ardour to those branches of education which they are led to believe to be most important; and, when they find obstetrics and gynaecology relegated to a summer course, they very reasonably suppose that they can well afford to neglect them. Moreover, those who do follow the teaching of their professors with some degree of attention, have only a garbled and mutilated epitome of midwifery proper presented to them; for what human being can possibly accomplish the impossible task of doing more than that in forty lectures, while gynaecology cannot even be alluded to? It is really lamentable to think of the hundreds of men who are launched into the daily work of practice with such preparation as this; and of the infinite suffering and misery which their ignorance, for which they cannot fairly be held responsible, may cause. To those on whom is imposed the impossible task of teaching midwifery under such conditions, the question is of vital moment. We may remonstrate; we may disclaim responsibility; but the fact remains, that we are the men to whom the students look for instruction. And when, being men with consciences, we reflect on the risk to life and the damage to health that may follow, we cannot, I am sure, but feel it to be our duty to protest as strongly as we can. It was only the other day that the Fellows of the Royal College of Physicians, assembled in Comitia, found it necessary to complain of the ignorance of the candidates who applied for the College licence on topics connected with practical obstetrics. I have had the honour to examine for that licence, and I know that the complaint was not unfounded. But what remedy did they suggest? It is hardly credible, but it is a fact, that all they proposed was to issue a circular to the teachers of midwifery, begging them to pay more attention to the teaching of obstetrics; while at the same time they rejected a motion, proposed by Dr. Barnes and seconded by myself, that they should recommend an extension of the period of instruction to six months. In the face of the repeated assertion of the metropolitan teachers of midwifery that they could not possibly teach their subject in the time allotted to them, such a circular was a manifest absurdity, and could have no possible effect but that of demonstrating the ignorance of those who proposed it.

I do not think that a meeting such as this can do anything to enforce the needed reform; but the opinion of the profession at large is, beyond doubt, a great power; and therefore I have ventured to trespass on your patience by referring to this topic, since it is one which must interest you all, especially such of you as have sons or relatives who are to follow your steps; and I feel confident that, if due pressure be applied, both to the examining bodies and by your individual advice to the members of the legislature with whom you may have influence, in the new scheme for conjoint examination which must ere long become law, the due claims of obstetrics will no longer be so unfairly overlooked as has hitherto been the case.

And now, gentlemen, having ventilated a pet grievance of my own, I shall not occupy your time further by any introductory remarks on the work before us, since it will be far more profitably employed in listening to the discussions and papers which form part of our programme. The selection of set subjects for discussion is somewhat of a novelty in our sectional arrangements; and I hope you will think that those we have chosen this year are not only interesting in themselves, but are of great practical value. You will, I am sure, agree with me that the Section is peculiarly fortunate in having Mr. Spencer Wells to introduce that on abdominal section. Only a few weeks ago, he performed his thousandth ovariectomy; and, having accomplished that astonishing feat, and won for himself undying fame as the practical father of abdominal surgery, he may well turn his energies into a new direction, and reap fresh laurels in developing a comparatively new and untried branch of operative skill. It is not to be expected that an operation requiring so much manipulative dexterity can ever be widely performed; nor are the cases in which it is even to be contemplated of anything like the frequent occurrence of those requiring ovariectomy. Still it is a matter of primary consequence that its indications, risks, and methods should be thoroughly and closely studied; and I anticipate that the discussion about to be commenced will naturally increase our knowledge of the subject.

The second topic we have selected for discussion is of scarcely less interest; and, bearing in mind that it treats of the best means of dealing with emergencies that may happen at any moment in the practice of any one of us, of still greater practical importance. I know of nothing in practice more trying, and more requiring cool judgment, than a sudden and severe attack of *post partum* hæmorrhage. Fortunately, modern science places at our disposal means of arresting hæmorrhage and of obviating its effects, such as the injection of styptic solutions, the use of hot water irrigations, and the hypodermic injection of ergotin and sulphuric ether, which were unknown to our predecessors, and with regard to which much remains to be learnt.

In addition to these subjects of debate, we have a superabundance of

most valuable and interesting papers on questions of great importance. I greatly fear that the time at our disposal will not enable us to do them the justice they deserve; but, in order that we may do our best, I shall not further trespass on your patience with any remarks of my own, but proceed at once to the work that lies before us.

AN ADDRESS

DELIVERED AT THE OPENING OF

THE SECTION OF PSYCHOLOGY,

*At the Annual Meeting of the British Medical Association,
at Cambridge, August 1880.*

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CIRCLES OF MENTAL DISORDER—MODERN NERVOUS DISEASES.

THE General Council of Medical Education and Registration, at its recent session, declined to recommend the licensing bodies of this kingdom to make mental diseases a subject of separate examination for all degrees and licences to practise medicine; and those who know most of the state of medical education on the one hand, and of Psychological Medicine on the other, will, I think, approve the decision at which the Council arrived. The curriculum which a student of medicine has to pursue is already so laborious and varied, that cogent reasons ought to be adduced for adding in any way to its intricacy and burdens; while the teachings of psychological medicine are still so ambiguous and unsystematic, that they can scarcely pretend to supply either much useful instruction or a valuable discipline to the mind. A specialty in medicine—and psychological medicine is a natural and inevitable specialty—is a late differentiation of professional knowledge, and implies skill and attainments that should be sought for only after a liberal general training is complete. To incorporate special study with general medical education is, therefore, to do injustice to both; for general medical education, which already fully occupies the time set apart for it, must be detrimentally curtailed or compressed to make room for the special study; and the special study cannot be advantageously carried on while the foundations on which it ought to rest have not been wholly laid down nor thoroughly consolidated. Facilities for the special study of medical psychology, and perhaps also some test of proficiency in it, ought to be provided for those who propose to devote themselves to lunacy practice; but no one should be encouraged to avail himself of these facilities, nor submit to this test, until he has finished his general medical studies and surmounted his examinations. For those, however, who look to general practice, such an acquaintance with insanity as may be obtained in connection with the study of physiology, medicine, and medical jurisprudence, should be considered sufficient, until the exigencies of professional life bring with them their special and inimitable training in this as in so many other subjects.

But, while we deprecate the introduction of the subject of mental diseases into medical education and examinations, we may, without inconsistency, applaud its recognition by this Association, and the dedication of a Section to its consideration at these annual meetings; for this Association, representing as it does the breadth and culture of the profession, its theoretical scope and practical aims, could not, without grievous default, ignore a department of medical science that is in intimate relation with philosophy, and a branch of practice that deals with a large class of diseases, and in which a numerous body of able and painstaking men are engaged. To overlook medical psychology at these meetings, and to relegate the consideration of it to societies composed entirely of those who march under its banner, would, it seems to me, be to inflict some deprivation on medical psychologists and the Association generally. It would be to deprive the former of the benefit they draw from contrasting their special experiences; while at the same time they come into contact with professional brethren of views and habits of thought different from their own, and obtain a commanding survey of the whole field of medicine, with its broad central expanses and fringe of minor allotments. And it would be to deprive the latter of the advantage it derives from bringing before its members in a convenient way whatever advances are being made in the knowledge and treatment of a group of diseases that have an ever-growing interest for all who practise medicine.

Medical psychology is, as I have said, an inevitable specialty; but it is a specialty that is broadly based on general medicine, and that tends, not, as some specialties unhappily do, to become pedunculated into a quackery, but to increase the breadth and depth of its attachments to the parent stock. It becomes daily more and more apparent that a bodily derangement is responsible for every mental disorder, and that a mental element mingles with every bodily disease. Upon the medical psychologist, therefore, it is incumbent to keep abreast of general pathology; while upon the general practitioner it is incumbent to know something of the progress of psychological medicine. And how important to the public it is that the duty of each of them in these respects should be diligently performed, becomes apparent when we contemplate the number of victims of mental disease that we have with us now, and of diseases which, although they may not be designated mental, nor fall immediately within the province of medical psychology, are still in close alliance with insanity.

According to the latest official returns, there were, on the 1st of January last, 71,191 lunatics, idiots, and persons of unsound mind, in England and Wales; 9,624 in Scotland; and 12,819 in Ireland,—making a grand total of 93,634 persons labouring under mental diseases or defects in Great Britain and Ireland. But this grand total, we must recollect, represents only certified or officially recognised lunatics and idiots, and corresponds with an inner circle of insanity, marked off by an arbitrary and somewhat shifting line, and outside of which lies a second circle, embracing a multitude of persons who are subject to no legal restraint, but still come to a large extent under medical supervision, and cannot be shut out from any scientific survey of insanity. Within this second circle—the crazy circle, I should be inclined to call it—fall lunatics whose mental disease, although patent enough, is of so inoffensive a kind that it is not thought justifiable to interfere with their liberty; lunatics whose mental disease is concealed; and lunatics whose mental disease is of a partial character, and is not, perhaps, popularly regarded as mental disease at all. Here we have instances of incipient insanity that has not yet expanded into dimensions that are perceptible to the eye of the law, and of chronic insanity that has crept out of its range of vision; and hosts of eccentric, half-mad, crackbrained, and imbecile persons, who move about in every grade of society. No census of the population of this second or crazy circle has ever been attempted; but that it is very great, may be inferred from a number of circumstances. The late Premier told us that he had to keep a capacious bag for the crazy correspondence from presumably sensible people that was constantly pouring in upon him; and the Astronomer-Royal, we are informed, has a row of pigeon-holes, in which are stowed away the mad communications as to perpetual motion, the squaring of the circle, and other obscure problems, that reach him daily from unappreciated lunatics. Our courts of justice are but too often engaged in investigating crimes committed by indisputable lunatics, whose insanity was not noticed until it culminated in violence or fraud; and our coroners can tell a dismal tale of the consequences of mental disease that has never secured official recognition. There are now upwards of one thousand seven hundred suicides in England and Wales annually, and of these not more than thirty occur amongst registered lunatics of all classes; but in at least three-fourths of these one thousand seven hundred suicides, as appears from evidence given at the inquests, there were distinct signs of mental unsoundness preceding, often for considerable periods, the act of self-destruction; and, as suicide is but the crowning expression of melancholia of a certain intensity, and is only resorted to by a small percentage of those who suffer from mental despondency, the fact that not fewer than one thousand three hundred suicides of unregistered insane persons take place in England and Wales yearly reveals great unfathomed depths of mental unhealthiness in our community. And the experience of medical men also points to vast reserves of hidden and unauthenticated insanity. Of the patients whom they are called on to certify insane, a large proportion have been more or less mentally deranged for months, or even years, before the date at which legal or medical intervention is deemed requisite; and of the patients who seek their advice for mere bodily ailments, a certain number prove to be unmistakably mad, even when they are figuring as useful members of society, and are unsuspected, save by their nearest relatives, of any mental taint.

With the view of obtaining an approximative estimate of the contents of the crazy circle, I some time ago asked a few of my friends, both lay and medical, to scrutinise for me their own acquaintance, and to jot down, firstly, the number of acknowledged lunatics within that acquaintance, whether in asylums, boarded in private houses, or at home; and, secondly, the number of individuals included in it who, although not certified or acknowledged lunatics, are still held in general estimation to be *non compos mentis*—eccentric or half mad. Well, the result of that inquiry was that, within its range, the half mad were to

the mad as two to one; from which we should have to conclude that there are, at the present time upwards of 180,000 occupants of our crazy circle in the United Kingdom. Now, I am not inclined to adopt or defend that computation, nor to attach undue importance to an inquiry so trivial in character and so beset with sources of fallacy. I only refer to it as affording some corroboration of the belief that there is much unrecognised insanity in the country, and that the crazy circle is densely populated.

But if we had summed up all the constituents of the crazy circle surrounding the circle of recognised insanity, we should still not have exhausted the material with which medical psychology is concerned; for, beyond the crazy circle, there lies another and an outer circle, which may be named neurotic, and in which are assembled the sufferers from all forms of nervous disease that are not necessarily accompanied by mental disorder, but that must be placed in the same category with insanity, and that in many instances tend towards it. These are epilepsy and paralysis, locomotor ataxia, and every sort of spinal mischief, neuralgia, hysteria, chorea, and, indeed, the whole order of nervous diseases, which, it need scarcely be said, are widely prevalent amongst our population. The returns of the Registrar-General, which are unavoidably most imperfect on this point, show that nearly 70,000 deaths are attributed to nervous disease in England and Wales each year; and as these diseases are not all acute in their course, and are sometimes much protracted, this rate of mortality betokens that the number of persons afflicted by them and living at one time, must be very considerable.

In the three concentric circles that I have enumerated, the insane, the crazy, and the neurotic, interchange and circulation is of course perpetually going on. They are incessantly agitated by centripetal and centrifugal and rotatory currents. A person who has been simply neurotic becomes suddenly insane, and rushes into the central circle. A certified lunatic recovers partially, and being emancipated from restraint, steps into the crazy circle. And a crazy being with occasional acute exacerbations of his craziness requiring temporary asylum treatment, oscillates between the crazy and the insane circles. And as I have already hinted, these circles are not sharply demarcated from each other. On the contrary, the whole mass of mental and nerve disease is finely gradated from the centre to the circumference, and the lines enclosing the circles into which it is for convenience divided, are drawn in an arbitrary manner, and are not by any means fixed and immovable. Hence the difficulties that arise in determining whether the contents of any of the circles are increasing or diminishing, for the shifting of the containing line in the slightest degree would obviously altogether vitiate any comparison of the quantity of the contents of any two circles at two periods, one before and the other after the shifting. With reference to the insane circle, it is alleged that its radius, which is really the definition of insanity, is of an elastic nature, and has been stretched in modern times so as to comprehend much that formerly belonged to the circle of craziness. And thus an explanation, that will not seriously alarm us, is offered of the startling fact that the number of our registered lunatics and idiots has nearly doubled itself in the last twenty-one years, having increased from 37,762 in 1859, to 71,191 on the 1st of January last. Under the influence of the lunacy laws, we are told, and of a more liberal popular conception of insanity, a considerable belt of what was formerly the crazy circle has been annexed to the insane one; and this annexation, together with the enlargement of all the circles in proportion to the increase of the population, will account for its strangely increased dimensions and for the enormous increment of lunatics and idiots with which we have now to deal. For my part, I am not able to credit this flattering tale, nor to perceive any proof that the definition of insanity has been extended in the manner alleged; but I cannot pause here to examine this vexed and entangled question by the old methods. I desire rather to call your attention to the dimensions of the outer, or neurotic, than to those of the inner, or insane circle; and in doing so, I may, perhaps, throw some light on the dispute as to the real or fictitious character of the enlargement of the latter. For probably a certain proportion is maintained between these two circles. Many nervous diseases lead up to and eventuate in mental derangement, and the *neuroses* of one generation are not rarely the *insanias* of the next. We should expect, therefore, that any marked increase or diminution in neurotic affections, would be followed, after a time, by a corresponding rise or fall in the rate of prevalence of affections of the mind.

Well, the fact seems to be that neurotic affections are increasing and multiplying on every hand. Dr. Beard, an American physician, who has studied the subject with much ability, maintains that an entirely new state of the system, a morbid nervousness, unknown to the ancients or to the fathers of medicine, has developed itself amongst

his countrymen during the last half century. This state declares itself in neuralgia, sick-headache, dyspepsia, hay-fever, and above all in neurasthenia or nervous exhaustion; and Dr. Beard appears to think that this is that has set its stamp upon bodily configuration—making the Americans taller, thinner, and lankier than their original stock in England and Germany. The indications which he adduces of the unprecedented nervousness of the inhabitants of the United States, when that nervousness has not mounted into actual disease, are their increased sensitiveness to cold and heat, rendering them unable to live with comfort in rooms of a temperature lower than 70° F., their greatly augmented susceptibility to the action of stimulants and narcotics, the customary doses of which have had to be universally reduced in modern times, the premature decay of their teeth, and their utter inability to digest pork, which their grandfathers partook of in large quantities with impunity. From his own observations, and from the information which he has obtained from old and experienced physicians, and from medical literature, Dr. Beard unhesitatingly concludes, that all nervous diseases are on the increase in America, that many bodily diseases are assuming a nervous or asthenic type, and that nervous exhaustion is so common that it must be regarded as a distinct disease of which there are several varieties.

In this country, nervousness has not certainly obtained the ascendancy that it is represented by American physicians to have secured, at least in certain districts—notably, in the Northern and Eastern States—on the other side of the Atlantic. And yet, we are not without evidences that nervousness, that is to say, the nervous temperament and diathesis, are much more common in these Islands than they used to be, and that in some respects we are approaching the state of matters that exists in America. It has even been maintained that in bodily habit our people are visibly adopting the style of Brother Jonathan, and that fat people are less numerous, and thin people more numerous, in the well fed classes of society, than was formerly the case. Allowing, it is said, for the effects of changes in diet, and for the deceptions which changes of costume, like that from crinoline to tying-back and jerseys, may create, it is still manifest that our nation is growing thinner as a whole, and that plumpness is giving place to elegant attenuation. I daresay many of us recollect Hawthorne's description of a middle-aged Englishwoman as she appeared to him in 1863. "She has an awful ponderosity of frame," it ran, "not pulpy, like the looser development of our few fat women, but massive, with solid beef and streaky tallow, so that (though struggling manfully against the idea) you inevitably think of her as made of steaks and sirloins. When she walks, her advance is elephantine; when she sits down, it is on a great round space of her Maker's footstool, where she looks as if nothing could ever move her." That was a coarse and ungracious caricature to come from a pen usually so dainty and kindly as that of Hawthorne; but it would, I think, give comparatively little offence if published now, compared with the storm of indignation that greeted it at the date of its appearance, and simply for the reason that there would be less truth in it. Very stout women, even middle-aged, are, I fancy, less frequently met with than they formerly were; while our young women, although, happily, far from rivalling the slimmness of American girls, are, on the average, probably thinner than their grandmothers were at the same age. If this is so, we can only attribute the change which has taken place to the influence of the conditions of modern life upon the nervous system, and through the nervous system upon the nutrition of the tissues. The female sex is of nervous temperament as compared with the male sex, and Laycock used to say that feminine and nervous were synonymous terms. It is, therefore, in women that we should expect to find the earliest and most marked manifestations of changes in the nervous system, influencing nutrition, like those just alluded to, and also of changes establishing greater susceptibility in sensory perception, which has also been pointed to as a sign of the growing nervousness of the age. Our refined and nicely discriminating nerves, it has been asserted, cannot, without discomfort, endure the strong impressions that give to coarse nervous organisations only an agreeable stimulus; and hence the substitution in modern decorative art of delicate combinations and neutral tints, for the glare of primary hues, orange and red and purple, which were in vogue in days less nervous than ours.

All this, however, is somewhat problematical, and we are not without more definite proofs that nervousness is increasing amongst us. What might perhaps be regarded as the best of all proofs of that proposition—an increase in the rate of mortality from nervous diseases, the results of nervousness—cannot be adduced in its support, for the returns show that nervous diseases, as a whole, were as fatal twenty years ago as they are now, and that the number of deaths ascribed to them has fluctuated very little from year to year. But it is to be borne in mind that the death-rate from nervous diseases, as officially set forth, is but a fallacious guide to any estimate of their prevalence, for a large number

of the victims of nervous disease succumb to intercurrent maladies, which are registered as the causes of death; and nervous diseases might be disseminating themselves widely amongst us, while nothing in the death-rate gave token of the process. Then, analysis of the return of deaths due to diseases of the nervous system reveals that, while that return, as a whole, has undergone little change, very remarkable changes have taken place in the items of which it is made up. A great reduction has taken place in the number of deaths ascribed to "convulsions", a term which used to cover a multitude of infantile ailments—many of them not nervous at all—and which is still too indiscriminately applied, while a compensatory augmentation has taken place in the number of deaths ascribed to other and less obscure diseases of the nervous system, about which there could be no mistake. As, then, owing to increased care and skill in diagnosis, a large number of deaths which were formerly improperly classified under diseases of the nervous system, are now classified under other headings, and as, notwithstanding this, the death-rate from diseases of the nervous system remains the same, we are entitled to conclude that there has been an increase in the death-rate from nervous diseases, although this is not apparent on the face of the returns.

It is not, however, in connection with the death-rate due to diseases of the nervous system themselves, that the increasing nervousness of this country is most clearly evinced. That comes out most distinctly in connection with the prevalence of other diseases not called nervous, but containing a powerful nervous ingredient. In diabetes, the nervous system plays an important part, and the highest authorities are agreed that it is often brought on by mental anxiety and distress, or by sudden fear and shock. Well, diabetes is advancing with rapid strides in this country. In the year 1863, it caused twenty-seven deaths in every hundred thousand persons living; in the year 1878, it caused forty-three deaths in every hundred thousand living, having advanced steadily year by year in the interim. Dr. Pavy, who speaks from an unique experience, and with unsurpassed insight, is satisfied that these figures cannot be explained away by supposing that there is a more painstaking search for, and a readier recognition of, the disease now-a-days than of yore. He believes that the disease is decidedly more common than it was, and he attributes its greater prevalence to the increased wear and tear of these times. Kidney-diseases, including under these nephritis and Bright's disease, have also advanced rapidly in recent years, having caused 338 deaths in every hundred thousand persons living in 1878, against 215 in the same number living in 1863; and in kidney-diseases, we are now taught to believe, conditions of the nervous system are often involved. Dr. Clifford Allbutt has shown that mental worry is the chief cause of granular kidney; and Dr. George Johnson, while not agreeing with Dr. Allbutt on this point, holds that there is a real etiological relation between mental anxiety and some cases of albuminuria, and that mental emotion often aggravates chronic renal diseases. Heart-diseases are year by year advancing all along the line, and particularly in their neurotic wing. They caused 909 deaths in every hundred thousand persons living in 1863, and 1,373 deaths in every hundred thousand living in 1878, and the movement must be traced, in part at least, as Dr. Quain has pointed out, to the operation of the conditions of modern life, through the nervous system, upon the organs of circulation. The deaths due to aneurism, which in my experience is as much connected with mental as with physical strain, have increased in proportion to the deaths from heart-disease. Rheumatism, in which there is unquestionably a nervous element, and gout, the neurotic character of which has been ingeniously vindicated by Dr. Duckworth, are both much more fatal than they were twenty years ago.

But without any increase in the death-rate from diseases in which there is a nervous element, or from nervous diseases themselves, it is still possible that the latter might be multiplying amongst us in a disastrous manner. For there are diseases of this class which do not shorten life. They cause chronic invalidism; they cripple power, and mar usefulness; they spread wretchedness around; they embitter existence, but they do not curtail it. Indeed, it might be argued that a few mild types of nervous disease are favourable to longevity, by imposing on those whom they afflict a strict regard to health, by withdrawing them from participation in pursuits that are beset with risks, and, by creating a state of system that is indisposed to acute inflammatory attacks. Many observant medical men are of opinion that cases of the minor nervous affections, about which no statistics are available, of hysteria and fidgets, herpes zoster, and urticaria, writers' cramp, and sick headache, are now studded over practice with a profusion that was formerly unknown. Premature baldness is far more frequent than it used to be. Early decay of the teeth occurs in the rising generation with painful frequency. Annual holidays have become a necessity, instead of a luxury. A new literature of neurology has sprung up of late years. New hospitals dedicated to the treatment of nervous diseases have been

established; a new set of specialist physicians have adopted that line of practice. The consumption of neurotic remedies, of morphia, hyoscyamus, conium, chloral, the bromides, arsenic, strychnia, and gelsiminum, is enormously on the increase, as is also the consumption of neurotic beverages like tea and coffee, and of that great nerve sedative, tobacco.

These facts and considerations, and many more of like import, which might be placed before you did time permit, seem to warrant the inferences, that nervousness and nervous diseases are increasing in this country, that the neurotic circle is enlarging out of proportion to the increase of the population, and that the crazy and insane circles which draw from it the bulk of their constituents, are also probably enlarging in a manner disproportionate to the increase of population.

To inquire fully into the causes of this increase of nervousness and nervous disease, would be to enter on an investigation of great interest but of vast extent. They may all, however, be summed up under, 1st. the increasing complexity of the nervous system and, 2nd, the increasing complexity of life. Neural development is still going on in the brain. It is not improbable that that organ is increasing in size in our race, and, of course, an addition to its weight that would be imperceptible in the scales might be of profound import in relation to its functional activity. But without increasing its size, the brain may elaborate its structure by putting forth new gyri, deepening its grey matter, developing new cells, and laying down new commissural fibres, to an incalculable degree; and this much is certain, that whatever their nature be, organic processes are going on in the brain, by which new impressions and new modes of action are registered and transmitted from one generation to another. Thus it is that we, who are of the latest birth of time, inherit something from all past ages, a legacy which is paid not only in wealth of printed books, in cultivated continents, in multitudinous cities, in opulence of arts, in obedient armies of machines and scientific instruments, but in the finer architecture of our brains, in the enrichment of our nervous systems, in new phases of intelligence, and even in new proclivities to disease. For it would seem that subtlety of the higher nerve-centres brings with it instability, and that, as brain-substance grows finer in texture it becomes more explosive in nature.

"Intelligence", says Herbert Spencer, "is the adjustment of the inner to the outer relations". If, then, the outer relations become more numerous, complex, and heterogeneous, the process of adjustment must become proportionately more difficult and hazardous. And our outer relations have surely grown numerous, complex, and heterogeneous in modern times. Our environment has grown varied and intricate; and our environment it is that contains those conditions of modern life, which, acting upon complex and subtle nerve-centres, cause our increased nervousness and increased liability to nervous disease. On every class and on all ages, the pressure of modern life puts a severer tension. Competition waxes keener; the struggle for existence grows more exciting; and that this struggle involves danger is certain, for statisticians tell us that annuitants, clergymen, and the well-to-do classes who have to take no thought for the morrow, live longer than shopkeepers, artisans, and labourers, who have to contend for daily bread. In this struggle, men find it to their advantage to crowd into towns, and Mr. Bright looks forward to a gradual diminution of the rural, and an increase of the urban, population. Well, it is in towns that nervousness and nervous diseases most abound, their growth being encouraged apparently by the excitement of town-life, by the absence of the refining and tranquilising influences of nature, and by the relaxation of those social restraints which conduce to rectitude of conduct in villages and small communities.

Of the many conditions of modern life which may be influential in promoting nervousness, and therefore in contributing to the increase of nervous and mental diseases, there is just one to which I would wish to direct your attention in the time that remains to me, and that is education. Now, it is perhaps somewhat disquieting to be told that education may be a source of disease. We have been accustomed to regard it as the panacea against all diseases, and we have just adopted a national system of education, and greatly improved our standard of culture and machinery of instruction in the hope that we shall thereby abolish or mitigate most of the evils by which the body politic is afflicted. Against the beneficial effects of education, no physiologist or medical psychologist can have a word to say. They know well, none better, that it may be a safeguard of bodily vigour and mental integrity. Undisciplined grey matter is apt to be unstable grey matter, and the want of proper exercise, when nourishment is abundantly supplied, favours a rank and spongy development of feebly acting tissue. The brain steeped in idleness may degenerate as well as the brain that is

worn and frayed with excessive toil; while ignorance is for ever betraying the ignorant into a violation of those laws, the observance of which is indispensable to the well-being of the brain. But, on the other hand, the physiologist and the psychologist know also that education, while it secures many and great advantages, brings with it certain dangers that are peculiarly its own. They know that, under certain circumstances and in certain directions, it may be a menace to health and sow broadcast the seeds of disease. To them education is the guidance of growth, and it may be good or bad according as it is calculated to result in constitutional vigour, and a harmonious and well balanced development of parts, or in constitutional debility and a disproportionate and irregular development of parts.

The general tendency of education is unquestionably to increase the activity and susceptibility of the nervous system. It aims at establishing in the supreme nerve-centres certain approved channels of least resistance and areas of ready diffusion, and in doing this, it has to modify the nutrition of these centres and stimulate their growth. It involves increased use of the brain, during which, of course, a larger supply of blood is received, and the vessels become enlarged. In the robust and enduring, this process, if wisely conducted, goes on without detriment to health, and in certain temperaments even with advantage to it. But in the fragile and sickly, in those who are badly nourished, or scrofulous, who are unprepared by inheritance for brain-labour or who are precocious and excitable, it may work serious mischief, particularly if it be pushed on with injudicious haste or ill considered zeal. Then it is that it not only quickens the action of the nervous system, thus causing nervousness, but induces exhaustion of the brain and even structural changes in it.

Dr. Treichler of Bad-Lenk-Bern, in a paper read last year to the Society of Natural Historians and Physicians of Germany, called attention to the great increase of habitual headaches, which has, he alleges, taken place amongst boys and girls, and attributed this to the exhausting effects of excessive and ill-directed brain-work in schools. The publication of an abstract of Dr. Treichler's paper in the *Times* has led to a very full discussion of the subject of which it treats by medical men and educationalists amongst ourselves, and the result of that discussion seems to me to be this, that whilst Dr. Treichler has exposed serious dangers which lurk in our present teaching processes, his estimate that one-third of the pupils attending schools in France and Germany suffer from headaches, which destroy much of the happiness of life and blunt the acuteness of the faculties, is probably an exaggeration. With us, at any rate, no such proportion of children attending schools of any class are subject to headaches brought on by over-exertion of the mind or any other cause. But still an appreciable and perhaps increasing number of school-children in this country suffer from recurrent headaches which are dependent on the toils and anxieties of school-life, and a great many are injuriously affected by these toils and anxieties in a variety of other ways. Mr. Brudenell Carter long ago pointed out that stupidity may be artificially induced by unintelligent and injudicious teaching in schools; and many physicians have recorded cases in which sleeplessness, night-terrors, somnambulism, epilepsy, hydrocephalus, hallucinations, and other maladies have followed upon educational pressure unwisely applied to weakly children.

It is of course difficult to measure, even roughly, the evil consequences of educational pressure and brain-fatigue. Headaches may be unaccompanied by any very ostensible symptoms and may scarcely interfere with school attendance. The manufacture of stupidity may be carried on on a large scale, and obtain no recognition in inspector's reports, and tissue-degenerations and mental diseases may be separated, by long intervals of time from the premature or inordinate stimulation of the brain in which their roots really lie. It is only in exceptional instances that that stimulation brings on at once disabling or fatal disease. Some indication, however, of its effects in that exceptional direction may be discovered, I think, in the curious fact that of late years, in which it will not be denied that the schoolmaster has been abroad, the increase in the number of deaths from hydrocephalus has been not amongst infants under five years of age, but among children and young persons from five to twenty-five, that is to say, in the education and post-education periods. Then evidence of the more remote evil consequences of intemperance in education may be seen in the preponderance of nervous diseases in the refined and cultivated classes, and in the parallelism which has been observed all over Europe between the progress of education and the increase of suicides.

If, then, education may have such pernicious consequences as those just enumerated, and many more might have been added to the list, it is clear that it must be carefully guarded and regulated; but guarding and regulation such as required can come only from the physiologist and

psychologist. The schoolmaster must therefore take counsel with them, and they, on their part, must enter more deeply than heretofore into the embryology and evolution of brain and mind, so that they may be able to supply precise rules for the guidance of growth. No doubt much valuable information on this subject has been already accumulated, justifying the promulgation of rules for the preservation of health during education, and for the avoidance of its detrimental effects, which are still but too little regarded. Our knowledge of the growth of the body has enabled us to arrive at some safe conclusions as to the growth of the mind. But an altogether new vista is opened up to us in reference to education by recent discoveries as to the localisation of function in the brain; and no more important problem in connection with education and neurology now awaits solution than that relating to the natural order of development of the various centres of which the brain is made up.

The brain of a foetus differs from that of an adult not only in size, consistence, and external configuration, being comparatively deficient in secondary gyri, but also in internal structure. Its cineritious substance is composed of an unvaried nucleated network, the nuclei being rounded, and none of those cells with intercommunicating processes being visible, which at a later period are characteristic of the grey matter of the convolutions. As development advances the brain increases in bulk and density, the gyri became more complicated in their arrangement, and layers may be distinguished in the grey matter containing nerve-elements of varied appearance, in which, moreover, cells of different shapes with numerous processes are conspicuous. In the adult brain, as the admirable investigations of Bevan-Lewis and Lockhart Clarke have demonstrated, a structural differentiation has been established in different areas of the hemisphere. In certain portions of their surface, the grey matter is six laminated, in other portions it is five laminated, the latter arrangement being more distinct in the parietal and frontal convolutions, constituting the excitable or motor area of the brain, where so-called giant-cells exist in irregular clusters or aggregations.

Now, we are still unable to say at what stages of growth this elaboration of cerebral structure takes place, but we have grounds for believing that it goes on gradually, but not uniformly, the budding and branching of the cells commencing in certain territories or centres and spreading from them in various directions. It is perhaps late in life before the multiplication of cells, and the extension of their interlacements are at an end; for it is certain that the brain may continue to increase in size until upwards of thirty years of age, and that in every nerve-centre, structural complexity may be augmented, long after the limit of bulk has been reached. Then there can be no question that the functional activity of the different centres is established at different epochs and perfected at different rates. The senses, the motor powers, the emotions, the intellectual faculties, do not come all at once, nor drop in fortuitously now and again. They present themselves in a definite succession, and with a strict regard to evolutionary precedence in the infant, the child, and the youth, from the most simple reflex acts to the supreme efforts of will. Each centre emerges from its "antenatal gloom" at an appointed time, and each has a certain season prescribed to it in which to perfect its functions. Reflex centres that have been long laid down, like that for the respiratory process, are at once proficient in their duty; but intellectual centres of recent evolution are only brought tardily to do their work, under the direct influence of conscious effect. And between these are innumerable centres which arise in due succession into activity, and are engaged in training for very varied periods. The foot and leg centres are in advance of these of the hand and arm in their development, and the latter again are in advance of these of the tongue and lips. Chewing is commenced at the eighth or ninth month of life, but the sexual appetite does not assert itself until the twelfth or fourteenth year. Equilibrium is speedily acquired, but years are spent in mastering the niceties of speech.

Now, in each nerve-centre there are two kinds of activity, which must not be confounded with each other. There is nutrient activity and functional activity, and the rule would seem to be that these are generally in the inverse ratio of each other. When nutrient activity is at its maximum, functional activity is at its minimum, and *vice versa*. When the brain of the child is growing most rapidly, its functional manifestations are not of the highest order; and when the brain of the man is doing its best work, growth may be said to be over. Growth precedes function, and yet function is, after a certain stage, essential to growth, and it is while growth and function co-exist that the opportunities for education occur. It is at the nascent period in the history of each nerve-centre when growth activity, although becoming less energetic, is still present, and when functional activity, although still feeble, is gradually gathering strength, that most may be done to make or mar it and other centres with which it is associated. Then it is that,

by suitable exercise and stimulation cautiously applied, it may be brought to the highest development of which it is capable. By skilful management this nascent period may be prolonged, and a superior anatomical substratum provided for subsequent developments; but by undue eagerness or negligence it may be curtailed, or allowed to slip past unimproved.

The duration of the nascent period, as I have called it, in which growth and function go hand-in-hand, varies exceedingly in different centres. In those concerned with instinctive operations it cannot be said to exist, for their growth is completed without functional stimulation, and they start at once into full functional activity; but in those concerned in the higher intellectual operations it may apparently run on until late in life. But, whatever the duration of its nascent period, each centre requires extrinsic stimuli to develop its structural potentialities, and this is true of the lower reflex as well as of the higher discriminating centres. Dr. Allen Thomson hatched a number of chickens upon a carpet, and they ran about on the soft surface, and never attempted to scrape until a little gravel was sprinkled over it. The moment this was done, however, the appropriate gritty stimulus being applied to their feet and conveyed to the nerve-centre, vigorous scraping commenced—a proceeding in which knowledge or discrimination took no part, for the object of scraping is to find insects or seeds, and, for anything such inexperienced chickens knew, these might be lodged in the carpet as well as in the gravel.

In higher and more complex centres we may discern the influence of extrinsic stimuli, not merely in inaugurating function, but in promoting growth and sustaining structural development. Gudden, a Swiss physiologist, has shown that when the nasal organ of a young rabbit is closed, the olfactory nerve and bulb of the same side are perceptibly atrophied in six or eight weeks, and that when the eye of a young pigeon is enucleated or shut up from the light, the optic nerve and anterior prominence of the corpora quadrigemina of the same side waste very speedily. And similar consequences apparently result in the cerebral centres of the human subject when they are early cut off from functional activity, even in the higher centres; for in two remarkable cases reported by Dr. Gowers and Dr. Bastian, there co-existed with congenital absence of the left hand, and with an aborted condition of the whole of the left upper limb in two adults, an imperfect or dwarfed condition of the ascending parietal gyrus of the right side, in which gyrus the individual and combined movements of the fingers and wrist are localised by Ferrier. Now, whether we regard this gyrus as a true motor centre, or as a sensory region of the kinæsthetic type, it is clear that its growth was stunted by the curtailment of its functional activity during its growth period. But surely we are at liberty to conclude that, had its functional activity been restricted in any other way than by congenital malformation, its growth would still have been restricted. We have long known that muscles, when not exercised, do not develop, and we have now reason to believe that the same is true of the highest nerve-centres. But muscles that have been fully developed, if cut off from exercise, waste and degenerate, which is not true of the highest nerve-centres; for it has been shown, in cases noted by Ferrier and others, that where a leg had been amputated in an adult who had lived many years after the operation, there was no alteration in the cerebral convolution corresponding with the limb, but only atrophy of the lumbar enlargement of the spinal cord on the same side. The lower and comparatively independent centre, with a narrow functional range, had suffered wasting; but the cortical centre, with innumerable cerebral connections, and its complex functions as a basis of motor ideation and of organic memory, had not degenerated, after the restriction of its fundamental activities by the operation.

These facts, that cerebral centres never properly exercised do not develop, and that, once developed, they do not waste, although cut off from those activities that insured their development, strikingly inculcate the importance of educating every centre at the proper nascent period, and the danger of neglecting education until the nascent period is over. They give also a new significance to physical education. Hitherto that has been advocated as a mean towards the improvement of health and the strengthening of the frame, and not as an instrument of mental development. The notion has been that muscular exercise expands the lungs, quickens the circulation, and braces the nerves, and that notion is correct; but to it must now be added the pregnant idea that it also contributes to brain-growth and mental evolution. A large district of the brain is made up of motor centres, and concerned in motor ideas, which form a no less important element in our mental stores and processes than ideally revived sensations. The growth of that district of brain is apparently dependent on muscular exercise, and if that be withheld at the growth period, the development of the brain will be stunted, and perhaps the whole series of ideas connected with form, distance, resistance, weight, etc., rendered faulty or incomplete. And

not only so, but this district is made up of a series of centres in relation with different groups of muscles, and each centre is dependent for its development upon its own group of muscles, and the defective exercise of any group of muscles during the growth period in its own particular centre (the growth periods in most of the motor centres having different starting-points, although overlapping in various degrees) will result in dwarfing of that centre, and a corresponding hiatus, or a general weakness, must exist in the mental fabric.

From this we might deduce that swaddling-bands so applied at birth as to restrain all muscular movements, and kept on during infancy and childhood, would result in idiocy—a speculation to which the wretched muscular development of most idiots and imbeciles, and the fact that their mental training is most successfully begun and carried on through muscular lessons, give some countenance. We should also have to infer that, in order to build up a sound and vigorous brain, we must insure free exercise to the different groups of muscles in the order of the development of their centres, and must in no degree interfere with the natural sequence of their evolution. That being so, we must necessarily ascertain what that natural sequence is which is to be so important a guide to education; for, in our present ignorance of it, we may unwittingly be doing much mischief. Suppose that we are encroaching on the time at which the hand-centres ought to receive their most valuable education—their nascent period—and are devoting that time to the cultivation of the tongue- and lip-centres, then we should be impairing the full development of the brain—disturbing the balance of mind, and sacrificing that technic skill in our artisans of the future which is essential to the maintenance of our national position. For the hand-controlling centre, if not fully exercised at its nascent period, can never afterwards attain to the highest cunning—witness the clumsy calligraphy of those who learn to write in mature life, even when they practise with more than boyish assiduity, and the inferiority of the work of any craftsman who has not served a regular apprenticeship to his trade. In these bewildered times, says Carlyle, all education has run to tongue. But it seems to me, that not only tongue, but hand, and foot, and eye, and back, and every muscle in the body, must be trained in due season, if education is to do what we expect of it, and is to result, not in headaches, and imbecilities, and nervousness, and insanity, but in well-balanced growth of body and mind. The differences which we notice between man and man in deportment and gait and expression are but the outward and visible signs of individual variations in the development of the motor centres of the brain; and the stammerings, grimacings, twitches, and antics which are so common and annoying, are probably, in many instances, the effects of neglected education of some of those centres, and might have been abolished by timely drill, and discipline. Of these centres, one group—presiding over the hand—ought, I think, to receive more attention than it now does amongst those who are not called upon to earn their living by manual labour. A cunning right hand is one of man's proudest possessions; and I go so far as to say, that every man, no matter what his rank or fortune, would be mentally improved by learning a handicraft, and that every woman should be taught to use her fingers deftly in technic work of some kind. The most learned Jews have always followed trades; and Spinoza was not only a philosopher, but a maker of spectacles. "When we begin", remarks an eloquent writer, "at all to understand the handling of any truly great executor—such as that of the three great Venetians, of Corregio, of Turner—the awe of it is something greater than that felt from the most stupendous natural scenery; for the creation of such a system as a high human intelligence, endowed with its ineffably perfect instruments of eye and hand, is a far more appalling manifestation of infinite power than the making of seas and mountains."

In the hurried glance at education in its relation to the etiology and prophylaxis of nervous diseases, which has been alone possible to me to-day, I have chiefly referred to the motor centres of the brain; but the principle of training in growth-periods is, of course, as applicable to the sensory and other centres as it is to them. The sensory centres are gradually and successively developed; and the future complexion of mental life is in great measure determined by the impressions made upon them when they are undergoing development. Art in the nursery is a subject well worthy of consideration; and efforts should certainly be made to put before children, especially those pent up in towns, good and worthy and beautiful objects at the time their minds are being formed. A little introspection will satisfy most men that pictures and images and forms presented to them in their earliest years enter largely into all their subsequent mental commerce, and sometimes influence their history for weal or woe. "The Edinburgh Castle rock", says Ruskin, "had a daily influence in forming the taste and kindling the imagination of every promising youth in Edinburgh." "The plea for art", says Watts, "rests on much wider and more solid foundations than mere amusement for moments of leisure.....Nothing is so likely to

cure the widespread habits of intemperance that disgrace the nation as a taste for art and music generally developed."

I should have been glad to speak of the acquisition of speech, of the basis of attention, of the value of natural science as a branch of elementary education. If I say nothing of these subjects, nor of moral and religious training, it is not because I underrate their importance in contributing to the harmonious development of the brain, but because time does not permit me to enter on so large a theme. As regards moral and religious training, I would say just this, that no one can study insanity without realising that to make men prudent and just and generous, is to protect them in great measure against those moral contagia which float about in such varied abundance in our social atmosphere, and which are so inimical to mental health. And no one can justly study the constitution of the human mind without, I think, perceiving that it contains emotional elements and religious feelings which, when cultivated, contribute to its strength and endurance, but which, when neglected, become sources of weakness and decay. To discipline the natural forces of character, and to place over the mind a pure and lofty ideal, is to take the best possible measures to insure its prosperity and peace. Three-fourths of life are conduct, says Arnold, and three-fourths of conduct are imitation; and it is surely better to imitate an ideal than the men around us or the beasts that perish. In the former, we may have bound up whatever of beauty and goodness the universe displays or it has entered into the heart to conceive; in the latter, we have a strange medley of good and evil, with selfishness in the ascendant, for selfishness must ever be the soul of the plot in that tragedy "The Struggle for Life", with its hero "the Conquering Worm." But, besides the struggle for Life, there is the struggle for Light—an inward struggle, employing no brute force, dealing no death around, but terrible in its earnestness, and fraught with disaster to many minds. For that struggle, as well as for the life-struggle, the mind should be prepared. It cannot be overlooked in any system of education that aims at completeness. And it is at completeness that all systems of education must aim. Only when that is attained, when body and brain and mind are harmoniously developed, shall we be able thoroughly to reconcile progress with health. In the meantime, we must labour in that direction, and strive, as best we may in this dim dawn of biological science, by a timely and well-adjusted cultivation of sense, motion, and intellect, moral and religious feeling, to resist the inroads of nervous and mental disease, and of every foe that may assail us from without or within, and to secure to our country what is stronger than fleets of ironclads, more inviolate than the streak of silver sea,

"A virtuous populace who rise the while,
And stand a wall of fire around their much-loved Isle."

NERVE-STRETCHING FOR THE CURE OF LUMBAGO AND SCIATICA, WITHOUT ANY CUTTING OPERATION.

IN a late number of the BRITISH MEDICAL JOURNAL, Dr. Bramwell of Perth gives some cases of cure, and others of relief, "by cutting down on, and exposing, the sciatic nerve, and then stretching it," so as to break down adhesions existing between it and its sheath, in cases of severe sciatica. The relief was most immediate and satisfactory in those of his cases in which a feeling, or snapping, or breaking down of adhesions was felt, on putting the nerve on the stretch. I have had myself very lately an attack of lumbago, for the first time in my life. A patient of mine, whom I could not go to see, came to my house, and, seeing how I was suffering, volunteered to cure me; assuring me he had cured, almost instantaneously, several people suffering in the same manner as I then was, by kneading and pressing very hard the parts affected. He placed me on my face and hands on the sofa, and he kneaded the painful parts very forcibly for some time; and then he said, "I don't hear the 'cric-cric' which I always hear when I succeed at once, so I fear I shall not succeed with you." This is evidently the sensation of "adhesions giving way", as described by Dr. Bramwell, when the cure is satisfactory. I have known cases of torticollis get suddenly well, also of pain in the shoulder, on some involuntary violent movement being made. These are evidently cases of "nerve-stretching"; and I think we have got at the true scientific explanation of the success of the popular proceeding in those cases; and with the distinct object of "stretching the nerve", and "breaking up any existing adhesions", we may adopt with advantage, and much greater chance of success, the popular proceeding. In severe cases, the preceding must be very painful; but with chloroform, or any other analogous preparation we may prefer to fall back upon, this objection of pain can be obviated, and kneading, or forcible movements sufficient for our object, can be freely put in practice.

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