to organic nervous disease. And so over-pressure from ten to seventeen years of age may have amongst its remote consequences, not only the reproduction in the same or modified forms of the functional nervous disorders which so often manifest themselves at that period, but a crop of gross nervous degenerations, which have, up to this time, been rarely seen in women. And notwithstanding all Weismann's arguments, I would say, "Woe betide the generation that springs from mothers amongst whom gross nervous degenerations abound!"

The study of the effects of over-pressure, immediate and remote, on the monthly rhythm, and on the fitness and capacity of the woman to reproduce the species and to bear healthy children—health implying both bodily and mental vigour—must be kept for separate examination at some other time. So also must a study of the effects of secondary over-pressure, as applied, in colleges and halls, to young women at from eighteen to twenty-four years of age. Admirable culture is supplied in these colleges and halls; but they, too, have their risks, notwithstanding that their pupils are all picked lives. The suicide of a pupil, who had just undergone examination at one of them, was reported two months ago. I must, however, even now express my belief that the University of St. Andrews, in deciding, as it has lately done, to open all its classes in Arts, Science, and Theology to women as well as men, has taken not a retrograde step—for our ancestors never did anything so foolish,—but a downhill step towards confusion and disaster. Its now empty benches may be thronged with pupils, its professors may batten for a time on duplex fees; but the attempt to educate young men and women, not only on the same lines but in the same coaches, cannot but prove injurious to both. "What was decided amongst the prehistoric protozoa cannot," it has been well said, "be annulled by Act of Parliament," and the essential difference between male and female cannot be obliterated at a stroke of the pen by any *Senatus Academicus*. To essay such work is to fly in the face of evolution. Amongst unicellular organisms the conjugating cells are exactly alike, and do exactly the same work in the world; but amongst multicellular organisms they are dimorphic, and from that point upwards differentiation in structure and function goes on. With occasional aberrant variation the sexes diverge from each other, not merely in primary and secondary sexual characteristics, but in functions, not directly associated with sex, as we ascend in the animal kingdom, and it is in the human species that sexual distinctions, bodily and mental, are most marked.

And with this divergent differentiation of the sexes has come more reciprocal dependence and higher harmony. It is no question of superiority or inferiority of the one sex to the other. Each sex is higher; each is lower; together they make up the perfect whole. Separate they are infirm; in union they are strong; in competition they are mutually destructive. It is in the sympathetic accord of the differentiated sexes that human progress can alone be hoped for.

"He is a half-part of a blessed man,
Left to be finished by such a she,
And she a fair divided excellence,
Whose fulness of perfection lies in him."

And blindness to this complementary relation of the sexes, so patent to Shakespeare, it is that leads wise men—wise but ignorant, or contemptuous of biology—to sanction intersexual competition in education, and for subsistence with its ruinous effects. Men and women are constitutionally adapted to do different work in the world. To set them to do the same work is wasteful, and detrimental to the sex that is less adapted to it. It is impossible to contemplate with complacency some of the experiments in this direction which are being carried out, and it is impossible to speculate, from a medical point of view, without apprehension what the outcome of such experiments may be, or what high-school, and college, and hall education may do for the country in a few generations, if they be pushed on with relentless zeal.

Those tall, graceful, lovely English girls whom we see around us so plentifully to-day, and never in the world's history has woman's beauty been so beautiful as it is in England to-day—those tall, graceful, lovely girls are the offspring of mothers who had not the advantage of a high-school education. What will the next generation of English girls be like? I saw a vision once that has haunted me ever since. It was of a score of sweet girl graduates from a celebrated college, standing together in a group on

the platform of a provincial railway station, waiting for trains to carry them home at the end of the term. Sweet they were I doubt not; most of them carried musical instruments, but they were not, upon the whole—well, not just—"fairest of the fair" to look upon. I am afraid I shall be called ribald and profane, but I should describe them as pantaloons-like girls, for many of them had a stooping gait and withered appearance, shrunk shanks and spectacles on nose. Let us conserve the beauty of our English girls very jealously. I would rather they remained ignorant of logarithms than that they lost a jot of it.

ABSTRACT OF

The Morton Lecture

ON

THE ETIOLOGY OF CANCER.

By G. SIMS WOODHEAD, M.D.,

DIRECTOR OF THE RESEARCH LABORATORY OF THE CONJOINT BOARD OF
THE ROYAL COLLEGES OF PHYSICIANS AND SURGEONS.

MR. PRESIDENT AND GENTLEMEN,—I understand that the Morton lectureship was established by its founder with the view, in the first instance, that the lecturer for the time should gather together and give in the form of a summary any fresh light that may from time to time be shed on the subject of cancer. Beyond this, however, the primary object of the founder was to stimulate thought and research in connexion with a disease the importance of an accurate knowledge of which is at present only equalled by the futility of all the efforts that have been made to elucidate even a few of the problems that a most cursory glance at the subject must at once suggest. We owe to histology and to statistics almost all the knowledge we have hitherto acquired, and most of the answers to such questions as have been solved. The clinician, to whom cancer has been one of the most absorbing studies, has done all that was within his power; but beyond determining the bounds of the periods of life during which it may occur, and the nature of the hereditary predisposition of certain subjects and tissues, this all has been but little. Even the attempts to associate the growth of cancer (and by cancer I shall to-day mean cancer in the strictest limitation of the term) with any specific causal agent have hitherto failed, and I must confess that until quite recently I have remained strongly of opinion that, although cancer may possibly be the result of certain forms of irritation, it can scarcely be looked upon as due to the vital activity of any specific micro-organism, whether animal or vegetable; in fact, I am not yet prepared to depart entirely from this position, though I must acknowledge that comparatively recent observations have been made which, if confirmed, would go far to limit the range of irritants which possibly may give rise to the proliferation of the special tissues with their special arrangement so characteristic of cancerous growths.

What I have to say to-day may be arranged under three heads:—1. The conditions within the tissues that may predispose to the formation of cancerous tumours. 2. What we know as to the nature of the irritants that are now assumed to play a specific etiological part in the production of cancers. 3. What is to be gathered in respect to the treatment of cancer from recent researches on the subject. It has frequently been insisted upon that the nucleus plays a most important part in determining the multiplication of cells. We may say, indeed, that the nucleus is the active part of the cell, in the sense that it is always the first part of the cell to undergo division. From the extraordinary size and distinctness of the nucleus and nucleolus of the cancer cell, some have gone so far as to indicate that these are practically sperm and germ cells respectively. Within these undoubtedly there is during the normal life of the individual a power of multiplication, a power which greatly varies at different stages of this life. As this power dies out under normal conditions a man dies of old age, and it is necessary for the continuance of the species that there should be a recurrence to a process of direct reproduction through the well-nourished ovum and the highly differentiated sperm cell, by the conjunction of which the cycle is recommenced.

Here we have, just as really as in the case of certain parasitic organisms, a kind of cycle or alternation of generation.

More than forty years ago, when Virchow brought forward his epoch-making doctrine that in all pathological as in all physiological processes cells beget their like, he at the same time shadowed forth the idea that, although all cells are begotten of other cells, the progeny only resemble their parents when they are produced under general conditions and surroundings, circumscribed within certain very definite limits. We now regard it as a well-known fact that by varying the conditions of nutrition, the facilities for excretion, and the nature and amount of stimulation or irritation, we can, to a certain extent, control or alter the character of the cells produced by certain tissues. Elsewhere I have indicated that it is necessary to study the epithelial tissues and the connective tissue separately, in order that we may be able to gain some insight into their relation to tumour growth. All epithelial surfaces are covered with a single layer or with several layers of cells, the forms of these cells varying very considerably according to the function that is assigned to them; in fact, they can only become fully developed as the necessity for some special function comes into play. Whatever epithelial cells we examine, and in whatever conditions, it may be accepted that the greater their vegetative power, the less completely is their functional activity developed. We have an exceedingly good example of this in what takes place in the embryo, where, development and growth going on rapidly, the cells are called upon to exert little or no function, and no draft is made on their energy and nutrition for carrying on of such function; the whole of these may therefore be devoted to reproduction. At the same time the connective-tissue cells are extremely active, although they in turn do not become fully developed, as we see from the mucous tissue that is found as the forerunner of the subcutaneous areolar tissue. It is during this period that all the in-foldings of the epithelium that take place in the foetal tissues occur. Here we have the scaffolding of the whole gland erected long before it is called upon to perform any function; whilst in the developing mammary gland of the adult, when it first becomes active, the initial draft on its resources is in connexion with an active proliferation of the cells of the gland acini, and is not associated directly with any functional activity. During this period of development of the embryo within the uterus, and of the breast at puberty, we cannot describe either of the groups of tissues as being in a *stable condition*, and we can readily imagine that with any great nutritive disturbance, especially when this impairment is due to increased demand on the cells, due to local irritation, it may result in tumour growth.

Why do we get the age distribution of tumours that was insisted upon, now many years ago, by Virchow and Paget? Why are sarcomatous tumours so much more common during foetal and early life than in old people? Why are the tumours of adult life those which have no great tendency to become malignant—adenomas, cystic glandular tumours, fibroid adenomas, or cystic sarcomas, in which we have always an increase in both sets of tissues, and which vary in one direction or another, becoming more sarcomatous or more glandular according to the age at which they are developed? Why are epitheliomas, as a rule, met with in old age, or rather at the end of adult life? May it not be that similar stimulating or irritating agents are capable of giving rise at different periods of life to these different forms of tumours, and that the essential difference consists in the different nutrient and developmental conditions of the tissues? I shall have something to say against this theory, but for the present let us look at it as affording some explanation of the occurrence of different tumours at different periods of life. In the embryo and during the first years of growth we have as yet an unbalanced condition of the tissues; the building-up process in which the connective tissues are specially concerned is going on at a great rate, and tumours occur in those tissues—the connective tissues,—on which the greatest strain is put under ordinary developmental conditions, and which therefore are, as it were, in a condition of unstable equilibrium; a comparatively slight increased stimulation being sufficient to maintain the vegetative activity at the expense of the true connective-tissue-forming power. In adult life, as has been frequently pointed out, the two sets of tissue may be looked upon as growing equally side by side; they are now both past the great vegetative strain, the connective-tissue framework has been completed, the

functionally active gland cells have taken their position and part in the economy of the tissues, and both sets have settled down to their every-day work and to their every-day nutrition; the nutrition and function of the one appearing to be dependent in a very marked degree on those of the other. An increased growth of the one is accompanied by a similar growth of the other, and in both cases the cells are so far stable that their vegetative activity is never excessive. Local irritation or increased blood-supply may set up a localised hypertrophy, as it were; but beyond this we have no tendency to the formation of malignant tumours. During the period at which cancer is most usually developed, but when of course sarcomatous tumours may also occur, the connective tissues have passed their prime. The epithelial tissues have also reached their zenith, and are now on the turn; but, as we know, they have still great vitality, sufficient, indeed, when diverted from the imperfect functional to a vegetative activity, to give rise to very large masses of imperfectly developed epithelial cells which, as in the embryo, appear to have the power of invading the connective tissue. I have long been of the opinion that in classifying cancers and epitheliomas, the age of the patient is not the only factor that had to be taken into account; the organ affected must also be taken into consideration. We know that epithelioma of the skin and mucous membrane-tissue—which function is never highly specialised, but which remains longer than in the more specialised glandular cells—is usually developed later in life than cancers of the uterus and breast in which the function is lost at a comparatively early age. Epitheliomas, for instance, are probably commoner between the ages of sixty and seventy than at any other period.

Some time ago I examined a series of tongues taken from patients of different ages, and afterwards Dr. T. W. Dewar continued the investigation of the changes that take place in the epithelial tissues in a large number of tongues taken from patients at various periods of life. As the result of this examination I should like to bring under your notice several important facts which, up to the present, have not been systematically studied. If the tongue of an old person be examined the appearance is quite different from what is seen in the tongue of an infant; the subepithelial tissue is distinctly less in amount, whilst here and there are groups of small round cells; the fibrils of the connective tissue are wider apart and appear to be considerably atrophied. The epithelial covering, on the other hand, has assumed a very different appearance. The masses of cells, instead of being simple, are more or less ramified, small finger-like processes passing down from the main column into the connective-tissue spaces; until in some cases we might almost imagine that we were examining an epithelioma, especially where there are small cell-nests formed in the thickened epithelium. When this condition of affairs is normally present—for such a condition appears to be present in the tongues of most old people—it is easy to understand how some comparatively slight but long-continued irritation at this point may give rise to an epithelioma; we have practically an invasion of the much atrophied and non-resistant connective tissue by the highly vegetative epithelium. Similarly in old people it has often been remarked that as involution of the breast proceeds the connective tissue becomes opener, the spaces larger, and the cells fewer; in fact, it becomes atrophied, and this atrophy becomes more marked as age advances. If during this period of atrophy there is no irritation, there comes a time at which the epithelium also undergoes atrophic changes, and there is a steady involution. Should there be any irritation, however, instability of the epithelial cells results; we have proliferative activity of these cells, an invasion of the non-resistant atrophied connective tissue, and the formation of a cancer.

It may be accepted for the present, then, that malignant tumours are to be looked upon as overgrowths of certain tissues started into activity by some unknown cause. This unknown cause has been a subject on which the pathologist has bestowed the most earnest attention. It has been recognised that it is necessary to search beyond the condition of the tissues themselves for a primary causal factor such as would account for the peculiar proliferation of different sets of cells under definite conditions and at certain periods of life. It has been found that malignant tumours of an epithelial type cannot be produced in healthy tissues, although certain adenomatous forms have been ascribed to the action of such irritants on compara-

tively healthy tissues. It has also been indicated that if the irritation that brings about this formation of simple tumours be continued for a considerable period, or if during the process of irritation a "cancerous age" is reached, a cancerous element—that is, rapid vegetative power of the epithelium leading to invasion of the lymphatics—is developed. What, then, can be the exciting cause of cancer formation? We have already spoken of the unbalanced condition of the tissues and of the vulnerability to invasion of connective tissues by epithelial cells under certain irritative conditions and at certain ages, first indicated by Thiersch. For the development of cancer it is necessary that there should be a continuous irritation, and one capable of multiplication. After the demonstration of the fact that bacteria were capable of setting up proliferative changes in the connective tissues, great efforts were very naturally made to determine whether similar organisms might not play an equally important part in setting up cancerous proliferation. Some observers thought they had succeeded, but the organisms were shown to be common saprophytic germs. We are, then, compelled to look elsewhere for an exciting agent, an agent which must act continuously in the sense that it has the power not only of persisting, but of increasing in quantity and in activity. It must also have, under certain conditions, the power of acting almost specifically on epithelial cells, and of setting up proliferation in them at the expense of their functional power. All these qualities must be inherent in the irritant that has the faculty of stimulating epithelium into cancerous activity; this we know from our observations on the nature of the disease.

It has long been known to zoologists, especially to those interested in the animal parasites, that we have a number of parasites most of which affect epithelial cells, which exhibit little motion, are more or less homogeneous in structure, but which are surrounded by a hard smooth cuticle. This class of organism has been specially described as occurring in the liver of the rabbit, where, under the name "coccidium," it is known to set up a peculiar irritated condition of the bile ducts, which ends in the formation of psorosperm nodules, which are really cysts containing papilliform projections covered with rapidly proliferating epithelium, in the cells of which are numerous protoplasmic bodies answering in all respects to the description above given. Similar organisms, setting up similar proliferative changes, have been described as present in the epithelial cells lining the intestine of the mouse, the dog, cat, rabbit, and even of man. On examining the literature and descriptions given of these parasites, and of the effects they produce, one cannot but be struck by the very marked similarity, not only as regards the naked-eye appearances, but also as to the histological changes generally (especially those that are found in the epithelium), between psorosperm nodules and cancerous growths. We have here, then, in the lower animals organisms which, as parasites of the epithelial tissues in which they set up and maintain continuous proliferation, and comply with all the conditions required, theoretically, in the irritant that should be the cause of cancer. This being the case, it was natural that in psorosperm infection, observers should look for the cause of epithelial cancers, and for long there has been a vigorous strife between those who believe that certain structures met with in the epithelial cells are merely colloid bodies and those who maintain that some of them at least are parasitic organisms which have a definite structure and play a definite part in the production of cancerous growths. An important paper was published by Russell, in which he pointed out that he was able to stain certain structures in cancerous tissues very brilliantly, and that these structures appeared to bear a definite causal relation to the growth of cancer.

With the assistance of Mr. Douglas Stanley, M.B., I have been able to examine a very large number of tumours kindly supplied to me by Mr. Hulke, and have so been able to confirm Russell's observations as regards the presence of his so-called fuchsin bodies. Russell looks upon these bodies as being probably somewhat closely related to the yeasts, and he describes in them a kind of reproduction by budding, which, he thinks, supports his contention. On careful examination of many specimens specially hardened with bichloride of mercury and alcohol, I was, however, led to believe that these bodies resembled the coccidia group more than any other known organism; in the larger ones especially, where there appears to be a distinct investing capsule, there is often a rather more deeply stained

centre, sometimes granular, sometimes perfectly homogeneous, whilst the differentiation between the central portion and the periphery is frequently well marked, the central portion being irregularly mottled with small radiating projections, which may be sharp-pointed or club-shaped. Again, the protoplasm within the capsule sometimes assumes a stellate form. Wherever these larger organisms are found, small fuchsin-stained points can always be distinguished in or near the nucleus of the proliferating epithelial cells; they are quite distinct from the nucleus, and the only thing to which they can be compared is the adnuclear body. In some cases the nucleus is pushed to one side, forming a crescent around one end of the fuchsin body, whilst in other cases the nucleus has almost disappeared, and the fuchsin body appeared to be surrounded by a ring of protoplasm, the remains of the epithelial cell with a little granular matter, the remains of the nucleus, at one corner. Soudakowitch's observations, recently announced in the "Annales de l'Institut Pasteur," offer most important confirmatory evidence as to the nature of these intra-cellular organisms, important because he has been able to demonstrate the possibility of throwing these objects into much greater relief than has ever yet been done. On account of the thick chitinous capsule of the coccidium, its contained protoplasm appears to be little affected by the action of weak chromic acid or Muller's fluid, and the organism continues to live and then to undergo degenerative changes after the protoplasm of the epithelial cells has been partially fixed by the hardening reagents. By fixing the tissues rapidly with bichloride of mercury, osmic acid, Fleming's solution, or absolute alcohol, the structure of these organisms is retained, in some degree at any rate, and then, by staining with logwood or with logwood and safranin, this structure can be brought out fairly distinctly. After examining specimens so prepared, so great an authority on zoology as Metchnikoff pronounces the organisms to be undoubtedly coccidia. Dr. Ruffer and Mr. J. H. Walker have placed at my disposal a number of sections stained with a combination of aniline dyes, some of which are under the microscope; others we have been able to photograph under a magnification of 800 diameters. A careful examination of these sections removes all doubt as to the nature of these bodies; they are certainly not the result of degenerative processes; they are not leucocytes or red blood-corpuscles taken into the epithelial cells, though small cells appear to find their way into the proliferating epithelial cells in some cases; equally certain is it that they are not vacuoles. They have, indeed, as Metchnikoff points out, all the characters of coccidia. In some of the capsules there appears to be a process of division going on, whilst here and there are capsules in which several (four to twelve) small rounded or crescent-shaped psorospermæ, in other respects like the coccidia except that they have no capsule, may be made out. In one or two instances these appear to be lying free between the epithelial cells, from which they have probably escaped on the breaking down of the mother capsule. They are of very various sizes, from the diameter of a red blood-corpuscles to three or four times that size. On examining a section of a rapidly growing secondary cancer in which these bodies are present, the proliferation of the epithelium is always most marked where the encapsuled bodies are most numerous. In the larger alveoli many of the cells contain these organisms, and in the long narrow spaces, where we have simply a single row of epithelium cells, every third or fourth cell may be seen to contain at least one, whilst in transverse sections of these spaces a single one of these bodies fills up the whole of the cavity. We are still very far from the proof that these organisms are the actual cause of cancer. Why should they make themselves felt only under certain conditions and at certain periods of life? We have already spoken of some of the conditions favourable to the production of cancer, and it may be, as Mr. Jonathan Hutchinson says in respect to the production of tubercle by the tubercle bacillus, that a special kind of soil, and one to which special kinds of manure have been added, is required for the nutrition of the psorospermæ. The conditions of parasitism are such that the healthy dry epithelial tissues are enabled to resist the attacks of even the most vigorous parasite; when once, however, their functional activity is impaired or their vitality somewhat lowered, the coccidia may find a nidus in which they may develop, secrete the products of their protoplasm, and so act on the epithelial cells, giving rise to proliferation and allowing

them to become fully developed, and thus by their irritation bringing them back to their embryonic form, during which their vegetative activity is increased in proportion to the impairment of their functional activity. It is this vegetative activity that enables them to invade the lymph spaces of the connective tissue. Beyond this, however, these same products of metabolism must exert an irritant effect on the connective tissue in the immediate neighbourhood of the proliferating epithelial cells, and so give rise to what is practically granulation tissue; the greater the departure of this from the normal fully developed connective tissue the more readily does it allow of the invasion of the proliferating epithelial cells. May not these secretions also play an important part in the cachexia so marked a feature not only in cancer, but in all cases of coccidial disease both in man and in animals? One extremely weak link in the chain of evidence is that hitherto all inoculation experiments with cancerous material have failed most signally to produce any cancerous reaction. At first sight this appears to be an almost insurmountable obstacle to the acceptance of coccidia as the primary causal agent in the production of cancer; but it must be remembered that the evidence offered by zoologists as to the nature of these organisms indicates that they are exceedingly fastidious, both as to the positions in which they will grow and the kind of nutriment they will take up.

In the inoculation experiments that have been made the cancerous mass has usually been introduced into the connective tissue, into the veins, or into the abdominal cavity; in which position, although it has been demonstrated that coccidia can retain their vitality for three days, the tissues in which they are lodged, and eventually the coccidia themselves, are absorbed by the new connective tissue that is formed around them, a small mass of such connective tissue being all that is left to indicate the locality of the inoculated tissue. As soon as the epithelial cells disappear, the coccidia have nothing on which they can subsist or in which they can grow, and they immediately undergo degenerative changes, and are removed just as were the epithelial cells. Under the most favourable conditions for their growth and development they appear to be able to continue their existence only when protected from the connective tissue by the proliferating epithelium in which they are lodged. It is little wonder, therefore, that inoculation experiments have not succeeded. A coccidial origin of cancer, if proved to be correct, would render it necessary that we should throw aside the doctrine that cancerous epithelium can be developed from anything but epithelial cells. We can, no doubt, find various kinds of epithelium, according to the seat of origin of the cancer, the rapidity with which the cells proliferate, and the extent of the invasion; but in every case we find epithelium which resembles in a greater or less degree normal epithelium. From what has already been said as to the relation of the coccidium to the epithelial cell, it is evident that, in order that a primary cancer may be developed or a secondary cancer grow, epithelium must be present in which the coccidium can maintain its existence and perform its parasitic functions. Before I conclude I wish to say a few words under my third head.

In all our researches as to the nature and etiology of cancer we have in view the alleviation of the suffering of those who are affected by this disease; and hitherto our main object has been to determine how far it was necessary to remove certain structures in order to minimise as far as possible the chance of any return of the disease. From a careful microscopical investigation of many hundreds of cancers that have been submitted to me for examination, I am firmly of the opinion that many surgeons make the mistake of not removing sufficiently freely either the tissues in which a cancerous growth has made its appearance or the lymphatic glands associated with it. Quite recently Mr. Harold Stiles, of Edinburgh, has carried on an extensive and careful investigation into the question of how far the immediate tissues around the naked-eye cancer of the breast are affected. His method is based upon the effect which nitric acid has upon the tissues, causing the connective tissue to become clearly differentiated from the epithelium. From a careful study of sections so prepared, both by Mr. Stiles and myself, as well as from microscopic examination, I am convinced that the only safe rule to be observed in removing cancer of the breast is to remove not only the main mass of the gland, but all outlying portions of glandular tissue, so that if on cutting away the

margins of the tumour, treating with methylated spirit and nitric acid and then with water, any opaque columns or fragments are to be seen still, I should consider that the removal has not been free enough. Of course, the part of the tumour that should be specially examined in such a case is that near the sternum, where, on account of the shape of the incision usually adopted, as pointed out by the late Charles Moore and mentioned to me by Mr. Hulke, there is the greatest danger of fragments of the gland being left. I shall not to-day attempt to enter into any discussion as to the relative frequency of the spread of cancer by bloodvessels and by lymphatics, although latterly some doubt has been thrown on the accuracy of our present teaching in regard to this question. I will merely state that I am more and more convinced that cancer extends almost entirely by the lymphatic vessels, that this takes place not only locally by direct extension, but in some cases where the lymphatics are especially wide, and especially after they have been called upon to do temporary extra work, the cells may make their way for some distance without leaving any intermediate trace between themselves and the parent mass. It may appear that I am taking much for granted, and of which at present we have extremely insufficient proof; but I hold that until we have more definite knowledge on all these points, we must for the sake of our patients accept them as proved, and certainly take them into consideration when planning out our method of treatment.

OUR MISTAKES.¹

BY WILLIAM MURRAY, M.D., F.R.C.P. LOND.

THE man who makes no mistakes seldom or never does anything worthy of note. Life is so closely interwoven with tentative efforts on the part of those who keep its machinery in motion, that it would be strange indeed if mistakes were not often made. As experience, often dearly bought, on the part of both doctor and patient, is our best guide amidst the pitfalls which surround us, I think it is a most profitable task to go over the ground of our past experiences and gather up the lessons taught us by our failures and mistakes. A great general was once found making a careful survey of the field of a battle which he had won. On being asked what he was doing, he said he was *studying his mistakes*—a lesson well worthy of our imitation. Our mistakes may be divided into (1) those which can and ought to be avoided by every intelligent, well-taught, and experienced practitioner; (2) those which can only be avoided by an unusual amount of experience and insight; (3) those which no amount of care, experience, or insight would enable us to avoid. I shall give examples of these as we proceed. In disease nature is for ever making fresh experiments before our eyes, and we are to watch how she varies the experiment, lest its many variations from the normal type of the disease mislead us into a false diagnosis. Each disease varies as much in expression as the human countenance. In my experience no two cases are exactly alike. What is described as a typical case exists only in the imagination of the writer of a text-book or a lecturer to his class. This typical case is like the archetypal vertebra, which exists only in the brain of the anatomist; all real vertebrae are, like all real diseases, variations from the typical. To push the analogy, just as the skilled anatomist can amplify the most rudimentary vertebra into one possessed of all its parts, so the skilled physician can grasp the true nature of a case and build up a diagnosis from the faintest indications; and, further, he can simplify and reduce to order the most irregular and complicated manifestations of a difficult case. It is by the exercise of this constructive faculty on the one hand, and by that analytical faculty on the other, that our difficulties are to be overcome and our mistakes avoided.

With regard to the first class of mistakes—namely, those which ought to be avoided,—let me remark that the best of us will sometimes be caught napping. “Nemo mortalium omnibus horis sapit.” We somehow get on the wrong scent in a case, and becoming occupied by a train of minor symptoms, miss its main features; or we are the victims of

¹ An Address delivered before the Newcastle Clinical Society.