanity had it been the only responsible agent, used intelligently by a people who knew what they did, and why they did it. All other methods are imposed upon a people; this is one that may deliberately and consciously be employed by a State to achieve harmony whilst new discoveries are awaited. At the present time it would seem that most, if not all, methods of birth control are too uncertain to allow any policy to be based upon their employment. A real control of fecundity and of fertility must soon be achieved if man, the rebel, is to consolidate the gains that he has won from Nature.

The course of pregnancy and parturition is affected by factors which disturb the harmonious and parallel development of the maternal organisms on the one hand and of the foetus on the other. It is not improbable that, if the rate of the development of the pregnant uterus becomes out of tune with the rate of development of the foetus, abortion results. Sex-linked lethal factors can operate in this way, as can also genetic disharmonies in the time or rate of functioning of the endocrine glands. The birth rate of that race or stock in which such genetic factors exist must necessarily be affected.

Such, then, is my contribution to this discussion. I have tried to be provocative; I have incautiously stepped from the solid ground of fact to the uncertain terrain of opinion, but on my opinions I set no great store; none of them are precious to me. I trust that I have faithfully performed the duty that I undertook, that of exciting you to rob me of my point of view. I shall not mind if, in exchange, I get a better.

II.—THE ECONOMIC ASPECT.

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THERE has been a period in which certain propositions concerning population were widely considered to rank as well-established and most important theorems of economic science, and an economist who did not profess or accept them would at least be expected to discuss them and to give his reasons for rejecting them. Malthus, the propounder of these laws of population, as they were sometimes called, was believed to have enormously increased the range of historical facts which the economist could explain, and to have indicated and established conditions of human social life on earth which no economic thinker, who was not satisfied with building castles in the air, could long afford to ignore. It is well known that Malthus's treatment of population, which secured the assent of a long-continued tradition among the political economists of

many nations, also acquired a wider biological significance through suggesting to Charles Darwin certain lines of inquiry into the variation of species. Some of Malthus's main contentions appear to have been, in fact, biological propositions and not propositions to which economic inquiry, in any proper or limited sense, would have led him. This is assuredly of no importance in comparison with the truth of the contentions themselves; and I mention it here only because I shall presently have occasion to distinguish between propositions which are themselves economic and propositions which, however much they may concern the economist to take account of them, are not established by any method or inquiry which belongs specifically to economic science.

Economists continue to discuss the question of population, and most of the comprehensive treatises will be found to contain considerable sections devoted to this discussion. Recent inquiry by economists and sociologists into the theory of population is much more critical and tentative than the argument found, for example, in Mill's *Principles of Political Economy*, a work which I mention especially because it was one of the last general treatises published in this country to present the old doctrine of population in a readable and overwhelmingly persuasive form. I cannot claim that the science of economics now offers an orthodox or generally accepted doctrine of population, with the suggestion that the intelligent student can, once he has understood it, set about "applying" it with confidence to the actual situations which confront him. What can be claimed on behalf of our contemporaries is that they have access to a much wider range of facts than their predecessors, who so confidently propounded a law of population; that, in particular, statistical data are much ampler and statistical methods much more refined, and that economists and kindred inquirers are apt to discuss the problems of population responsibly, and in view of important social issues. But a simple and definite theory, or law of population no longer holds the field.

"Restriction of births" occupied a prominent place in the presentation of the older theories, and the notion has accordingly been familiar to economists since the first publication of Malthus's work. His fundamental proposition was that the population tended naturally, by the birth of new members, to press against the limits of subsistence or of food. The excessive population necessarily perished, though not in all cases directly of starvation: misery, pestilence, war, and other such "positive checks" diminished the number of the population, and thus anticipated the work of starvation, selecting, we may notice, victims who would not necessarily all have died of starvation, but, at all events, giving a better chance of livelihood to the survivors. The operation of such causes as starvation, war, and pestilence in reducing the population might, it was argued, be replaced, with great advantage to human well-being, by prudential checks on multiplication, as, for example, later marriage, marriage only when future livelihood was assured, and so on. The artificial prevention of conception was advocated by later writers and agitators as a suitable prudential check, but often guardedly, and subject to social censure and handicap which have notoriously, within our lifetime, shown a strong tendency to diminish.

I do not find Malthus's reasoning cogent or impressive, and hope that I shall not be accused of misrepresenting it in the above brief summary. What will not, I think, be disputed is that Malthus's doctrine was advanced by him and used by its later adherents as a doctrine of political or social economy, and only incidentally or occasionally as embodying sound counsel for the ease and security of particular families. The social problem was thought to consist in the disproportion between the numerical increase of a group—a national or political group, for example, or the whole of a group within which regular commerce prevailed; and so possibly, if intercommunication became sufficiently penetrating and prevalent, between the increase of the whole human race—and the resources available for its physical maintenance; not in the mere inconvenience which adventurous or unfortunate parents might fear or encounter in trying to rear a large family. If members of such families grew up and prospered at the expense,

as might sometimes happen, of the less vigorous or less fortunate children of more prudent parents, the liberal political economy of the nineteenth century was not equipped with any argument against the desirability of such competition.

The decline in the reputation of the old doctrine of population, and, less directly, of other economic doctrines connected with it, is often declared, and I think rightly, to be related causally to the actual adoption in many countries, including our own, on a large scale, of the practice of prudential restraint—in the form not mainly, or to any extent relatively important, of the deferring of marriage to a late age, but of the express and deliberate limitation of the number of children born to parents capable of producing them. Statistical data concerning numbers of children born, the age and sex distribution of the population, and other facts which are relevant exist for our own and for many other countries; though no one contends that the statistics are perfectly accurate, no informed person would, I suppose, contend, either, that they are completely worthless and misleading. The official statistical data naturally throw no light on the means by which the reduction of the number of births is secured within the marital relation, and we are compelled here to have recourse to other sources of information which are in their way ample and obvious to those who care to attend to them, but not, like the figures published by governing authorities, precise and statistical.

A fairly persistent decline in the birth rate is shown in the public statistics of this country during the last fifty years, and, roughly speaking, during the same period the same tendency is shown in the statistics of other countries of Western civilization. The phenomenon appeared considerably earlier in France and in certain sections of the population of the United States of America, and there are other variations also which would prevent us from insisting upon the seventies of the last century as a critical period for the natural increase of the population of these areas. It is noteworthy, also, that a diminution in the death rate has been, generally speaking, a characteristic of the same period, and that the statistics of births and deaths, taken together, have not in most countries given rise to lively apprehensions of a net diminution of population or even of a future failure of the population to increase. Such apprehensions have found expression in respect of the French population, and in the United States in respect of the relatively native or settled population, as opposed to the recent immigrants. American statistics are said to be manifoldly imperfect, but they enable conclusions to be drawn as to the rate of reproduction of various classes of the population; and they show, for example, that relatively more children are born to unassimilated immigrants than to the pure Americans. That the rate of increase may be "differential" as between different classes of the population is a matter to which importance is naturally, though not in all cases very reasonably, attached. We must return presently to this subject, noting for the moment that the population of a particular area may be recruited and increased by immigration, and, of course, diminished by emigration, that such movements have taken place in recent periods on an enormous scale, and that they have occasioned political and economic changes of the first magnitude.

The British statistics yield, indirectly at least, much information to the effect that the decline in the birth rate is "differential" also in our community, and more especially that birth control prevails more widely among the relatively better situated. Other sources of information are accessible here also, and it may be treated as notorious that the restriction of births is not confined to the well-to-do, and that large families, and especially large families of undesired young children, are to be found mainly among the poor. Mortality in early years and shorter life might be expected to be more frequent in this class also, and those who fear for the parentage and upbringing of the future adult population of this country are properly reminded of this connexion between high birth rates and high death rates. An observation which may frequently be made does not, however, lose

its impressiveness through the consideration just mentioned; a married couple, for example, admirably equipped according to the prevailing standards for the decent upbringing of children, rears to maturity two children or only one or none. In the first case the couple is, to use the common phrase, just "reproducing itself" if its children reach maturity, and it is not even doing this in the two other cases. If we think of such parents as a class of eminently good citizens—apart from the possible dereliction of duty in this respect—and of conduct like theirs as prevalent in the class which possesses the like eminence, we may be led to feel alarm at the prospect of the failure of the "best" elements of the community to reproduce themselves.

It is not surprising to find that the propagation of children can be urged as a duty towards a social group or members of that group, as I think we may see at once by attending to the following sentences from Sir Arthur Newsholme's work on *The Declining Birth Rate* (1911): "It cannot be regarded as a matter of indifference whether the unfilled portions of the world shall be peopled by Eastern races (Chinese, Japanese, Hindoos, etc.), by negroes, by Slavonic or other Eastern European peoples, by the Latin races, or by the races of Northern Europe. . . . Every Briton will wish that his race may have a preponderant share in shaping the future destinies of mankind" (pp. 57 and 58). Whether we have in these sentences moral and social teaching which will bear rigorous philosophical examination or not, no one will question the assertion that these and similar statements would command a general and spontaneous assent among members of the groups to which the appeal implied in them is made. The average Briton is, I suppose, ready at once to prefer that persons of his race should enjoy in the present and the future such and such kinds of preponderance, and to do so not merely with an unoffended, but with an approving, conscience. His group reactions towards other "races" are notoriously more fluctuating. We can readily imagine also a preference, more or less deliberate and more or less vehement, similarly manifested at the prospect of a particular country being peopled by the adherents of this or that religion; and the larger families of Roman Catholics, for example—not unconnected apparently with the attitude of the Roman Catholic Church towards birth control—have already excited apprehensions and hopes in certain communities of the effects on future public policy; the prevalence of mass numerical and disciplined voting obviously gives a certain definiteness to these apprehensions. I have referred already to certain fears which have been expressed concerning the relatively small number of children which are now being reared in middle-class surroundings and traditions. It is not perhaps so well known that opposition has also appeared in some labour or socialist circles to the propagation of birth control among the working classes, on the ground that the future voting and political and industrial "fighting" force of labour would be thus diminished.

It would obviously be rash to argue directly from the general assent, which statements of the kind just quoted would command, to the future conduct in their personal and private relations of the persons assenting; and it is important here to keep in view the possibility of mass effects on the conduct of large groups rather than effects in isolated instances. The average individual is not apt, I suspect, to pass immediately from his general preferences for the social and political future to any shouldering of a share—which to him, personally, is heavy, but may turn out to be insignificant in the mass—of the costs of bringing about such a result; accordance with his other inclinations and interests, persistent group pressure and example, and like causes may sometimes come to the aid of such ideal and remote aspirations.

That discussion of changes in the number and distribution of the population is often strongly affected by class interest and bias is obvious to all who are acquainted with it, and this view has been strengthened, I hope, by the preceding sections of this paper. Scientific, and more especially economic, discussion of the subject should, it might be claimed, be unbiased and disinterested, and should address

itself to establishing and exhibiting general relations between the changes of population and the conditions of subsistence and prosperity. The old law of population offered such a statement of general relations in terms of natural phenomena, distinguishing, indeed, between the successful and the unsuccessful competitors for food and existence, but containing no suggestion that the division of population into hostile groups was anything but an incidental result of its excessive number. The unprosperous were broadly and simply the numerical excess of mouths for which Nature, even when subjected to the utmost pressure from the available labour, did not provide. Economic writers who accepted this law of population did indeed occupy themselves largely with the conflicts of groups, the supposed errors of Governments, and other such matters; but they did so with this apparently simple and austere law in the background, beside which the group conflicts of actual social life could, at any moment, be made to appear theoretically insignificant results. Modern economists, as I have pointed out, are not even vaguely agreed on any simple doctrine of population which could perform the debating functions of the older one. Many of them would, however, recognize the scientific importance of the notion of the "social class"—that is, of groups of persons similarly situated in respect of their modes and opportunities of livelihood, and distinguished thereby from groups which differ in this respect. Obvious and notable differences, constitutive of social classes, arise out of what we must be content to call generally the distribution of property or of "capital." Much more is involved in this distribution than the mere distribution during limited periods of the actual products of industry. The quantity of the products created and made available, and expected to be created and made available, also depends upon it.

From this point of view it becomes necessary in discussing the actual growth of population in the areas with which we are concerned to take account of the political and social divisions which prevail in them and to seek to discover how they affect the conditions of the problem. We cannot pass directly from propositions concerning the generosity with which Nature produces human beings, and the niggardliness with which she produces the things which they happen to need for their subsistence, to the actual problems of a society which obviously does not enjoy the use of more than a small fraction of the resources available to it for its sustenance and comfort. It is true also that we cannot learn in a few lessons to perform marvels of explanation by using the notion of the class war and of the catastrophe to which it is inevitably leading us.

It must be remembered, too, that our existing social institutions and situations are not ultimate facts, however important it may be to understand them, but are only a stage in the development of processes economic and non-economic. We can properly contrast them with such ideal constructions as we are able to conceive theoretically and to approve morally as reasonable and just. In doing this we may derive confidence from the reflection that our thoughts and aspirations have a claim to be considered as parts of the process which I have just mentioned.

I must now summarize briefly what I think a representative of economic science finds himself in a position to say on this aspect of the problem of population, and I must first show what I conceive to be, and not to be, the proper and peculiar object of economic inquiry. Economics deals specifically with a certain aspect of the conduct of men as members of social groups—that is, with such of their deliberate and not merely impulsive acts as are directed to the non-violent, and in this sense peaceful, but onerous or costly, acquisition of external things, the performance of labour and the exchange of its products being the typical and important modes of such peaceful acquisition. It does not study greed or covetousness, nor does it even indirectly commend them. It deals with an aspect of the conduct of every reasonable and responsible person, however generous his ideals and motives may be, and with any disposition which such person may make of his labour and his means with a view to acquiring results of labour and exchange without waste; that is, without unnecessary or superfluous expenditure or cost. The "economic man" or

the man who is, or is assumed to be, wholly absorbed in the acquisition of "wealth" is not the proper or peculiar object of the science of economics.

Both the things which we "demand" or seek to acquire and the terms on which we can acquire them are to a large extent socially determined; departure from the normal expenditure of the social group or class is difficult and, practically speaking, not possible for its average member. The consideration given by economists and others to what is sometimes called "consumption," to fashion and to its changes, yields uniformly this same result. The interested stimulation and direction of demand with a view to profit is a very strongly marked feature of modern civilization, and has consequences of a kind especially important for our present purpose in the sense of creating uniformity of demand and in breaking down class barriers, in so far as these depend on habitual differences of expenditure. "The standard of life proper to a class" is not so constant a notion as to make its more or less assured attainment a source of deep satisfaction or confidence in the future; and this standard is not apt to include under modern conditions the rearing of a large or even of a small family of children.

That the children of a family should in certain circumstances be looked upon as a source of economic strength to it, and accordingly that the upbringing of children should be encouraged by the persuasion that the condition of parents will be easier when the children come to earn, need not shock or surprise us, unfamiliar to our personal experience though such express calculation may be. The possession of some undertaking in which children, as they grow up, can help or to which they, or some of them, can succeed is a condition obviously favourable to the parental habit, though it will obviously again not always impel in the direction of large families; and parents thus situated may exhibit, as a class, habits which might be rashly enough attributed to some parental instinct or impulse. Again the following remarks of Dr. Newsholme (p. 40) ought not to evoke merely cynical comment, but should rather inspire confidence in the economic study of social facts: "In the earlier years of these [the textile] industries each child was his parents' savings-bank, from which savings could be drawn as soon as the child could go to the mill as a half-timer. Now the age at which the child's immature strength can be exploited has been retarded, and the child is a less profitable asset than in the past." Doubtless, Dr. Newsholme views with satisfaction the diminished exploitation of the child's immature strength, and probably none of us would defend it against him. But the interest of this instance, in which some of the causes of birth control are manifested, should not be exhausted in an expression of satisfaction at the disappearance of the half-time system; we may see how the elements in a class or group situation are connected, and how measures which must have some good effects may also tend to destroy the economic unity of the family. Practically, we may feel ourselves urged to promote measures which tend towards family coherence under better conditions than those of the half-time system.

In the above instance, and in general, economic inquiry brings into prominence the connexions observable in the situations of groups and classes; and it substitutes insight into such connexions for such beliefs as the belief that important differences in social conduct are traceable to the persistence of profound or fundamental differences, of a psychological or biological kind, between individuals, and thus between the various groups which the individuals constitute. Thus, for example, in the above instance, we should say that the large families of textile workers in the half-time period were not the result of the peculiar greed and of the hard calculating temper of an inferior breed or "race" of men who happened to be textile workers, but were the result of the intelligible reactions of average human beings to given situations; and that the average person forced from one social situation into another tends to put off the habits fitted to the old and to assume those fitted to the new, even to the extent of changing some of his estimates of virtuous and vicious conduct. Even when, as may happen, the

transition encounters friction, strange habits and points of view become easier to "understand" in the sense of intelligent sympathy, if not always of abstract and intellectual comprehension. Economic inquiry tends, I think, to destroy utterly the impression that, corresponding, roughly at least, to the social divisions, there is a division of the people of this island, for example, into biologically distinct breeds or races, some of which are fitted by origin and nature to bear rule over the others. It is true enough that an economist as such will not be allowed to claim the last word in the matter; but he has or should have some special qualifications to examine such claims as: (1) that the economic advantages of the relatively comfortable classes are the result of the prevailing excellence of their merely biological descent; (2) that these classes exhibit aptitudes for leadership and command which are in danger of perishing to the great loss of society if their stock is not continued; and (3) that in order to continue their stock they must be relieved of some of the taxes which now fall upon them, and otherwise favoured at the cost of the governed classes, who are now being pampered by doles and other public concessions and thus encouraged to propagate their inferior stock. That grievances with which we can sympathize underlie such contentions is obvious enough; but they are grievances which, like those of other groups, must be understood in the light of the general social and economic situation. This will probably appear to members of my audience, as it appears to the average economist, not to be one which should satisfy any informed and thoughtful person, and certainly not of a nature to pamper the unprivileged masses. They suffer, like many of their envious critics, from ignorance and from the lack of security and hope.

I will only refer briefly to the general problem of eugenics, with the intimation that I should like to hear the question discussed in a medical conference, if, as is possible, the issues raised and some of the proposals made are felt to be of interest. Some advocates of eugenic proposals advance contentions which economic inquiry is not called upon directly to endorse or to refute; and I may mention as an obvious instance some of the results based on the measurement of skulls. With the social and economic situations to which these results are applied the economist obviously must concern himself, and he has had occasion to regret the lack of economic interest sometimes shown by the students of corporeal measurements and the devotees of craniometry.

On certain other matters the economist would also wish to be better informed, and would gladly recognize that there is no method proper to the science of economics by which he can investigate them. The effect on conduct and habit generally of a widespread dissociation of sexual gratification from parental responsibility is such a matter, and so are certain other consequences of childless marriages and of very small families. Gratification at some of the results of birth restriction is widely expressed, and there is a tragedy in the birth of "unwanted" children which I need not try to impress upon my present audience. But there are many such aspects of the matter which future experience and inquiries not properly economic may be expected to illuminate. That men should know and choose, rather than behave as blind victims of impulse and despair, would seem to be in general a ground for confidence and hope.

To what used to be considered, and what probably is in fact, the main economic question, the question which the "law of population" purported to answer, I would offer the following definite reply. The obstacles to the growth of population, and the causes of misery and restricted livelihood in the mass of the people, are not those suggested in the "law of population" as lying in the niggardliness with which Nature responds to human labour and co-operation and science and goodwill. I do not think that our own island, to say nothing of what has been called our little planet, is overcrowded, or that our difficulties are due to any approximation to such a calamity. Our troubles are due, not to the efforts of free and equal people to win a livelihood, and are accordingly not "economic" in any such simple sense, but to causes which I may distinguish

as political, that is, to habits and institutions whose origin and purpose is mastery and privilege and monopoly. Much of the political activity and enthusiasm and the divisions created by them, to which we are trained to attach supreme importance, is, viewed economically, a cause of pinched and anxious livelihood for large masses of the population; and these masses are, or are becoming, sufficiently educated in certain directions to contrast the prospects offered to themselves and their successors, both with the apparent productive capacities of our civilization, and with the sacrifices demanded of themselves. That justice should prevail over the whole economic community and not merely, if that were possible in such isolation, within the boundaries of particular States, is seen to be the main condition on which the continuous unfolding of productive capacity depends.

Economic doctrines concerning the advantages of the division of labour, and the dependence of the effective division of labour on the extent—that is, the numerical frequency—of the market, would be meaningless if it were not possible for a region to be more thinly populated than would be desirable, or for a community to suffer disadvantage, even apart from military and political considerations, from its too small numbers. Or again, a community may suffer from the fact that its population is too thinly spread over the area available to it, and that portions of its population are too closely crowded in particular centres and favoured areas. These possibilities do not admit of brief explanation and illustration, and I mention them here with a view to suggesting that the task of the economist is a more complex and more hopeful one than it was thought to be in the days when the niggardliness of Nature and the imprudence of parents were always at hand, to be invoked at need to account for almost every shape of social misery and calamity.

III.—THE MEDICAL ASPECT.

BY

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EVER since I yielded, reluctantly, to the invitation to open this discussion from the medical side I have searched my mind very thoroughly for reasons which might be set against my original protest—that the subject before us seemed to me to be very largely outside the doctor's province. Whether or no my distinguished colleague has felt the same difficulty I cannot say, but up to the moment of writing these words I have had no opportunity of reading Lady Barrett's remarks, and so one of my last hopes has had to be relinquished.

To the Biologist, Yes; and to the Economist, again Yes—the subject clearly has great interest for both of these students, as is manifest from the able papers presented by my two predecessors. But to the Doctor, the population problem seems to me to overlap very little his usual activities, and this whether his work lies mainly with the individual when sick or with that reputedly higher and larger function termed the prevention of disease. In short, the question of over-population or under-population seems to me to lie largely outside the doctor's sphere.

And yet I have enough confidence in the wisdom of those who choose the subjects of our annual discussions, and nominate the speakers, to believe that there is, after all, a medical aspect to this question of the falling birth rate. I therefore propose to examine the matter as well as I am able.

We are told that the problem of population resolves itself into three elements: natality, mortality, and migration. Surely, it will be said, the doctor has a good deal to do with the first two of these? If the doctor is not concerned with birth and with death, who is? But a closer look reveals the fact that the aspects of real determining value in regard to both of these things, as they are related to population, lie outside the doctor's province.

Take the case of natality. The age of marriage, a fact

having great influence upon natality, is almost wholly governed by economic conditions, and medical men have little or nothing to do with this side of the problem. Fertility, and even sterility, are at present questions which lie beyond the ken of the physiologist, let alone the doctor. If we exclude syphilis, a known cause of sterility, there is little or nothing of pathological importance known to us as operating in this direction, and therefore little or nothing that we can do to remove this deterrent to natality. Sex incompatibility, too, is a complete mystery to us, and even if we knew exactly upon what it depends its prevention would seem to be a matter for the eugenicists rather than for us.

Behind all these things lie the laws which govern the function of reproduction, laws which so far remain inscrutable. We have to await solutions of these problems by the biologist, whether physiologist or biochemist, before we can prescribe appropriately for the patients who come to us inside this sphere.

Mortality? But we doctors function here, it will be said. And it is true that both in preventive and in curative fields of action there are things we can do to prolong life; our efforts do seem to achieve something in this direction, though here the main credit may really lie more with the sociologist than with the doctor, albeit the former relies upon the latter for stimulus and direction. Be it observed, however, in this connexion, that merely to *prolong* life is but a feeble contribution to population adjustment, and serves us in poor stead in the main issue. *Saving* life, however, and improving health may serve us well, since these things may be done at all ages, and therefore at the child-bearing period in women and during childhood. In Germany it has been shown that whilst there is an increasing duration of life, there is also a rapid fall in the birth rate. In effect, old age is on the increase: a parlous state of affairs, and a grim reward for the doctor's contribution to the population difficulties. Such a condition of things must, of course, eventually show itself by an increasing mortality rate—a consequence which will doubtless be set at the doctor's door.

Let me turn for a moment to the actual position as we understand it. To a visitor from another planet much of our attitude towards the population question during recent years would seem very puzzling indeed. A few years ago many of us were not a little concerned about the dangers of over-population; we are to-day met together to consider the falling birth rate. If our visitor were human like ourselves he would probably agree with the poet that there is only one thing common to us all, and that is discontent. But, as I read the position, the present concern is not with the falling birth rate in absolute terms, but with the fact that it possesses differential values of an undesirable kind. It is generally conceded that a low population in any country is a serious affair, because the quality of a population is wont to suffer by a fall in the quantity. The crux of the situation would therefore seem to be the difficulty of securing a regulation of births as between the different social grades in a country. It would appear that this difficulty depends for its solution upon the differential use of family limitation. If so, we have once more reduced matters to a sociological, or economic, or eugenic platform.

The more I examine the matter the more convinced I become that until, and unless, the doctor associates himself closely and definitely with eugenic and economic principles, his opportunities of influencing the population problem are very small, not to say insignificant. But is this really the doctor's sphere? That he would prove a powerful ally, both to the eugenicist and to the economist, I have no doubt whatever. But does society expect him to function in this wise? Is he briefed for this particular advocacy? Until now he has not concerned himself with questions of family limitation, or only to give advice and instruction when husband and wife have already decided upon their course of action. With few exceptions he has not sought to influence men and women upon matters of principle, and he has kept clear of propaganda. He has a sanction for individual therapeutics, but he has hitherto not considered that he possesses any other sanction on

this matter. Even in the important subject of birth control he has very largely stood aloof, regarding jealously his lien over matters of individual health, and not risking his patients' confidence on the personal issue by voicing his opinion in regard to economic and eugenistic questions. Is he right, or is he expedient, in this attitude? Has the time come when he should enter the field on the side of these larger issues? I think the point well merits discussion. If it be decided ultimately that he should do this, then he should be taught a good many things that are not now included in his curriculum, and his thoughts should be directed quite early to this vital question of the regulation of births, which is clearly the ideal to aim at. Such regulation presupposes, as has been said, "the economic encouragement of those parents who rise above the lowest levels, since it is the superior performance of numerous healthy parents which now requires moral and material recognition on the part of society."

It may be interesting to glance for a moment at the sort of advice the doctor would find himself giving, and the kind of effort he would be making, in his practice, if ever his help were really sought and given, in an attempt to carry such a rule as this into effect. Professor Grotjahn has indicated for us the elements of conduct which the operation of such a rule as I have specified would involve. The lifting of parenthood on to a rational basis in eugenic practice would imply the three following duties:

1. That every married couple would be in duty bound to bring up a minimum of three children above the fifth year.
2. That this minimum must be aimed at wherever the situation of the parents gives expectation of descendants not falling below an irreducible minimum standard. In this case, however, the minimum must not be exceeded.
3. That every married couple characterized by particular virility should have the right to double the minimum, and should receive for every child in excess material contributions, which would be exacted from the single and from those couples which for any reason whatsoever remain below the lowest number.

When, by the exercise of some such rule as this, the stability of the population has been safeguarded and the general quality raised, the professor considers that the rational use of contraceptives may follow undisturbed. The reward promised for observing a rule like this is the desideratum which all thinking folk desire—the checking of fertility in those social strata which have least means, room, time, or capacity for the upbringing of their offspring.

I have stated the matter thus explicitly because it is just as well to realize clearly the sort of problem the doctor would find himself "up against" were he to embark upon the task of discouraging pregnancy for eugenistic as well as for therapeutic reasons. It is a task before undertaking which we may well be forgiven for pausing. And it must be obvious to us all that we should need, not only public sanction, but Government assistance and a system of penalties before we could even begin to make any progress. A merely pious expression of hope that in some Micawber-like fashion differential reproductivity of a beneficial kind will arrive as the result of arousing eugenistic interests in the doctor's mind does not advance the matter in the slightest. We are all eugenistic in our attitude towards racial progress, but I doubt very much if the onus lies with us of initiating a carefully considered scheme by which alone such progress can be attained. I feel strongly that the will to improve the race must first be aroused by the sociologist, and that the study of the population problem, especially in relation to the differential birth rate, must be taken much further before the doctor's aid is sought. In summing up the discussion on this subject at the Geneva conference last year, Professor Julian Huxley remarked that, "from our point of view as scientists, one fact will emerge very clearly, and that is the lamentable insufficiency of the data we have on which to base any conclusions."

I have already referred to the fact that the profession has very largely, up till now, whether deliberately or sloth-

fully, stood aloof from the question of pregnancy control. I do not now refer to the therapeutic aspect of the matter, but to the social aspect. I may be peculiar in this, but I feel that such aloofness has been justified by the obvious lack of data upon which to form a sound judgement. I would go further and say that, as pregnancy control is only a part, and probably a small part, of the population problem, the principles governing its exercise do not, in the first instance, lie with the doctor, for reasons I have already adduced.

But the study of contraception is quite another matter, and the inventing or devising of methods, and judging of their success or failure, are certainly matters that concern the doctor. A number of cases present themselves to every busy practitioner where the therapeutic indication for family limitation is definite, and sometimes even imperative. Another important question which clearly lies within the doctor's province, with which, indeed, he alone can deal, is whether or no, and if so to what extent, the use of contraceptives is a factor in the production of disease, local or general. Dr. McCann has expressed himself as quite convinced that pelvic diseases are fairly frequently traceable to this cause. But more investigations are required before we can come to any definite conclusions on the point.

Both in the cases in which there is a definite therapeutic indication for controlling pregnancy, and in the cases in which married couples have settled for themselves that it is their duty to avoid pregnancy and the doctor considers he is under an obligation to help them to carry out this decision—in both these cases our present available methods are lamentably defective. There seems to be no clear teaching on the part of our gynaecological colleagues, and many of them appear to regard the subject as taboo. I think this is a great pity.

The fact which emerges most strikingly from a consideration of the subject is, as I say, the completely inadequate means that are at our disposal in advising a patient.

In summarizing very briefly what these means are, such a conclusion becomes all too obvious. A certain very common method of pregnancy control, besides being quite impossible for many men, is such a gross physical and psychological offence to both parties that to continue to consider it at all is, as I have pointed out, only to pander to that itch which some people possess to be thoroughly inclusive, however impractical, in their survey of possibilities. To tell the partners to restrict the sex act to that period in the woman's menstrual cycle when she is least likely to conceive involves two great objections: first, that this reputed time of low conceptivity is relative only, and therefore cannot be relied upon, and second, that this period varies much with different individuals, and therefore cannot be calculated with safety. There is even a third objection to this method: a woman's time of relatively low procreative power by no means always synchronizes with her time of high sex desire; to adopt this method is therefore tantamount, in many instances, to the sacrifice of that very spontaneity in the union of the sexes which it is sought to preserve. As a writer has aptly expressed it, "practices founded upon this notion may not be in harmony with our present ideas of sexual justice."

Chemical contraceptives fail in that if they are physically harmless they are unreliable, and if they are dependable they are capable of endangering health. Mechanical contrivances have little more, if anything, in their favour. When adapted to the male partner they carry psychological and physical disadvantages for which their effectiveness scarcely compensates. If it falls to the woman's lot to make the mechanical adjustment necessary to achieve the object in view we, at present, know of no contrivance the use of which does not involve (for success) manipulation approximating to gynaecological acumen.

It is a question whether the contraceptive method generally advocated at birth control clinics as being the survival of the fittest is not too erudite or too uncertain ever to be popular. A friend of mine, who interests herself much in birth control clinics, and who, being fully persuaded of the need and of the wisdom of these clinics, is unlikely to minimize their value, tells me that their "follow-up"

system reveals the startling fact that in only about 50 per cent. of the cases do the contraceptive demonstration and practice prove effective.

It seems clear, therefore, that if it be granted that individual cases presented to the doctor in his routine work offer legitimate opportunity for advice concerning the checks to pregnancy, he has at the moment very poor make-shifts to deal with. If, in addition, it be deemed part of the doctor's duty to deal with pregnancy control as a part of the health and happiness of the community as a whole—and the two things have very different bearings—the knowledge at present available to secure the desired results is lamentably deficient. Here, at least, seems a subject deserving of inquiry, and concerning which the doctor's opportunities for research and observation are abundant, and his conclusions paramount. It is a sound thing that he should proceed to extend his knowledge on these matters, with the hope that by the time the public has made up its mind on the question of pregnancy control, and in the event of such a principle being established, he may have something worth offering as his contribution to the eugenics of the population problem.

IV.—INDICATIONS FROM STATISTICS.

BY

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BEFORE attempting to discuss the falling birth rate from a medical point of view it is necessary to define what we mean by the term "birth rate." The methods of stating the birth rate in common use are three:

1. The crude birth rate—or rate per 1,000 of the population living at all ages in the middle of the year.
2. The proportion of registered births to the women living at child-bearing years—that is, roughly 15 to 45 years of age.
3. Dividing legitimate from illegitimate, to state the number of legitimate births per 1,000 married women aged 15 to 45 and the number of illegitimate births per 1,000 unmarried women aged 15 to 45.

It is the third method only which will give us information as to the changing fertility in married women and as to the relative number of illegitimate births in proportion to the unmarried women.

In his book on vital statistics Sir Arthur Newsholme shows by the adjoined table how misleading the crude birth rate may be in comparing two districts like Kensington and Stepney, since Kensington has a large number of single women engaged in domestic service.

Legitimate Birth Rates in Kensington and Stepney, 1921.

	Kensington.	Stepney.	Percentage Excess of Birth Rate in Stepney over that in Kensington.
A. Birth rate per 1,000 inhabitants ...	18.1	24.2	33
B. Birth rate per 1000 women aged 15 to 45 years	55.7	98.8	77
C. Birth rate per 1,000 married women aged 15 to 45 years	163.0	207.4	27

Sir Arthur Newsholme has also shown very vividly by the example of Ireland that the crude do not always give the same indication as the standardized birth rates.

"In that country the crude birth rate was 24.5 in 1881, as compared with 33.9 in England and Wales, and was 23.1 in 1901, as compared with 28.4. Standardized rates in Ireland and England respectively were 35.2 and 34.7 in 1881, 36.1 and 28.4 in 1901. Thus Ireland, whose crude birth rate was approximately as low as that of France, had a true rate of fertility as high in 1881 as, and much higher in 1901 than, England. The reason for this remarkable change in the relative position of the two countries

produced by arithmetical corrections is that, while in England in 1901 the number of females aged 15-45 per 1,000 of the total population was 250, and in Ireland 235, the wives at ages 15-45 in England formed 46.8 per cent., and in Ireland only 32.5 per cent., of the females of the same age. The case of Connaught in 1901 is even more striking. Its crude birth rate was 21.3 as compared with 28.4 in England; while its standardized birth rate was 38.1 as compared with 28.4 for England."

We see, therefore, that the proportion of married women of child-bearing age in any country is a very important factor in considering crude birth rates.

Diminished fertility of marriages as a cause of the falling birth rate can only be judged by a comparison of the standardized legitimate birth rate in any two periods under discussion—for example, when the birth rate was high (in 1870), and to-day.

What has been the decline and when did it begin? We find that the birth rate in England and Wales was at its highest point in the decennium 1871-80. Since then up to 1910—that is, during the pre-war era—the birth rate reckoned by either method had steadily declined.

Mean Annual Birth Rates (England and Wales).

	Per 1,000 Living at all Ages.	Per 1,000 Women aged 15-45 years.	Legitimate Birth Rate per 1,000 Married Women aged 15-45.	Illegitimate Birth Rate per 1,000 Single and Widowed Women aged 15-45.
1851-60 ...	34.1	154.9	231.0	18.3
1851-70 ...	35.2	151.0	267.3	18.2
1871-80 ...	35.4	153.6	235.5	15.1
1881-90 ...	32.4	138.7	274.6	12.6
1891-1900 ...	29.9	122.7	250.3	9.6
1901-10 ...	27.2	109.0	221.6	8.2
1911-15 ...	23.6	91.4	189.7	7.8

The reduction up to 1910 was:

In the crude birth rate ...	33 per cent.
Standardized married birth rate ...	25 "
Standardized illegitimate birth rate ...	46 "

*Birth Rates and Fertility, 1871-1925 (England and Wales).**

Period.	Legitimate Births—		Illegitimate Births—		All Births— Per 1,000 Total Popula- tion.
	Per 1,000 Total Popula- tion.	Per 1,000 Married Women, 15-45.	Per 1,000 Total Popula- tion.	Per 1,000 Unmarried Women, 15-45.	
1871 (1870-72)	33.3	292.5	1.96	17.0	35.3
1881 (1880-82)	32.3	285.0	1.65	14.1	34.0
1891 (1890-92)	29.4	263.8	1.31	19.5	30.7
1901 (1900-02)	27.5	235.5	1.12	8.5	28.6
1911 (1910-12)	23.4	197.4	1.03	7.9	24.4
1921 ...	21.4	176.3	1.02	7.9	22.4
1922 ...	19.5	160.7	0.89	7.0	20.4
1923 ...	18.9	155.3	0.82	6.5	19.7
1924 ...	18.1	148.4	0.78	6.2	18.8
1925 ...	17.5	143.5	0.74	5.9	18.3

The difference between the crude and standardized figures is what we should expect from the effects of the war. Fewer women could marry, and therefore fewer children would be born, but there remains a reduction in the absolute fertility of marriages, and a decrease of illegitimate children. This reduction in the fertility of marriage has been assumed to be due to birth control.

One of the problems for the medical profession is to determine the relative importance of voluntary use of contraceptive measures and of other factors as causes of the diminished fertility of the race. For other causes of variation it is interesting to study conditions which existed before contraceptive measures were known or practised appreciably in any class. In doing so we find:

1. That there have always been variations in fertility in different classes.

Children Born per 100 Families—Standardized Rates.

Date of Marriage.	Duration of Marr. age in Years.	Upper and Middle Classes.	Textile Workers.	Miners.	Unskilled Labourers.
1503-11	0-5	70	76	105	100
1901-05	5-10	171	185	263	242
1896-01	10-15	242	275	359	362
1891-96	15-20	303	359	517	463
1886-91	20-25	357	435	610	541
1881-86	25-30	413	501	671	596
1871-81	30-40	497	557	717	652
1861-71	40-50	606	648	777	715
1851-61	50-60	662	696	797	763
	over 60	682	732	870	781
Total ...		277	319	433	392

Consider one example from this table—the families who had married in 1871-81 and who had lived thirty to forty years in wedlock. The actual figures of the numbers of children born in those thirty to forty years to each 100 families are: upper and middle classes 497, textile workers 567, miners 717, unskilled labourers 652—that is, the average family varied between roughly five in upper and middle classes to just over seven in miners. It must be allowed, however, that some marriages were probably sterile.

This variation in fertility has been further increased in the last fifteen years. Therefore some factor or factors in the lives of different strata of society affect fertility apart from artificial or voluntary interference; all the factors, including contraception, tend to diminish the upper, middle, and textile classes only.

2. Another factor affecting the natural fertility of marriage is the age of the parents. The age of the father is secondary in importance, but has some influence. Roughly it may be stated that fertility in the healthy man remains stationary between the ages of 20 and 35 and tends to decrease after. The age of the mother in its effect on fertility is more important and has greater variation. Actual fertility increases from the age of 15 to 25, when the age of maximum fertility is reached, and after remaining more or less stationary for a few years declines from the age of 30 to that of 50 in a steady curve.

Actual fertility is much greater before than after the climax. The fecundity of the mass of wives is greatest at the commencement of the child-bearing period and gradually declines; after the age of 40 the decline is very rapid.

The following tables illustrate various details in connexion with the fecundity of marriage viewed from the point of view of the wife.

1. The first shows the effect of the age of the wife at marriage on sterility.

Proportion of Sterile according to Experience in Scotland of 1855.

Ages at Marriage.	Proportion Sterile.
15-19	15.6 per 100 wives.
20-24	1.5 " "
25-29	22.5 " "
30-34	32.3 " "
35-39	50.0 " "
40-44	87.0 " "

2. The second shows (a) the initial fecundity according to age at marriage—that is, the percentage of women who bore children in the first year of marriage; (b) women who bore children within the second year of marriage; and (c) the percentage of women fertile at any time.

Ages at Marriage.	Percentage Fertile in First Year.	Percentage Fertile in Second Year.	Percentage Fertile at Any Time.
15-19	13.71	43.71	92.7
20-24	18.48	90.51	100
25-29	12.41	75.8	72.3
30-34	11.44	62.93	62.5
35-39	9.27	40.97	46.8
40-44	3.63	15.45	9.1
45-49	0	4.35	4.4

Therefore nearly all women married between the ages of 20 and 25 are fecund—that being the age of climax of fecundity. The fecundity of the very young (15-20) is greater than that of those married between 25 and 30, but the total fertility is less. These figures illustrate exactly in how many instances the use of contraceptives in the first year of marriage is unnecessary for the prevention of immediate child-bearing.

Fertile women after sixteen years generally had an average family of 4½. Persistently fertile women—that is, wives bearing children up to the end of the child-bearing period—have an average family of 11½.

From these considerations we see that marriage under the age of 20 does not appear to be the most successful for child-bearing, and this is supported by the development of children born of very young mothers.

The average weight and length of children at birth vary with the age of the mother. This is shown in the following table.

Age of Mother.	Average Weight.	Average Length.
15-19	6 lb. 15 oz.	19.0 in.
20-24	7 " 3 "	19.1 "
25-29	7 " 6 "	19.3 "
30-34	7 " 4 "	19.2 "
35-39	7 " 4 "	18.89 "
40-44	7 " 2 "	18.9 "
45-49	6 " 14 "	18.16 "

Hecker approves the above figures of Duncan, but thinks increase goes on till the end of fertility, age not being the only factor. The number of pregnancies also has an influence. The highest average in weight and length is found in the children of women aged 25 to 29. Matthews Duncan thinks the weight and length increase with successive pregnancies, but does not doubt the accuracy of the age influence.

Considering the total fertility of wives married at varying ages, we find that the very young marriages are the most prolific; thus girls married at 15 to 19 years of age will after thirty years of married life have an average of 9.1 children, while those married between the ages of 25 and 29 will after thirty years have an average of 6.3 children. Early marriage, therefore, *per se* in any community will increase the birth rate, but the development of the children born in the early years will tend to be lower than where the marriage age is 25 to 29. These considerations all point to 25 as the best age for marriage.

Another point of interest to our inquiry is the proportion of male births, because it brings with it some knowledge

Wholesale prices are shown by the broken line, sex-ratio at birth by the continuous line.

of another factor bearing on births. The accompanying chart gives Stevenson's figures regarding the relation of prices to masculinity.

Male births are always more numerous than female, but the proportion varies from time to time in this country and also varies in different countries. From 1870 to 1915 the highest point to which masculinity rose was 1,043 in

1875, the lowest being 1,033 in 1888 and 1890. In 1918 it reached the height of 1,060. The variations in different countries need not be described here; they will be more readily explained when the cause of changes in our own country is more clear.

We are now in a position to see that certain conditions obtain to-day which, apart from any artificial means, would tend to reduce the birth rate.

1. The later age of marriage. This, we have seen, affects the birth rate in various ways: (a) It diminishes the total fertility of the family. (b) It lengthens the period between marriage and the birth of the first child. (c) It tends to lengthen the space between each child.

2. Conditions affecting the fertility of husbands. All gynaecologists meet with cases of sterility in which no abnormality can be found in the woman, but if before subjecting the woman to any treatment necessitating an anaesthetic the semen is examined, in a number of cases it is found to be inactive. One of the causes of this is gonorrhoea. This also accounts for sterility in some women; but a man may have followed careful advice and abstained from marriage till non-infective, and though the wife remains healthy yet conception may be impossible. The work of Professor Leonard Hill on the sterilizing effect of heat (even body temperature) on the male cells suggests the possibility that sedentary indoor employment may account for some diminution in fertility of men of certain classes.

3. Of the factors which affect the relative fertility of different classes we have, however, no certain knowledge, but since the same differences existed in 1855 we know that it is not only due to the better knowledge of contraceptive measures, even though it were shown that their use in certain classes is very widespread. If relative prices and hence relative luxury and relative want affect the masculinity, it may also have an effect on total births.

4. Before drawing conclusions we must bear in mind that there are certain natural laws which, if obeyed, would affect the birth rate, and we must make allowance for the probability that in certain classes they have been a factor. (a) It is well known that ill health in either sex is marked by lack of desire for sex indulgence. If the mother is debilitated by too closely following pregnancies, or the father is worn out by stress of mental work, she or he does not desire sex gratification. (b) In more developed races where sex is associated with love, desire for the wishes and well-being of the object of affection forbids intercourse when it is not desired, but we know that in many instances intercourse takes place in spite of failing desire. (c) It is significant, however, that where either partner consents to intercourse against his or her desire the result is unsatisfactory to both.

Nature thus provides a kind of natural eugenic law which, if obeyed, protects the mother from the burden of pregnancy when health is becoming impaired, and protects the race by allowing conception to occur only when both parents are in full health. Nature's law would only allow large families where the parents are both virile, healthy beings free from mental anxiety or stress. Such results would obey the laws of eugenics, but, we must admit, might strain the resources of the parents in the matter of upbringing and of education. With the economic aspect, however, I am not dealing at the moment.

From the medical point of view much would be gained by obedience to these laws. (a) It would abolish motherhood in the overstrained woman, whether the overstrain resulted from too frequent child-bearing, from overwork, or from unhealthy conditions of environment, because women under these circumstances usually lose sex desire. On the other hand, if intercourse takes place in ill health, with or without their consent, the result is more prolific child-bearing than in the normally healthy woman. (b) Pregnancy under conditions of health produces an enhanced sense of vitality and well-being and is not a time of illness or invalidism; the expectant mother's efficiency is not impaired. (c) The dangers of child-bearing are diminished in women who enjoy mental and physical health.

This obedience, however, may be said to be an ideal unattainable in the case of exactly those instances where frequent child-bearing is taxing the strength and resources

of the mother to the uttermost. This is undoubtedly true at the moment, and yet if we regard this subject with an unbiased mind from the point of view of prophylactic medicine, we find that the ideal coincides with the health of the race. It is therefore the duty of the medical profession—itsself possessed of the highest ideals—to pursue and teach them to those able to receive them, just as it is our duty in the practice of our profession generally to aim at prophylaxis and only secondarily at cure. But we do and must aim secondarily at cure when prophylaxis fails, and in this question of the birth rate under the present unsatisfactory conditions of large numbers of people Nature's law does not obtain, and the health of many poor women is being destroyed by overwork and over-child-bearing. In such cases it is, in my opinion, our duty to see that child-bearing is modified and that the conditions of life are relieved.

The influence of the doctor on both factors is essential, otherwise no progress will be made, and the doctor will be reduced for years to the unsatisfactory empirical treatment of some form of conception control. With regard to the first—the modification of child-bearing—in the absence of the co-operation of the husband we are at present left with the problem of finding some method of preventing conception.

I do not propose to discuss here the various forms of contraceptives in use except to express my own opinion as to the undesirability of the various rubber instruments recommended. They are unreliable—that is, although they may prevent conception in a large number of women they entirely fail in many others; witness the fact that scarcely any advocates of them remain who do not combine with them the use of a spermicide. They are in many cases harmful. The clinics where they are in use have no records of systematic examination by the cervix with speculum to ascertain whether cervicitis occurs, and it is the only way of knowing if the cervix is damaged or if abnormal discharge is present. The observation recorded by the patient herself is valueless. I have found cervicitis a frequent result.

If conception is to be prevented the more harmless methods, in my opinion, are the use of the sheath, and the introduction of medicated pessaries made up to the prescription of a doctor. But, regarding this subject from a purely medical point of view, we must also remember that sex indulgence to any excess produces nerve exhaustion, and contraceptive methods in the cases we are discussing are not a cure for the mother's debility.

The responsibility of the doctor for advice as to contraceptive measures is only one part of his duty, whether the doctor is the medical attendant of the family or the hospital physician or surgeon. Sources of ill health and disease are often found in the conditions of life of the sufferer, and the influence of the medical attendant in calling attention to the lack of ordinary hygiene in the lives of working-class mothers is as important as the duty of those medical inspectors who insist on hygienic conditions in factories.

Is it not time that doctors spoke clearly as to the lack of change and rest and of outdoor exercise among other factors in the lives of the mothers who bear large families? There are, however, some cases in which the recurrence of pregnancy is a matter of life and death to the woman—for example, severe heart or kidney disease, or even recurring puerperal insanity. If in such cases the co-operation of the husband is not obtainable sterilization should be performed, as it is the only absolutely certain method, apart from complete abstention from intercourse.

We conclude that medical practitioners have an important part to play in this question of the falling birth rate. In some cases duty demands that they teach the advantages of normal marital relationship, in others it may be their duty to do all in their power to help a patient to avoid pregnancy. They cannot stand aside and take no part in directing, teaching, advising, and treating their patients. They cannot disregard eugenic considerations; their views and advice on conditions of life which cause debility and abnormal fertility are valuable, and, if frankly expressed, would be of real service to public health.

I make the most earnest claim that the family doctor should be the person to deal with this subject, whether with or without consultation with special clinics or consultants. I submit a few reasons for this in summing up some of the points to which I have drawn attention.

1. If the true facts, as shown in the above tables, about the chances of immediate conception and natural rate of child-bearing were explained, many young couples would begin married life naturally, unhampered by artificial contrivances. Such explanation is best given by the family doctor.

2. Most people of education in marriages of true affection would respond to the doctor's advice that it is not for the good of themselves or of their offspring to come together when either does not desire it.

3. The doctor knows the whole circumstances of the case in question, and how pressing or otherwise is the demand for some means of preventing conception, which may vary from avoiding a risk which would be almost certainly fatal, to anxiety as to whether financial resources will adequately maintain and educate another child.

It has been said that the medical practitioner is unable or unwilling to deal with this question, and has no training to equip him for giving wise advice suitable to each case.

I suggest that the remedy for this is that all that is at present known in regard to this subject should be taught to medical students, and their responsibility in regard to it be emphasized. If the family attendant refuses help in this respect it cannot be a matter of complaint if patients seek knowledge and helpful advice from a practitioner who is willing to give it.

One last word as to the medical aspect of the present situation from a wider point of view. The birth rate of the artisan class is falling most rapidly, but closely comparable is the fall in the upper and middle classes. The birth rate is actually rising among miners and unskilled labourers—that is to say, classes in economic comfort are becoming unnaturally sterile, while classes in or approaching destitution are unnaturally prolific.

In physical values, if only through being reared in unfavourable environment, the latter must be lower in vitality than the former, and as the proportion of healthy members of the race is gradually diminished and the proportion of ill-developed members is increased, the physical standard of the national health must deteriorate.

From a medical point of view the position is disastrous, and would not, in my opinion, be cured if all contraceptive practices were swept away. We should thereby add somewhat (though not to the extent imagined) to the stock of those who can afford physical necessities of health, but more drastic measures from a public health point of view are needed to arrest the fertility associated with destitution.

A CASE OF OSTEITIS FIBROSA.

BY

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THE following case presents some points of interest, and may be considered worthy of publication.

A girl, aged 18, cashier in a draper's shop, complained of "cutting pains" in the right knee, which gave out when she was walking. The pains were intermittent, did not incapacitate her from work, and lasted from October to December, 1926.

On Christmas Eve, 1926, she complained of pain in the right tibia, and took to her bed on January 4th, 1927. She then noticed a swelling about the middle of the tibia, and the pain became definitely worse. On examination I found a uniform swelling apparently involving the whole circumference of the bone at the junction of the upper two-thirds and lower third of the right tibia. There was some tenderness on deep pressure, but no other physical signs any-

where. No history of any blow or injury could be elicited. An antero-posterior x-ray photograph was taken of the right tibia and fibula, and showed a small area of rarefaction at the site of the swelling. A provisional diagnosis of chronic osteomyelitis was made, and the patient kept in bed, her temperature and pulse being carefully watched. At the end of a fortnight the pain had subsided and there had been no rise of temperature or pulse. The patient was allowed up and told to report again should there be any recurrence.

In March, 1927, she complained of a gradual onset of pain in the right hip-joint, saying that she got very stiff on sitting down and could not walk on rising. On examination there was a quarter of an inch true shortening of the right leg, marked limitation of movement on abduction, and some tenderness on pressure over the joint. A skiagram showed marked rarefaction of the neck of the right femur, with a spontaneous fracture extending about half-way across it. The upper half of the shaft also appeared to show rarefactive changes. The patient was put to bed for three months and given tab. parathyroid and calcium (P.D. and Co.) thrice daily, and began to walk again in August, 1927. There were no more symptoms, and another skiagram was taken in October. This showed rather more marked rarefaction in the neck of the right femur, but the fracture appeared to be healed.

In April, 1928, the patient again complained of some increase in size of the tibial swelling, with slight intermittent pain in this situation. A lateral view of the tibia revealed an extensive area of rarefaction with marked thinning of the bone. Permission could not be obtained for removal of some blood for the Wassermann reaction and calcium content estimation.

The comparative rarity of this condition and lack of definite knowledge concerning the fundamental metabolic errors responsible seem to make this case worthy of record. The condition is sometimes associated with parathyroid tumours; in this case there were none discovered.

Radiogram of right tibia and fibula, April 4th, 1928.

A CASE OF PARTIAL STAPHYLOMA OF THE CORNEA.

BY

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A STAPHYLOMA corneae parziale, the scar of which is giving way, complicated by a staphyloma totale of the other eye, is a somewhat rare condition, so the following case seems to be of sufficient general interest to merit publication.

A young South African farmer, 18 years of age, living at Eldoret, some three hundred miles from Kampala, had a severe infection of both eyes when 3 years old. His parents were on trek miles away from any town, and it was only by the good offices of a regimental surgeon whom they fortunately met that the child's sight was not entirely lost. As it was, the one eye was completely and the other partially blind. The boy first went to school when he was 16, but at his first half-term holiday it was noticed that his sight had deteriorated a little, so on the advice of a doctor he was removed from school and took up farming. The father reported that the sight had again begun to fail during the last two months.