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MEDICAL AIMS AND IDEALS*

BY

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Thomas Henry Huxley is rightly remembered as one of the most eminent among those who have studied in Charing Cross Hospital and its Medical School. When I myself was a student elsewhere, now more than sixty years ago, at a time when Huxley's life was already drawing to its close, I found a new inspiration in his published lectures and essays, with their championship of an unswerving fidelity to scientific truth, as a supreme duty. I have been deeply sensible of the honour done to me by the invitation to lecture in this series, which commemorates his life and his achievements, and the great service which they have rendered to science and to humanity. Whatever may be the varieties of our individual reactions to them, I do not think that any of us can doubt that Huxley's work and writings have had a deep and lasting influence upon all our ways of thinking about the nature of life, and about the problems which it presents, not only to the professional biologist, but to the philosopher, to the educator, to the sociologist, and, not least, to those who are concerned with science in the medical range, with the ways of its advancement, and with the various phases of its practical applications.

The invitation to deliver a lecture in commemoration of Thomas Huxley might be regarded also as confronting one with a formidable challenge. For, of all his services to his own generation, the one which brought him the widest recognition then, and the one perhaps with which his memory is most often associated to-day, was that which he rendered by his lectures. In these he dealt with a range of scientific and philosophical subjects, presenting them to audiences of widely different kinds. From many of these no greater equipment could be expected than that of a generally alert and intelligent interest in the new scientific discoveries and conceptions which Huxley presented to them with an incomparable vigour, clarity, and economy of language—characteristics which he himself would have held to be the only important features of a literary style. In days, indeed, when lectures were held in higher regard than to-day, as contributions to the instruction and entertainment of our parents and grandparents, Huxley stood supreme among a number of gifted contemporaries.

To such mixed audiences of the later Victorian period, from sixty to ninety years ago, Huxley was the intrepid champion and the supreme interpreter of what, for many of them, were the highly disconcerting, even painfully disturbing discoveries and conclusions which were then

revealing new aspects of scientific and, more particularly, of biological knowledge and thought. We, who find ourselves now so fully involved in an ever more rapid advance into the scientific era of human history, of which Huxley had seen and greeted only the dawn, have become so much more accustomed than our predecessors to this headlong progress of scientific discovery that we are less consciously resistant, perhaps, to the changes which, nevertheless, it is still imposing upon the direction and the form of all our thinking, about the material universe of which our sense organs make us aware, and about the place in it of our own human species. I should show but poor respect, however, for Huxley's own principles, and respond even less worthily than need be to the challenge of which I have spoken, if I were to allow the opportunity which has been given me to run further to waste, in vague and uncoordinated speculations. Huxley himself, we may be sure, would have had little use for a lecture lacking a central theme and an ordered argument. I have put forward "Medical Aims and Ideals" as my subject, and I must come to it without further delay.

As many will know, Huxley studied here for only three years and a half, and was still under 21 when he completed what were then the "obligatory medical studies," and passed, early in 1846, the first examination for the M.B. of the then relatively new University of London, winning a gold medal for anatomy and physiology. Needing to find an immediate livelihood, he applied for and received appointment as an assistant surgeon in Her Majesty's Navy, subject to his passing a qualifying examination; and, a year or so later, this gave him the opportunity which, in the event, was to determine the main course of his career in a direction away from any further personal contact with medical practice, or even with research in the scientific disciplines most directly related to medicine. For he returned from a four-years cruise on the naval survey-ship, *H.M.S. Rattlesnake*, to find himself welcomed in London as an already distinguished recruit to Zoology, which was thenceforward to be the centre of his main life's work.

Huxley's Attraction to Physiology

Referring many years later to his medical studies here, Huxley had a confession and a grateful acknowledgment to make. "I am now occasionally horrified," he wrote, "to think how very little I ever knew or cared about medicine as the art of healing. The only part of my professional course which really and deeply interested me was physiology, which is the mechanical engineering

* The Huxley Lecture delivered at Charing Cross Hospital Medical School on March 15.

of the living machine." This special attraction of physiology for him was partly due, no doubt, to the fact that, to quote him again, "the only instruction from which I ever obtained the proper effect of education was that which I received from Mr. Wharton Jones, who was the lecturer on physiology at the Charing Cross School of Medicine."

It may have some interest, then, to remind ourselves what this "Physiology" was, to the exposition of which, in the years 1842-5, Mr. Wharton Jones succeeded in imparting so much inspiration that the young Huxley found it to be much more interesting than the clinical medicine which he was supposed also to be studying. Physiology in those days, especially on the practical side of its teaching, must have been largely concerned with microscopical anatomy; and it would have been necessary to study even that with a relatively primitive microscope, without any mechanical microtome, or any process for the embedding of tissues, or even for selectively staining the preparations one could make by free-hand section-cutting, or by simple teasing. Even so, the young Huxley succeeded, at the age of 20, in discovering an unrecognized membrane in the root of a human hair, describing it in his first scientific publication, and even having his name attached to it, as "Huxley's layer." Experimental Physiology, as we now know it, was then, indeed, only just about to begin.

In a review written more than forty years later, in 1887, dealing with the advances made over the whole field of the natural sciences during the first fifty years of Queen Victoria's reign, Huxley refers to Müller's *Physiologie*, which had been the textbook available to him as a student, as "a masterpiece unsurpassed since the time of Haller"—Haller, the publication of whose treatise on the subject had been completed in 1766! Huxley's main concern in this review, however, was to emphasize the extent of the change during the fifty years completed in 1887, when, as he wrote, "That which characterizes the new physiology is that it is permeated by, and indeed based upon, conceptions which, though not wholly absent, are but dawning on the minds of the older writers." The matter for wonder, indeed, is that, even under the primitive conditions of knowledge in 1845, Huxley should have acquired from Wharton Jones's teaching a lasting interest in the physiological or functional aspects of biology—in what he himself calls "the architectural and engineering part of the business, the working out [of] the wonderful unity of plan in the thousands and thousands of diverse living constructions, and the modifications of similar apparatuses to serve diverse ends." From to-day's point of view, indeed, it is not easy to understand how Huxley should have received so potent and enduring a stimulus from his brief contact with a physiological knowledge so restricted in its range, and showing so little promise of progress, as that of 1845, when we compare it with the abundance and the rapidly widening scope of the physiology to which we are now accustomed.

If we were asked, indeed, to assign a date for the dawn of this new era of rapid and continuous progress in physiology, after more than two centuries since its first beginning at the hands of William Harvey, during which long interval its advances had been few and widely spaced, I think that we should have to choose 1846 for the beginning of this revival—actually, you will observe, the year after Huxley's medical studies came to an end. For it was then, in the years 1846-9, that Claude Bernard

published the first of his great physiological investigations, on the functions of the pancreas and the liver. It was in 1846, we may recall, that the first major surgical operation under anaesthesia was performed; and it was in 1847 that the methods of quantitative instrumental recording, which were to play so important a part in the development of modern physiology, had their effective beginning with Carl Ludwig's introduction of the kymograph. The professor of physiology under whom I began my own studies at Cambridge, Sir Michael Foster, Huxley's junior by eleven years, used to recall that, when he first studied physiology at University College, London, Ludwig's kymograph was still regarded as so extravagant a novelty that his teacher, the great William Sharpey, could demonstrate its principle only by rotating his cylindrical top-hat on a supporting spindle. A long way, we may think, from these days of cathode-ray oscillographs, electron microscopes, and all the other electronic devices for discovering and recording physiological reactions and structures!

New Conceptions

In Huxley's "Jubilee" review of 1887, we find him claiming already that "physiologists are now in a position to say that they have arrived at clear and distinct, though by no means complete, conceptions of the manner in which the great functions of assimilation, respiration, secretion, distribution of nutriment, removal of waste products, and reproduction are performed, while the operation of the nervous system . . . has been largely elucidated." I must confess that when I look at this statement now I am more impressed by the apparently prophetic insight, with which Huxley's enthusiasm had led him to anticipate future achievements, than by the justification for such an estimate of what had actually been accomplished by 1887. My reaction to it is naturally affected by the memory that my own undergraduate studies in physiology began in 1894, only seven years after the appearance of Huxley's review, and, of course, by what is now so obvious to anyone who has been able to watch its progress during the further period of more than sixty years to the present day—namely, that this more recent advance has been of an altogether greater and more revolutionary character than that which could be attributed to any earlier period of similar duration. So that when I look again now at what I was taught in 1894 from Michael Foster's then justly famous *Textbook of Physiology*, in the four volumes of its 1891 edition, I find myself impressed, not so much by the magnitude of the advance during the previous half-century, comparatively great though even that had been, as by the meagreness of the physiological data which even then could be put forward with a clear confidence—by the negative, tentative, speculative, even misleading character of much of what was then available for us to learn.

Gaps in Knowledge

It is astonishing indeed to recall how many and how great were the gaps in knowledge, the filling of which in the succeeding years has produced such radical changes not only in the teaching and the outlook of physiology but in the ideas and the methods of clinical medicine as well. Let me mention but a few examples. The textbook taught me, as a student, that the rhythm of respiration was mainly controlled by nervous reflexes, though lack of oxygen in the blood was admitted to be a factor in hyperpnoea and asphyxial convulsions. The significance of the tension of carbon dioxide, on the other hand, was then regarded as subsidiary and, indeed, obscure; it was allowed to have some action, but on parts of the central nervous system other than the respiratory centre. It is only, indeed, since 1905, when Haldane and Priestley published their new evidence, that the central importance of carbon dioxide, in

providing the stimulus which maintains the regular rhythmic activity of the respiratory centre and adjusts it within normal limits, has been clearly recognized.

Another volume of my 1891 edition of "Foster" described nerve cells, whether in the central grey matter or in the peripheral autonomic ganglia, simply as multipolar cells, with afferent and efferent fibre-processes, nothing yet being known of the neuronal structure of these systems or of the linkage of their constituent neurones by synaptic junctions; for knowledge of these we had to wait for a new edition of the volume in question, as revised by Sherrington in 1897. Practically all our knowledge of the structure, the distribution, and the contrasted functions of the different divisions of the involuntary or autonomic nervous system was, again, a product of the years since 1891, largely through the work of Gaskell, Langley, and their Cambridge pupils.

The 1891 "Foster" could offer, again, only fragmentary and largely misleading suggestions concerning the functions of the different ductless glands, the separate and interrelated endocrine activities of which figure so largely now in our conceptions of the normal functions of the body as a whole, of their disorders, and of the specific treatment of these. Hardly anything was then known about these organs, beyond what could be guessed from the observed effects of disease, or of operative removal. On such evidence the functions of the thyroid and parathyroid glands were still completely confused. The treatment of myxoedema with thyroid gland substance had been discovered in that very year, and too late, therefore, for mention; and the main function suggested for the gland was a mechanical regulation of the circulation of the brain. Even the relation of the pancreas to diabetes, though it had been discovered two years earlier, was apparently not yet ripe for mention. Nothing was really known about the suprarenal glands, except what could be guessed from Addison's description, in 1855, of the disease bearing his name, from the usually fatal results of their removal, and from the presence in an extract of something giving a colour reaction with iron salts. As for the pituitary body, the anterior lobe of which was to be described years afterwards by the late Sir Walter Langdon-Brown as "the conductor of the endocrine orchestra," and from the posterior lobe of which two separate hormones were isolated and structurally identified last year, and one of them actually synthesized—about this multifunctional marvel of our modern physiology my textbook could only tell me that "concerning the purposes of the whole organ we know absolutely nothing."

I could extend this negative catalogue almost indefinitely. Many years had yet to pass before we began to get Sherrington's great analysis of central nervous functions or to hear about Pavlov's conditioned reflexes. The knowledge then available of what we now call biochemistry looks astonishingly meagre and patchy in retrospect. The only amino-acids we heard about were leucine and tyrosine—as curious by-products, apparently, of a complete tryptic digestion; and another 20 years had to pass before the existence and specific functions of the vitamins began to be recognized.

Developments from Discovery of X Rays

Carrying our survey into other fields, we may note that the discovery of the x rays did not come till 1895; but its coming opened the way to all the ensuing developments of sub-atomic and radiophysics, with all their applications already in medical practice and research, apart from their still unmeasured potentialities in other directions. The specific association of different visible bacteria with different diseases was still at an early stage in 1891; and a virus was first recognized as the cause of an animal disease in 1898. In 1891, again, immunology was just making its effective beginning, with the discovery of the first antitoxins; while for any knowledge of the paradoxical immunity-phenomena, which we call anaphylaxis and allergy, we had still to wait till the opening decades of the present century. Ehrlich had foreseen the eventual possibility of a specific

chemotherapy, and had even made a first, abortive attempt at it in 1891; but we had to wait till 1910 for its first major practical success.

You will see that when we look back, in the light of to-day's experience, at the field of medical science as it was 60 years or more ago, though it had seemed to Huxley even then to be carrying already a wonderful harvest of new knowledge, it appears to have had very little to offer by comparison with the wealth which we see our modern tillage producing from it in such an abundance. And you may be assured that I am not unmindful of the possibility, the probability even, that some among you here to-day may be able, about the year 2016, to look back, if I may vary the figure, from whatever new height of medical and scientific achievement you may have attained in another 60 years' time, and to amuse yourselves by contemplating the almost incredible depth of primitive ignorance in which we were still groping and stumbling in 1956.

A Glance in Retrospect

Confining our attention for the moment, however, to the more realistic retrospect from to-day, it is surely not difficult to understand that there was relatively little in the way of helpful interchange, or even of common interest, between the researches of the laboratories and the practice of the wards until well into the present century. The research workers then had still so little to offer, relevant to any practical needs which the clinicians yet recognized; and clinical medicine seemed to be so complacent, even so boastful on occasion, about the traditional, empirical, unscientific basis of its knowledge and its practice. And the most widely significant, perhaps, of all the revolutionary changes during the intervening years, in the structure of medicine as a whole, has been the steady closing of what had earlier appeared to be so wide and impassable a chasm between experimental science and clinical practice, and the frequent building of bridges over such gaps between them as have still remained. Such a change has, of course, involved movements of advance and realignment from both sides.

The rapid growth in volume and extension in scope of experimental researches in the sciences related to medicine—a tributary stream, of course, to the great forward surge of all scientific knowledge and its practical applications in these recent years—has actually resulted in a rapidly increasing output of discoveries in the laboratories of a kind more readily applicable to medical needs; while clinical medicine, on its part, has shown a new willingness, not merely to accept such gifts ready-made from the laboratories and to put them to practical uses, but also, within the limits imposed by a first concern for the welfare of its patients, to assume also for itself the new character of a progressive experimental science, and to discard the faded robes of the empiricist and the magician. And these developments, with all the promise that they now hold for a forward movement of medical science and practice as a coherent organism, have, of course, received an immense and invaluable impetus from the creation of great benefactions by private generosity, and the even greater and still expanding provision made from the public funds, for the support of researches in the medical as well as in other departments of science, including now, of course, researches in the clinics as well as in the laboratories, and researches bringing both of these into an increasingly effective co-operation.

If a man to-day has a genuine desire for practical experience of medical research, and if he has reasonable credentials and a suitable problem, he is unlikely to fail to find the opportunity for a trial of his aptitude; and, whatever the outcome, the experience will not have been wasted, even if it only enables him to carry with him into a career of practice or administration some lasting impression of the methods by which knowledge can be truly advanced and of the stringent standards by which experimental evidence must be judged. And it is with particular reference to the possibilities of such a new era of co-operation and community of interest, between these different aspects of medical knowledge

and its uses, that I am asking you to consider with me, a little more closely, whither these changes are likely to lead us—what are, and what should be, the aims and ideals of medicine, as it is now developing.

Purpose of Scientific Research

Let us look first at an aspect of the question on which I might perhaps be thought to have more right to an opinion than on some others. What is, or what should be, the objective of medical research? Discussion about the purpose of scientific research in general goes back to the philosophy of Francis Bacon, who has even been quoted in recent years in support of the Marxian doctrine, that the only true object of research is the material benefit of mankind; and there are, indeed, passages in Bacon's writings which seem to support this idea. We should remember, however, that Bacon himself made no direct experiments or original observations, being rather the first of the scientific planners; and that, presumably on that account, his doctor, that prince of experimenters, William Harvey, is said to have taken rather a low view of Bacon's armchair opinions about research, remarking that "he writes philosophy like a Lord Chancellor." And even Bacon was not consistent in his advocacy of material betterment as the proper object of research; for he also maintained, elsewhere, that men should "seek for experiments of light, not for experiments of fruit."

The leading scientists of the nineteenth century were very clearly of that opinion, reacting strongly against a tendency, not unnatural at that time, to applaud science as the source of practical inventions, as the raiser of the living standard in our jargon of to-day, and to overlook the merit of the fundamental discoveries which had made these material advances possible. We find Lord Kelvin, himself very successful as a practical inventor as well as a great fundamental theorist, maintaining that "the instances are innumerable of investigations apparently quite useless . . . which have had the most valuable results"; and when the young William Perkin, working just a hundred years ago in the London laboratory of the great German chemist August von Hoffmann, came unexpectedly upon the synthesis of mauve—the first of the artificial dyestuffs, and thus the starting-point for the eventual development of the great synthetic chemical industry, producing not only the host of modern dyes and now of plastics, but the almost alarming range of our modern medicinal agents—we find Hoffmann protesting vigorously against the idea that his fortunate pupil should spend further time in an attempt to make more of such practical inventions. "Let him indulge in the pursuit of truth," he cries, "of truth pure and simple—let him pursue truth for the sake of truth."

Huxley was an enthusiastic advocate of this point of view, and made its support the main theme of one of the brilliant discourses to general audiences which he called his "lay sermons," taking as his text on this occasion the object which the Royal Society of London still claims for its activities in its full title—"The Improvement of Natural Knowledge." Huxley based on this a powerful defence of the view held by other scientists, then and since, that the primary object of scientific research should be to seek new evidence concerning the nature of the material universe in which man has his being, just for the sake of the essential beauty and interest of such knowledge, and for the widening of man's intellectual horizon. Huxley observed, of course, as many others have done, that the most fundamental and apparently unpractical investigations do often open the way to the widest developments of practical invention; and that, on the other hand, research undertaken to solve a practical problem sometimes results in a discovery of much wider and more fundamental importance.

When we find, however, that some of the champions of "truth for its own sake," as the proper object of research, appear to base their claim for it largely upon this tendency to lay the trail for practical inventions unawares, we may begin to wonder whether their attitude is, after all, so very different from that of the orthodox Marxist, who will also

advocate the support of the most abstruse and unrealistic kinds of research, on the assumption, in accordance with his creed, that their results will eventually contribute to man's material prosperity. The really important difference, of course, is not in the abstract philosophical theory or belief, but in the direction of the emphasis adopted in its application.

Benefit to Mankind

When we consider our own special problem of the aims of medical research we must surely admit that the very word "medical" implies the material benefit of mankind, at least as an ultimate objective. The long-term strategy of our medical researches must surely be directed to the improvement, protection, and restoration of human health, and to the relief of the suffering which departures from it entail. I myself could find no other meaning for the word "medical" in this connexion. It seems to me, however, that the very fact that we are conscious of this practically beneficent purpose as an ultimate aim ought to make us the more watchful, lest we allow too great a concern with directly practical problems to influence unduly our immediate, tactical policy in choosing, planning, supporting, or encouraging particular lines of activity in medical research. In this, as in all other departments of research, the branches of the tree of useful knowledge would soon cease to flourish and to bear their practical fruits if the growth and the spread of its roots of fundamental science were to fail for lack of adequate room and suitable nourishment. And perhaps there may be need for a special care to preserve a proper balance of these factors, now that the clinical departments, with their practical problems so ready to hand, are taking an increasing part in the common effort to advance medical knowledge by research.

Popular rumour will tend, quite naturally, to celebrate practical improvements, and especially new methods of treatment giving results which are readily observed, while fundamental advances in science are less apt to attract such public recognition, even though they may have opened the way to the practical achievements which are so widely acclaimed. I do not believe, indeed, that any of us are altogether free from such an imbalance of judgment—not even those of us who, in medical practice or research, have been privileged to watch the spectacular advance of medical knowledge in our own times, from behind the scenes, as it were. I must confess that, if I am faced with a sudden call to name the high peaks of achievement in medical discovery, the milestones on the course of its astonishing progress during the period covered by my own memory, those which come most readily to my mind are such as the discovery of salvarsan, and the effective treatment of syphilis; of insulin, and the gift of practically normal life to the diabetic; of vitamin D, and the elimination of rickets; of the sulpha drugs; of penicillin and the other antibiotics; of specific inoculation, and the effective banishment of diphtheria—I could, of course, make the list much longer.

The very last thing that I desire is a weakening of the general admiration and gratitude, so richly earned by men whose vision, enterprise, and devotion have enabled them to bring such conspicuous benefits as these to the knowledge and the use of mankind. If I give myself time to reflect, however, I am aware, and I think that we should all be made aware, that these high peaks of practically effective discovery arise from, and could only have been reached from, a rising general level of scientific knowledge, which the army of workers on its main fabric, few of them known even by name to the community at large, have all the time been raising with an always increasing speed.

Use of the New Medical Knowledge

And now I must ask you to consider with me, quite briefly, what is going to be done, what ought to be done, with all this new knowledge, the output of which may be confidently expected to continue, even with an acceleration, into any future which we can reasonably predict. It is a question which might now, as I recognize, bring us uncomfortably

near to issues which have, unfortunately, acquired political implications. I am no politician, medical or otherwise. It would be a foolish affectation, however, to pretend to be unaware, in such a connexion, of the magnitude of the change which the actions of Parliament, of ministers and of their advisers, have brought about in recent years, in the whole structure of medical practice; or of the fact that there are aspects of that change which affect the personal interests of the doctors of to-day and of to-morrow from more than one angle. I hope that nobody will suspect me of a lack of sympathy for such personal and professional problems; but I feel obliged to restrict my discussion now to aspects of the position which more directly concern the community at large.

Perhaps I can best make my point with the aid of a hypothesis. Let us imagine that the powers which deal with such matters had decided that, instead of making their projected change to a National Health Service at one blow, it would be wiser to make it by stages, taking the power, perhaps, to test the effect of each move by trial and error, and to watch its effect before embarking upon the next. I ask myself, and I venture to ask you, what, under such imaginary conditions, you would have selected, if the decision had been left to you, as the first and most obvious point at which the intervention and support of the State would be required, to enable medicine to render to the community as effective a service as it ought to give? My own first choice, to state it in the most general terms, would have been for the provision of the kind of organization which would give to every doctor in practice the readiest access to the expert technical co-operation required to enable him to use, for the benefit of his patients, any of the new and more complicated as well as more effective methods of diagnosis and treatment as these arose from the new knowledge which research would certainly continue to provide.

The State has now been supporting medical research in this country for more than 40 years, on a scale which, though it has been rapidly rising, I have not yet heard anybody criticize as too lavish. Some of you may find yourselves taking part in representations to the Government of the day concerning ways in which our National Health Service could, even yet, be improved. If that should happen, I ask you to consider whether priority should not be given to means for the really effective use of all this new medical knowledge. I should make that number one on my own list of demands; though I am aware, of course, that, as one whose working life has been wholly given to research, I can make no claim to any first-hand knowledge of the needs of practice.

A Wider Problem

The limits of my time, and of your patience, will not allow us to do more than glance briefly at another and much wider problem, which has at least a close relation to our medical aims and ideals. Though it may seem to us a matter of less immediate concern than some others, its importance is by no means remote. You may remember that Shakespeare makes King Henry the Fifth exclaim that "There is some soul of goodness in things evil. . . ." We do not, in these days, have to look far to find even terrible examples of the alternative possibility—that evil may come from the misuse of what ought to be, and may still be, immeasurably good. We have had to become uncomfortably familiar with threats offered to the future of civilization, even to the existence of the human race as we have known it, by the perversion, to the purposes of competitive destruction and slaughter, of scientific discoveries in sub-atomic physics, and even of some which were made in the course of researches that had essentially medical aims. We have to content ourselves with the hope that the vanishingly small prospect of a one-sided advantage, or of a one-sided avoidance of disaster, from the use of such weapons as these will act as such a deterrent from war itself, that good may, even here, emerge from what seems the very extremity of threatened evil. Problems such as these, however, may be judged to be beyond the pale of our present discussions, being excluded from any

truly medical aims and ideals by the conventions of the Red Cross and the undertakings of the Hippocratic Oath.

Medicine, we may agree, can have no concern with the contrivance of these destructive applications of potentially beneficent knowledge, but only, if need be, with the rescue or the restoration of their potential victims. My present concern, however, is with the quite different possibility, that the use of medical knowledge with wholly beneficent intentions and even with immediately beneficial results for individual patients, or even for large groups of them, may nevertheless create, or accentuate, the threat of a different kind of danger, even of disaster, to the human population of a country, a continent, or even of the whole world. The precarious balance between the growth of a population and that of the means of its subsistence was recognized already by philosophers in Ancient Greece. Malthus, at the end of the eighteenth century, focused the attention of thinking men upon it, submitting the problem to a quantitative examination, and, incidentally, giving Darwin the clue to his theory of the origin of species. In recent years, and especially since the last world war, it has been widely recognized as an imminent and even an actual problem for the teeming populations of materially backward countries, conspicuously in Asia, and as a more distant threat to the future of humanity as a whole. There has already been open, expert, enlightened, and responsible discussion of this problem, from the sides of economics, agricultural science, and general biology; and there has been evidence even of international rivalry, in ostensible attempts to mitigate the economic dangers which it threatens. It is obvious enough, I think, and has, indeed, been openly recognized, that tinkering with one side only of a problem which is essentially one of imbalance may eventually produce nothing but a new and, not improbably, a more dangerous imbalance, though at a different level.

Nobody would dare to advocate the retention of such checks on the increase of populations as wars, famines, and diseases; but their unbalanced elimination would clearly accentuate the pressure on inadequate means of subsistence by a population which is already increasing with a dangerous rapidity, even in spite of them. Medical research has concentrated its effort, hitherto, on finding the means for saving life, promoting health, preventing and curing diseases. If the means were available for organizing, on an adequate scale, even the application of what has already been discovered, I believe that major causes of high mortality and low vital efficiency, such as malaria, could soon be banished from the great communities which they now impoverish and depress; and that a fraction of the wealth now consumed by warlike preparations would suffice to make this practicable. But to what purpose, if the eventual and more permanent result would be to aggravate the problem of excessive population?

If the world's peoples are to be artificially protected, as they could be, from these causes of illness and premature death, they must surely be prepared to accept an artificial protection also against the dangers created by their own unlimited fertility. I believe that medical research and practice will yet have to accept a more definite and open responsibility for dealing with this world problem, recognizing that action to deal with it can be safely undertaken only if it is firmly based upon and controlled by medical science, and that the urgency of the problem may be, in part, a consequence of the benevolent interference with the natural order, which we accept without question as a proper fulfilment of our medical aims and ideals. I do not, of course, overlook the fact that the whole subject has become hedged about with a dense entanglement of social and traditional taboos: or that the mere suggestion that medical science has a chief responsibility for this problem, and ought to have an effective voice in the planning of organized action to deal with it, is unlikely to avoid opposition from the authorities which determine, or officially interpret, the doctrinal attitudes to the subject of more than one of the great religious systems of the world.

Conclusion

I can picture Thomas Huxley, if he could still be with us, refurbishing his armament, not perhaps without a certain zest, in expectation of a new encounter. He would know, however, that any real hope for the ultimate solution of this problem, in the interests of all humanity, must depend upon the degree to which it can be lifted into the clear light of scientific discussion, out of the range of irrelevant beliefs and furtive superstitions, beyond the reach of any suspicion of racial rivalry or patronage. He would know that any permanent solution must come from the spread of enlightenment, and thus from a patient and persistent effort of education. I can imagine him proclaiming, in the noble words with which he concluded his address to the British Association in 1870, that "mankind will have one more admonition that the people perish for lack of knowledge; that the alleviation of the miseries and the promotion of the welfare of men must be sought by those who will not lose their pains, in that diligent, patient, loving study of all the multitudinous aspects of Nature, the results of which constitute exact knowledge or Science."

FLEA INFESTATION AS A CAUSE OF PAPULAR URTICARIA

A PRELIMINARY INVESTIGATION

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A parasitic cause for the distressing and persistent eruption of papular urticaria in young children has been suspected for some time past. Evidence in support of this theory, which was suggested by Jonathan Hutchinson in 1879, has been accumulating in recent years.

Hallam's observations (1927, 1932) on the part played by the home surroundings in the production of papular urticaria are well known in this country. Other writers, such as Gordon (1933), Kinnear (1933), Tate (1935), Hamburger and Dietrich (1937), and Blank *et al.* (1950) have all supported the environmental or parasitic theory. Rook and Frain-Bell (1953) have given us the most complete account of the different writings bearing on this subject and bring strong support to the parasitic origin of papular urticaria based on their observations of 100 cases in South Wales.

We also are convinced that this disease is caused by parasites, and hope to provide one of the final links in the chain of evidence by observations made as a result of visits to the homes of the patients.

Symptoms and Signs

Previous observers have noted the variety of the lesions, ranging through an oval urticarial flare, small solid papules, vesicles, bullae, and crusted impetigo lesions to residual macules and small pigmented areas. The eruption comes out in crops of spots lasting some three days in an active irritable state, and is followed by gradual resolution with healing of the excoriated skin. New lesions keep appearing at intervals, and it is not uncommon for the condition to

last for several years. Irritation is intense, so that child and parents are in genuine distress owing to loss of sleep and constant efforts to relieve the condition.

Mothers very often try to explain the rash as "heat spots from eating too many sweets or oranges" or "too much acid in the system," and the family doctor may encourage this idea by suggesting that the rash is of dietetic origin. Surprise and occasionally indignation are registered by the mother when it is suggested that the trouble may be due to insect bites. The family doctor, on the other hand, is often willing to admit that he had thought that the spots were very like flea-bites.

The eruption of papular urticaria will often show lesions of varied type at the same time, and it is a striking fact that the rash does not resemble urticaria as seen in the adult. The individual spots persist and go through a process of resolution which takes several days. In many cases a central punctum can be seen in the lesion.

FIG. 1.—Vesicular lesions in papular urticaria.

The picture of papular urticaria in a child of 2 might be as follows (see Fig. 1):—*Feet*: Studded with small vesicles on the soles and dorsum. *Legs*: Scattered papules, some with small central vesicles in them. *Buttocks*: Many red macules of small size with an area of freedom from spots coinciding with pressure from the elastic band of the drawers. *Trunk*: More macules above the top of the drawers. Groups of oval flare-like lesions with central punctum. Many excoriations and some crusted infected lesions. *Arms*: Papular lesions on the outer aspect of the forearms and upper arms. *Hands*: A few vesicles, some on the palms, suggesting the possibility of scabies.

History.—The age at onset was 3 months in many instances, and the duration of the disease was two to five years or longer. Most children were 3 years old when first attending hospital, but a smaller group averaged 7 years. In one-third of this series of 30 cases more than one person was affected. Pets were kept in 20 of the houses. In several instances other children in the house were not affected. Severe irritation is the most prominent feature.

Procedure of Home Visiting.—(1) Ask permission to visit. (2) Arrange time of visit so that children will be at home. (3) Inspect living-room and child's bedroom in particular. (4) Inquire where animals lie most often and where they sleep. (5) Collect dust sample after careful inspection with naked eye and hand lens at close quarters. (6) If there is a cat or dog in the house this will often spend much of its time on a particular chair or rug near the fire. This is the place to look at closely. (7) Look around skirting-boards of living-room, pulling up linoleum where necessary. (8) Examine the child's bed for signs of flea droppings, which are reddish brown because of the blood ingested. (9) Where no positive results appear probable after looking at the inside of the house, outside factors should be considered. Birds' nests under the eaves and pigeon lofts near by should be looked for. (10) If none of these sources seem likely to be fruitful, a visit to the grand-