the phenomena which raise them are the characteristic phenomena of life. It is because of the necessity in any science of having working conceptions which correspond to observation that I must claim for biology her own working conception—that of the living organism as such. This was essentially the claim which Hippocrates was the first to put forward; and to me he appears as the father, not only of scientific medicine, but also of biology in general.

THE GREEK SCIENTIFIC TRADITION IN MEDICINE AND BIOLOGY.

It seems to me that the progress of biological investigation is and has been steadily in the direction of consolidating the Greek scientific conception which has been so closely associated with the development of medicine. The supposed mechanism of life has been steadily eluding our mental vision, while knowledge of organic regulation has been equally steadily advancing, as has been illustrated in this lecture. I have tried elsewhere to show that the mechanistic conception of life is based, not on biological observation, but on metaphysical assumptions for which there is no sound basis.¹⁴ Without going into this controversy, however, I wish to point out that the Greek conception gives us a working hypothesis which knits existing physiological knowledge together in a way that the mechanistic theory is quite incapable of, and which suggests new and fruitful paths of investigation in every direction. It also seems to give us what may be called a working philosophy of practical medicine and surgery. We of the medical profession are not mere chemists and mechanicians. Our business is to understand organic regulation, and where necessary to assist it. We cannot pretend to understand, replace, or repair, a physical and chemical mechanism which is beyond our powers of conception, and which, in my own opinion at least, is simply not there any more than was the traditional black hat in the dark room. What we can do, and do more and more effectively the more we understand of organic regulation and the conditions which disturb it, is to assist in the maintenance or restoration of this regulation.

Is the Nature which we are concerned with nothing but that apparent world of matter and energy which the working conceptions of physics and chemistry present to us? If it is, then organic regulation is only an appearance which will some day be explained in physical and chemical terms. Those who have been carried away by the flood of popular materialism which has been passing over the world in recent times are ready to answer this question in the affirmative and to go back to the search for the black hat in the dark room. Well, I cannot go with them. It seems to me that there are unanswerable reasons for concluding that the black hat is not there, and that the world as interpreted by the physicists and chemists is not the objective or real world, but only an imperfect subjective interpretation of it. The aspect of Nature which Hippocrates saw in the living body, and which a doctor can hardly help seeing in his daily work, is to my mind much nearer to objective reality than the aspect which is depicted by the physical sciences. What I have been trying to show to you this evening is that deeper and truer aspect of Nature which is seen not only in Medicine, but also in every other branch of biological work.

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A SECOND volume of *Studies in the History and Method of Science*, edited by Dr. Charles Singer, is about to be issued. The first volume appeared in 1917, with a preface by Sir William Osler. The second volume contains articles by Dr. E. T. Withington, on the Asclepiadae and the priests of Asclepius; by F. J. Cole, on the history of anatomical injections; by F. C. Conybeare, on four Armenian tracts on the structure of the human body; and by Mr. Arthur Platt on Aristotle on the heart. The editor contributes two articles, the one on Greek biology and its relation to the rise of modern biology, and the other on steps leading to the invention of the first optical apparatus.

PHYSIOLOGICAL PRINCIPLES IN MIDWIFERY PRACTICE.

BY

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THE reproductive cycle in its widest sense—from one generation to the maturity of the next—has somehow never received adequate attention from the physiologist or taken its proper place in the medical curriculum. From the purely biological aspect the only claim to the continuation of a species rests on its ability to perpetuate itself in the struggle with other species; from the medical standpoint, reproduction is as much an integral part of medicine as digestion, respiration, or the circulation. Owing, however, to the way in which medical practice and knowledge has developed, and not on logical grounds, much of what is included under the heading of the reproductive cycle has been separated off from medicine. Eugenics may be left out of account as too largely a sociological matter, but midwifery, in the modern interpretation of the term—that part of the cycle from conception to the care of the nursing mother and nursing—has been separated by practice; pediatrics and the importance of the developing child and adolescent have only recently been thrust into the foreground by a universal quickening of the consciousness of nations as to the necessity for the care of the rising generation. Perhaps as a result of the loss of its proper place in physiology and medicine the early part of the reproductive cycle—the part that counts most—has been later in acquiring the present-day tendency of medicine to study its problems from the point of view of physiology rather than pathology, and I wish to see what this may mean if applied to that portion of the reproductive cycle. I have included under the term "midwifery."

I will begin by taking as an instance of what greater attention to physiological processes may do, the change in our practice as regards infant feeding, and afterwards try to apply these lessons to the management of the woman in labour. I do this because this change has influenced my own mental attitude towards labour more than anything else, and may have a like influence on others, and also because it forms an illustration of reformation along physiological lines already accomplished, and thus indicates what may be possible in the case of labour.

Formerly our attention was largely directed towards perfecting substitutes for the natural food of the baby, and great success has been obtained in adapting the milk of another mammal, so as to enable the human infant to thrive on food never intended for it. Our textbooks devoted no more than a line or two to breast-feeding. There was a pious statement that it was best for infant and mother; there was a list of contraindications and instructions as to how to disperse the milk when suckling was not carried out, and that was about all; whereas the preparation of substitutes and the modification of cow's milk and other possibilities took up pages, and even chapters, so that there is little wonder that the student, when he had blossomed out into a practitioner, was entirely ignorant of the physiology of lactation and the management of breast-feeding. No attention was given to the causes of failure to suckle and how they might be removed, or to the means of increasing mammary activity when inefficient, or to the investigation of the reasons why the baby did not thrive satisfactorily at the breast. I am indebted to Dr. Truby King—and many others with me—and to what is accomplished at the School of Mothercraft, of which he was Director during his stay in this country, for an entirely fresh idea of the possibilities of breast-feeding in difficult cases.

At any time in the school at Trebovir Road living evidence of what a few years ago would have been thought impossible may be seen in the shape of mothers who have failed in previous confinements, and mothers whose infants have been weaned for six weeks or more, successfully nursing a contented baby. The error was that our energies had been devoted to providing a substitute for the function we did not attempt to control. We were clearly on wrong

* Part of a paper read in opening a discussion at the Sheffield Medico-Chirurgical Society, February 17th, 1921.

lines, for, however successful, such substitutes could never be as good as the real thing. We should rather have studied the function of lactation and how to improve it when defective—precisely what we are now learning to do.

I would apply this lesson to the management of labour in cases of deficient uterine action, for the analogy is a close one. Our attitude up to now has been largely that of perfecting the substitute for the maternal powers—namely, the bawny biceps of the attendant exerted through the midwifery forceps—and, as in the case of artificial feeding, we have attained great success, but also along wrong lines. If there is delay owing to deficient uterine action, the one idea of the attendant is to finish off the labour by instruments, just as the one idea in deficient mammary activity was to be off with the natural feeding and on with the artificial. Suppose, therefore, we adopt the same attitude towards parturition that we have adopted towards lactation, what will it mean?

It will mean a closer study of the normal functioning of the uterus, the factors that hinder it, and of how, by the removal of such factors, the natural powers can be made effective. We will first concentrate on eliminating the indications for the artificial termination of labour and reserve the forceps for those cases in which we fail to secure natural labour. It is no more than following the same line of thought towards management of sluggish uterine action, as towards sluggish intestinal action.

Putting aside cases of complicated labour and those in which some obstructive element is present, and confining our attention to simple delay, there are certain causes which can be readily detected and remedied, such as distension of the bowel or bladder, uterine obliquity, especially that associated with pendulous abdomen, and others, such as over-distension of the uterus and early rupture of the membranes, which may be easily recognized, but not so easily remedied, as there may be other complicating factors. The conditions chiefly contributing to failure of good uterine function in cases of otherwise normal labour may be grouped under the two headings of emotion and fatigue, and I would argue that it is their prevalence, particularly among the more leisured classes, that leads to the frequency of the artificial termination of labour, and I would therefore direct attention chiefly to a consideration of how these conditions can be removed.

Taking the emotional factor to begin with, it is likely to be operative in nervous, highly-strung women, particularly in their first labour. It will be increased by dread of the unknown, by what they have heard of the trials of their acquaintances in childbirth, by the constant suggestion of the necessity of artificial aid, by such circumstances as sympathetic mothers, husbands, and friends, and the concentration of their household on the event in which they, as patients, are playing the principal part. If, as so often happens, the anticipated date is past, they may have had several disturbed nights thinking about, and looking for, the expected pains that are to usher in their time of trial. Perhaps, also, there may be domestic and other worries to add to their mental distress. Thus the frame of mind in which labour begins is often highly unfavourable to physiological parturition, and is then aggravated by the wrong type of nurse and by the arrival of the medical attendant with a bottle of chloroform and a bag of clinking instruments, with their strong suggestion of a speedy ending without further effort.

The other factor, fatigue, requires perhaps even more management, for the uterus of an exhausted woman will not function efficiently. Loss of sleep, want of food, and, most of all, the fatigue that comes of long-continued pain, are among the common causes producing exhaustion.

The practical question is how far we can expect to make labour more natural by our endeavours to remove these causes of uterine inefficiency, and in regard to this I can only give suggestions, for the subject is too wide, and my intention is rather to indicate the lines of approach to the problem than to go into details.

In the first place, the study of the individual patient and an attempt to understand her temperament and attitude of mind towards labour is obviously important. The ante-natal care and observation should not be such as to increase her fears and anxieties, but should rather be directed towards reassuring her and impressing her with the idea that she is a normal woman capable of bearing her child naturally. In the case of a woman in her first pregnancy

some time spent in discussing the course of labour, what is to be expected and what she can do to help herself, will not be wasted, and, should she consider herself above the usual age for a first baby and, as is often the case, have special fears, an endeavour should be made to reassure her. The choice of a nurse, too, is a matter of extreme importance; the ideal nurse is hard to find, but if discovered, is beyond price. The talkative and ignorant creature who scares her patients with stories of what has happened to other unfortunate mothers on whom she has been inflicted, or the nervous woman who is easily worried by any incident she thinks may indicate something abnormal, are especially to be avoided. Lack of confidence and over-anxiety are at once reflected in the patient, and a nervous nurse makes a nervous patient. The quiet, understanding woman who recognizes where her patient requires help, and gives a feeling of strength and confidence, will have many more cases of natural labour than the over-anxious and fussy type.

When it comes to the labour itself the advantage of institution management over home delivery is readily seen, and forms an additional argument to that advanced by Mr. Bonney in his paper on "The continued high maternal mortality of child-bearing," on account of its better provision for surgical technique, in that it avoids also many domestic annoyances and the presence of well-meaning but unneeded relations. In the conduct of the labour the object of the medical attendant should be rather that of supervision, and of a supervision that is kept as much in the background as possible. Satisfied that everything is normal, all that can must be done to suggest that the patient's powers will suffice, and that no active interference will be required. The less he is with the patient the better. But she must not be allowed to become played out. Should she bear pain badly, become restless, and lose self-control, relief must be obtained by means of morphine, or morphine and hyoscine, or other sedative, and, to my mind, the great art in the management of labour is the knowledge of how and when to give relief to the exhaustion of the uterine pain. Every practitioner may have his favourite method—twilight sleep, so called, the old-fashioned opium or chloral and bromide—but everyone engaged in midwifery practice must study his patient and by careful observation watch for the indications of fatigue and endeavour to prevent its onset. The morphine-hyoscine narcosis has this great merit, that it greatly diminishes the emotional and fatigue effects, and though it may be argued that labour in which the patient is doped with toxic drugs is less physiological than one without drugs terminated by forceps, sedative drugs are too valuable under present conditions to be dismissed in this way. All drugs that have a sedative effect also interfere to some degree with the reflexes and with physiological action, and the problem, as it appears to me at the present time, is to decide how far the obvious disadvantages of their administration compensate for their equally obvious merits.

As a rough generalization I would advocate that preference be given to artificial delivery by the forceps when the failure of the natural powers is only the overcoming of the final obstacle, the muscular resistance at the vulval outlet; and, on the other hand, to place reliance on sedative treatment when deficiency in the expulsive powers is shown when the head is still some distance above the outlet. With increasing knowledge and experience of conducting labour on physiological lines there will gradually come fewer cases of failure to effect the final expulsion.

Returning to the analogy of successful breast-feeding, we cannot but be impressed by the importance of the "atmosphere" of the institution in which it is conducted and think how a like success might be attained in parturition. In the School for Mothercraft, for instance, the anxious mother, distraught by the care of an ailing baby, comes into an atmosphere of assured success with every suggestion of failure removed. The other patients are themselves a factor in her treatment; she hears of more obstinate cases than hers, and sees well-doing infants that were in a worse plight than hers, and the whole ritual impresses her as arranged to spell success. She, in hopes of a cure, is sent for her exercise in the open air with the woman who has been successful beyond her dreams and expatiates thereon. The sisters and nurses, full of confidence in the methods, impart a like confidence to the patients, and half the battle and more is won by the spirit

of the place. It is so striking that one feels that a similar "atmosphere" in the maternity home would also be victory half gained. The patients would be carefully supervised during pregnancy, so that all cases likely to have obstructive or other abnormalities were kept apart, and the place labelled as a home or hostel for natural labour, and not called a hospital. The midwives and nurses, carefully chosen and inspired with the spirit of the place to see their patients through a natural labour, would be on their mettle to make the methods a success, and would provide the proper atmosphere in which all suggestion of failure is abolished. The medical supervision would be kept in the background, and care would only be required to see that the methods were not carried to the extreme of refusing to recognize failure and postponing forceps delivery to the detriment of mother and infant.

A scheme of this sort is merely applying lessons learnt elsewhere in medicine. It is Dr. Hurst's method at the Seale Hayne Hospital for shell shock and war neurasthenia. The man struck dumb comes to be cured into a place where the chattering patient in the next bed was dumber than ever he was, and was miraculously restored to speech, as he will be, and so is the cure wrought.

This brings us to the final consideration as to what the future of medical practice in regard to maternity work will be, and, without wishing to attempt the dangerous art of prophesy, I would indicate merely possible changes. The duty of the doctor will be, much more than in the past, the supervision and "vetting" of pregnant women, and the picking out for special management of cases where trouble is likely. The ordinary cases will more and more be left to the charge of trained midwives, medical attention being required rather for unforeseen complications, for the prevention of fatigue, and for delivery in protracted cases. I suggest that once the primary object of the medical attendant is recognized to be the securing of a normal labour, his attendance in the lying-in room is not essential, and, at any rate, need only be occasional—when summoned by the midwife, or for visits of supervision. This is necessary to avoid the strong suggestion of artificial interference which his attendance means, and because among women delivered by midwives the percentage of instrumental deliveries is low, and the reverse for those attended by doctors. I would hope that every practitioner in family practice would have a list of competent midwives, who would be reserved for the duty of attendance on labour, and not merely employed as monthly nurses, and would carry out his methods in the spirit as well as the letter.

It is perhaps rather much to hope for in this world of erring mortals, but it is something to look forward to, and when one notes the reluctance of medical practitioners to take midwifery cases, and sees advertisements of practices made attractive by the announcement that there is little or no midwifery, and recognizes at the same time the primary importance to the nation of the maternity service, the advantage of securing the best medical supervision without taking up too much time and service in attendance on normal labour seems only possible if most of that attendance be given by trained midwives. This involves rather a shifting of the medical service from the part where least essential to those parts where it is most essential: the observation of pregnancy, the study of the individual characteristics of the woman, and the determination of the best methods of management; supervising her labour merely so far as to be assured of the absence of complications, and deciding what is advisable to maintain good uterine action and to avoid fatigue, and generally being ready to answer the summons of his midwife and to act on her reports; after the labour to give much more attention to the puerperium, to lactation, and the young infant, than has been the case in the past. Doubtless the public will have a big say in any change of method, but hitherto the medical services for maternity work have never been paid for adequately, and their shortcomings are, to my mind, largely ascribable to that fact. The public has expected an expenditure of time and skill for fees that are by no means equivalent, and the tendency of the profession has been to cut the loss by shortening the duration of the labour artificially.

Perhaps these speculations as to the lines on which the maternity service will develop are wide of the mark, but I feel sure that they will tend to approach nearer to physiology, and not away from it.

THE TREATMENT OF SYPHILIS.*

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The records we publish are the results of some investigations carried out by us in an attempt to gain more definite knowledge of the exact manner in which salvarsan—or one of its substitutes—acts in syphilis. To attain this end we have taken samples of blood before each weekly injection, a method which has afforded us a number of facts from which we have drawn certain conclusions.

It is common knowledge that when salvarsan was first introduced it was thought that one injection would cure syphilis. Further experience soon showed that several injections were required and that mercury should also be given. Such is the position to-day, but although potent arsenical drugs have been in common use for ten years, there is no general agreement as to what amounts of these remedies should be employed or over what time the treatment should be continued.

Curiously enough the first patient treated with salvarsan in the skin department of Middlesex Hospital in 1910 was cured by one injection of 0.6 gram of the original preparation, although the form of malignant syphilis from which he suffered had resisted all other remedies. As he was kept under observation for four years the belief in the reality of his cure seems justified. But such a result is unique in our experience. Indeed, considerable amounts of an arsenical compound and mercury may be given and yet failure result. These failures have tended to throw some doubt upon the efficacy of this form of treatment; but one must bear in mind that failure may be due not only to a defect in a remedy, but also to the manner in which an effective remedy is used.

TABLE I.—Cases of Secondary Syphilis.

	Intra- venous N.A.B. (No. of Injections).	Total Amount (Grams).	No. of Mercury Injections, each 1 Grain.	Wassermann Reaction.
No. 63 ...	6	2.7	17	Positive 13 months after end of course.
No. 68 ...	7	3.75	24	Positive 7 months after end of course.
No. 144 ...	12	10.2	13	Positive after 6 months.
No. 164 ...	10	6.0	14	Positive at end of course.
No. 190 ...	6	3.6	24	Positive after 1 year.
No. 32: Course 1	6	3.4	32	Suspicious at end of course.
Course 2*	6	5.4	29	Two months after this negative; 6 months later positive.

* Directly after Course 1, because of suspicious Wassermann reaction.

In Table I six such cases are shown. It should be noted that all were in the secondary stage—a peculiarly favourable period; that considerable amounts of novarsenobenzol and mercury had been given; and that in every case the Wassermann reaction ultimately became positive. In No. 32 actually two separate courses were undertaken. To save repetition it may be stated here that the arsenical preparation used in all cases reported in this paper was novarsenobenzol Billon (N.A.B.) administered by the intravenous route.

This type of treatment is thus open to criticism—although it is a form commonly followed—and should be replaced by some other. Either larger doses of N.A.B. should be used, or more numerous injections given, or both. These questions received consideration when Dr. Pringle took charge of the department in 1917, and he formulated a scheme which has been adopted. It is as follows: ten intravenous injections of N.A.B. are given at

* An address to the Essex Branch of the British Medical Association on September 23rd, 1920.