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T.S. Clouston.**

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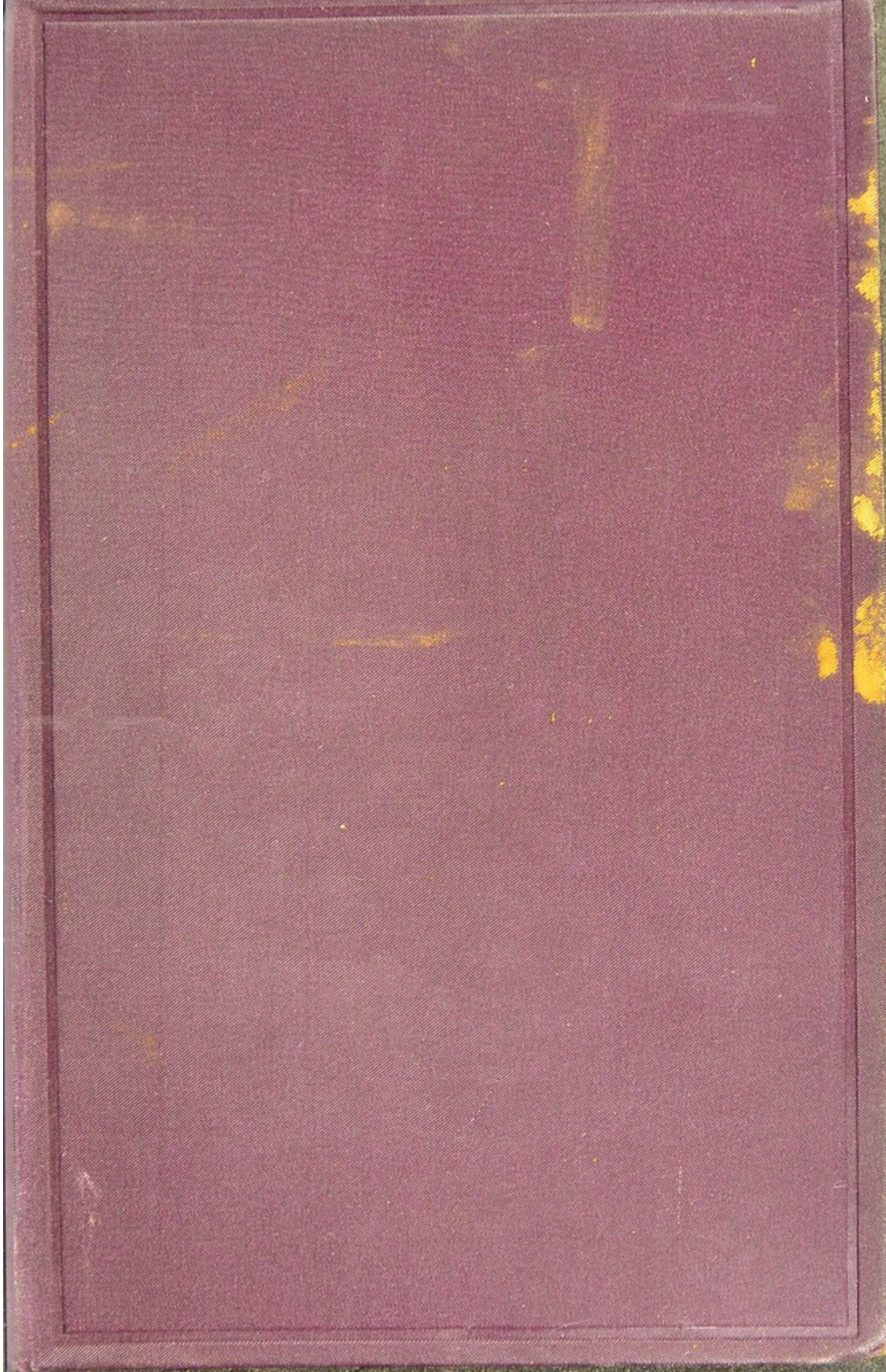
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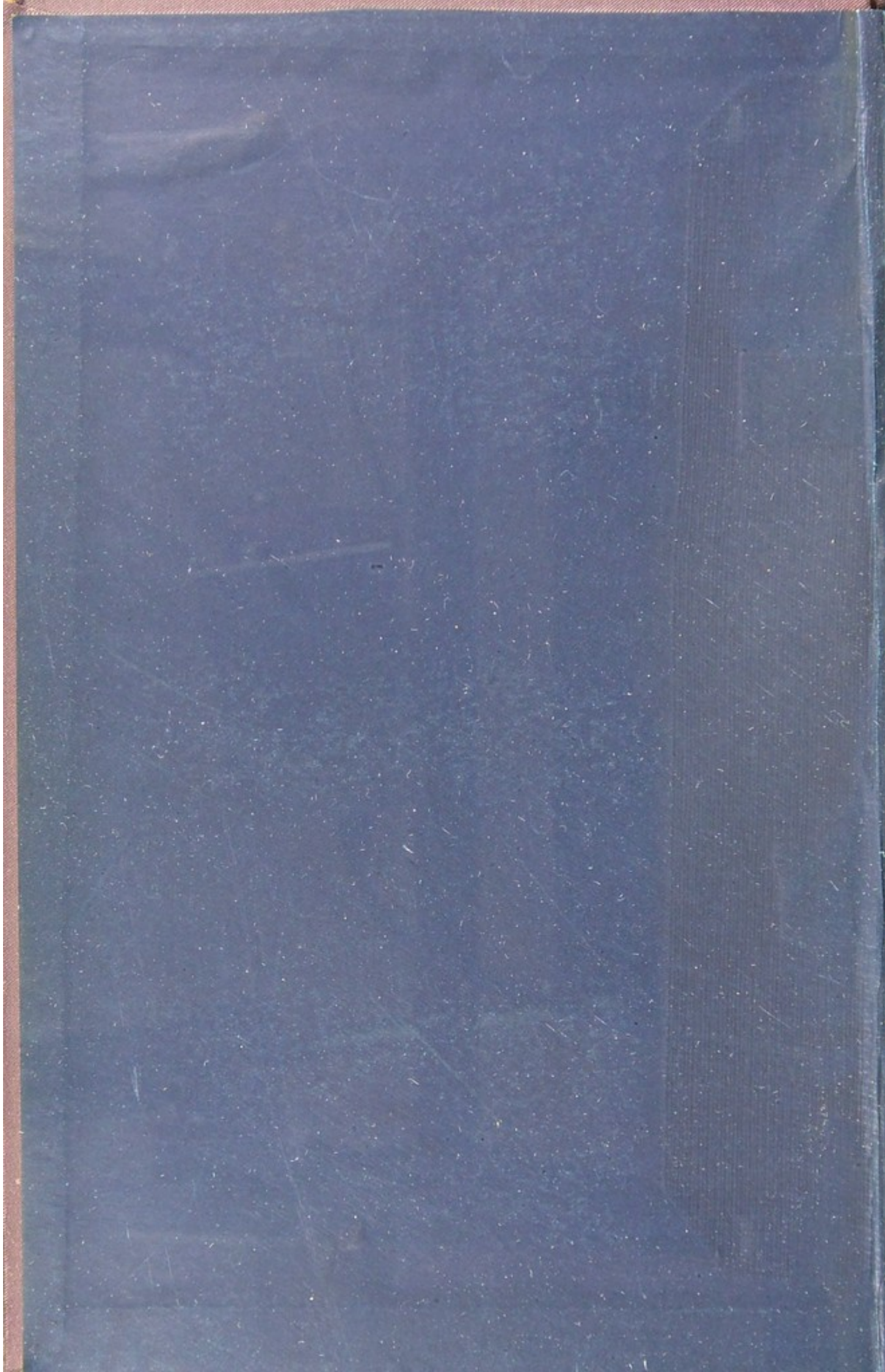
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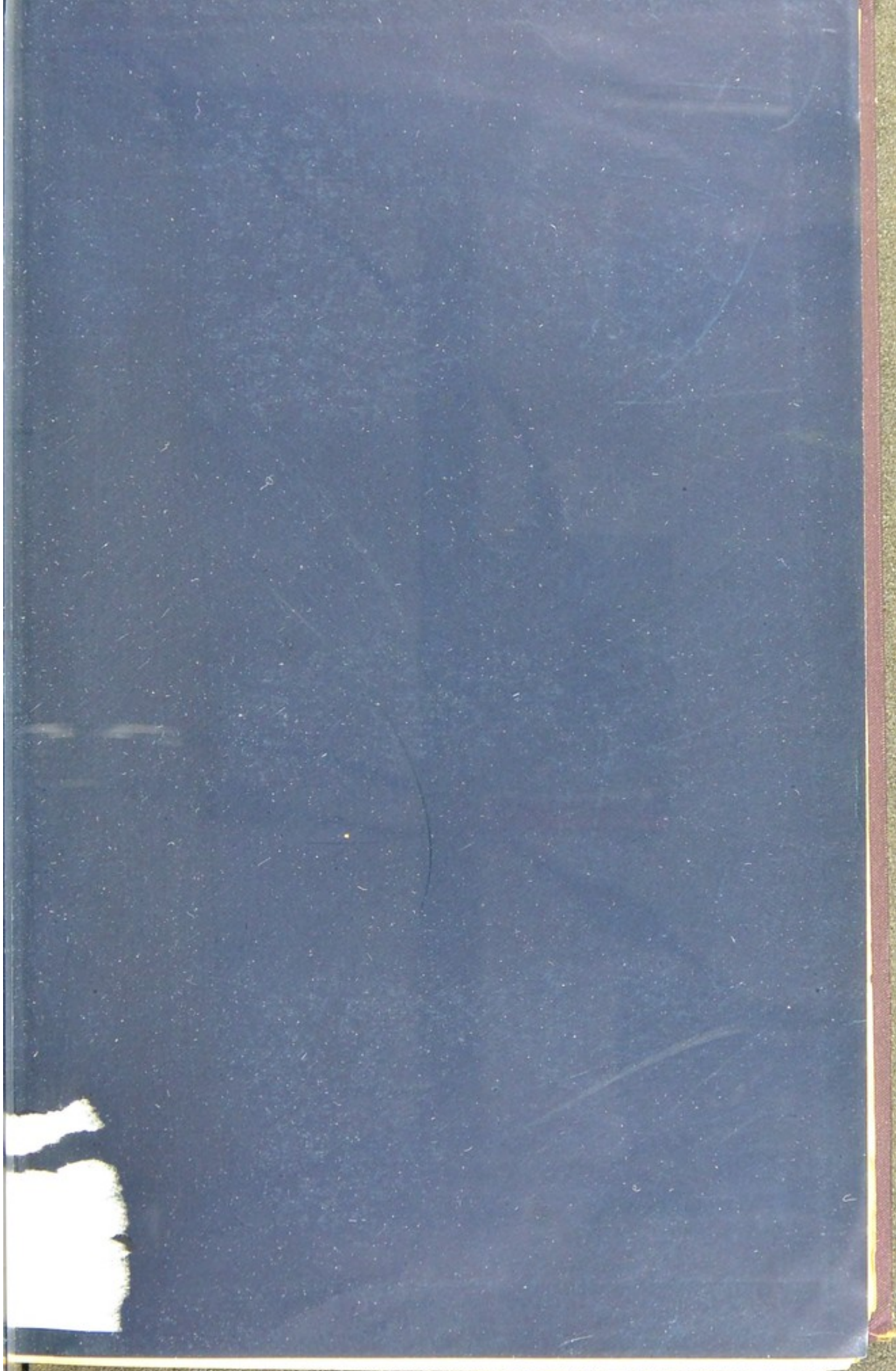
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THE NEUROSES OF DEVELOPMENT.



THE
Neuroses of Development

BEING

THE MORISON LECTURES FOR 1890.

BY

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PREFATORY NOTE.

AMONG the many points of view from which disease is now looked on by the modern physician, the etiological and the relational are not the least important. Looked at in these two ways, many diseases become vastly more interesting, and even become subject to modes of prevention and treatment that may legitimately be called scientific. In the course of the growth and development of the brain there are liable to occur certain failures in the attainment of a working standard of nervous and nutritional health, and the resulting defects or diseases may properly be called "Neuroses of Development." They have a natural relationship to each other in that they are thus developmental; and for the ultimate etiology of them all we have to look to heredity. The combined solidarity and differentiation of the brain in its structure and functions naturally give all such diseases and defects some common characters as well as certain special features. The following Lectures are a most imperfect and fragmentary attempt to treat of such defects and diseases looking at them chiefly from the developmental and the relational points of view. They were delivered to very numerous and far too appreciative audiences of my professional brethren, many of whom have said to me since, that this mode of looking at certain diseases had been of practical use to them. This must be my excuse for republishing them from the *Edinburgh Medical Journal*. The three Lectures I delivered in the College of Physicians were each illustrated by a clinical demonstration at the Royal Asylum; and seldom before have so many

busy practitioners of Medicine assembled together in an Asylum to study the mental and nervous problems of disease to be met with there. The published Lectures combine the more systematic expositions and the cliniques, so far as the latter could be embodied in print. Of one thing I am sure, and that is, that the family practitioner only has access to the facts of the early and minor neuroses of children, which are just as important to be studied as the graver nervous lesions. He, too, has by far the best opportunity of getting reliable data as to their heredity. The most effective service these Lectures could perform would be to interest such practitioners in the hereditary, the developmental, and the relational mode of looking at the nervous diseases of the earlier ages of life they so frequently have to treat in family practice.

T. S. C.

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EDINBURGH.

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THE
NEUROSES OF DEVELOPMENT.

LECTURE I.

THAT period in the life of a human being which precedes completed development may, when looked at from the nervous point of view, be divided into two portions from more than one standpoint. If we take merely gross bulk and weight, the brain is found to have attained its maximum at about seventeen or eighteen years of age, though it has grown its full growth up to a few ounces at seven years of age. From birth to seventeen would be the period of growth and development together, therefore; and from that to full maturity would be the period of development alone without growth. It is abundantly proved by physiological and pathological facts, that the cells of any organic tissue have, in many respects, different qualities, and are subject to different diseases, during these two periods of increase in bulk and of perfecting their functions. While cells are multiplying in number or size, so as to give the organ to which they belong its normal bulk and form, they do not energize in precisely the same way as they do after growth is completed. There is more formative power, and less out-put of energy exhibited. They consume more oxygen, and produce more carbonic acid and urea. The chemical constitution of the muscles is different, and, no doubt, of the neurine of the nervous centres. They are more subject to proliferative diseases, and less to those of disordered function and degeneration. After normal bulk has been attained, the next period, or that of development of full function, during which energizing and resistive qualities, and all sorts of most varied potentialities are attained, is of very different

duration in the different tissues. The purely excretory organs, like the kidneys, are so comparatively simple in function that they soon attain organic perfection in their texture and in their work, while the brain after it has attained its full weight takes at least seven or eight years on the average to develop fully its special powers and qualities, so as to be able to do its all-important work. The difference between what the brain of the child of eight and the brain of the man of twenty-five can do, and can resist, is quite indescribable. The organ at these two periods might belong to two different species of animals so far as its essential qualities go. According to our present knowledge, so far as histological appearances are concerned, the tissues are often much the same whether the organ is fully developed in function or not. That certainly results from our present imperfect means of histological research, for it would surely be an impossible conclusion in physiology to assume that we may have different kinds and degrees of function, yet the same structure in any tissue or organ. It will require time, and the application of tests at present unknown to us, to discover the structural difference between the sensory apparatus, peripheral and central, which enables one man accurately to distinguish between water of 90° and 92° , and that of another man who cannot distinguish between 85° and 95° . There are some differences no doubt that we can now see between the brain substances, gray and white, of the child of eight and the man of twenty-five, but they utterly fail to even suggest the enormous differences in qualities between the two organs. A portion of gray matter from the anterior lobes of such a child might be put up and examined by the most skilled investigator, and it is exceedingly doubtful if any histological or chemical differences could be surely detected between it and that of the man of twenty-five. Certainly no differences can at present be demonstrated between the early adolescent of fifteen and the man of twenty-five, and yet the functional differences are enormous, not only of degree but of kind. At present we assume, but cannot prove, that wherever difference of function exists, there difference of structure must also be as its basis and certain accompaniment, if not its explanation.

In treating of the period of man's life from its beginning *in*

utero up to maturity, from the point of view of the brain and its functions, we must, in addition to the two periods of growth and development, also divide it into the two physiological periods of absolutely non-reproductive and gradually developing reproductive capacity; in short, into the period before puberty, and into the period from puberty during adolescence up to maturity. Pathologically even as much as physiologically, I believe, this division is founded on essential grounds. This distinction between reproductive and non-reproductive eras is no doubt the most important of all in the life of man. This has always been more or less recognised. But the long period of gradual attainment of such reproductive perfection as is possible to each individual from its first beginning,—that of adolescence,—has not attracted the attention it deserves, in either its physiological or its pathological relations. I do not propose to enter on its most interesting psychological or physiological characteristics in this lecture, except in so far as these cannot be dissociated from its pathological relations. To understand in any way most pathological facts, we must have some reference to the physiological functions of the organ affected. The periods of brain growth and that of non-reproduction do not absolutely correspond, but it may be held as a great law, that when active cell growth ceases in the cortex, then only does reproductive function begin.

It will be one of the objects of this course of lectures to show that the most serious of all the pathological facts of brain development are certain mental disturbances in the functions of the brain, and that these are intimately associated, hereditarily and functionally, with certain motor, sensory, and trophic neuroses incidental to the period of development. When we carefully study some of these developmental disturbances, we find them associated with and taking their character from the function of reproduction, which during adolescence is attaining its full strength. And when we find that this reproductive function is arousing the keenest emotions, the most vivid imaginations, and the most earnest volitional efforts at the same time that it is in some cases disturbing the motor, sensory, and trophic functions of the brain, we get to realize that it may be possible to take a larger, a more comprehensive, and a more physiological

view of the whole subject of brain growth and development in its combined physiological and pathological aspects. It will no doubt be possible in this way in the future to co-relate and classify the whole of the neuroses of development into one large and most interesting scheme—so giving a physiological coherence to what have been hitherto unrelated pathological facts. I believe, if our knowledge of heredity and physiology were sufficiently advanced, we should be able to fit into such a scheme, and to show the true relationship of the acephalous fœtus, the hare-lipped, the cleft-palated, and the open-spined child, the congenital imbecile, the deaf and dumb, the cases of infantile delirium and *pavor nocturnus*, the convulsions of teething, those of chorea and epilepsy occurring before twenty-five, the speech defect of stammering, infantile paralysis, megrim, Friedreich's disease, hysteria in girls, possibly phthisis, and acute rheumatism, the insanities of puberty and adolescence, as well as many moral perversions, volitional paralyses, and intellectual peculiarities which are met with in both sexes during the developmental period of life. If I can in any way make the idea, that there is a real developmental connexion between all these diseases, and many others, more familiar, so that observers in different fields may furnish facts more fully to illustrate it, my object in this course will have been attained. No one can deny that the subject is full of interest to, and well worth the attention of the physiologist, the physician, and the psychologist, as well as the parent, the educationalist, and the sociologist.

The Maturation of Tissues and Individual Organs as distinguished from the perfecting of the whole Organism.

Can a tissue or an individual organ come to full structural and functional perfection, and yet many other tissues, and other organs in the same body, and the organism as a whole be still undeveloped? It is quite certain as a physiological fact that this may be so. The red and the white blood corpuscles have attained their full perfection of size and shape, and have their proportionate numbers and constitution long before birth. The bloodvessels, too, and the heart muscle seem to attain their completed organic perfection in early childhood. The arteries

and veins, and the various tissues that build them up, are then as strong and elastic as they ever become. The various tissue constituents of the lungs seem to attain perfection in childhood, but yet when subjected to the very real but subtile test of resistiveness to the tubercle bacillus, and to other causes of disintegration and disease in adolescence, these tissues show themselves to be still abnormally unresistive to such lethal agencies, and therefore incomplete in organic development, for it is certainly as important a quality of an organ or a tissue to resist the causes of disease as to do its proper work. May it not be, that the liability of the child and the adolescent to the whole class of zymotic diseases is due to the imperfect development of the epithelial cells of the bronchi and the air vesicles through which the disease germs find entrance into the circulation? A child's skin seems softer, and in some ways more perfect than the skin of an adult, and yet it is certain that it is not so resistive against the germs of ringworm and many other skin diseases. *Any tissue or organ that is abnormally non-resistive to disease may be fairly considered not to have attained maturity or to have undergone retrogression, temporary or permanent.* The analogy of the epithelial lining of the air vesicles of the lung of the child of six not being able to destroy the germs of scarlet fever, so letting them freely into the circulation, and the cells of the epidermis of the same child not being able to resist the ringworm spore, and so letting it grow and penetrate into the tissues of the *cutis vera*—in both cases the non-resistiveness being due to imperfect development of the pulmonary epithelial cell and that of the *cutis*—may not be true, but it seems to me a reasonable hypothesis. In that way scarlet fever and ringworm, as well as most similar diseases, which they may be taken to represent, can be looked on as being as much developmental through trophic defect as undoubtedly rickets is. Such pathological considerations hang so directly on physiological facts, that we cannot possibly dissociate them any more than we can sever the pathology of the developmental psychoses from the physiology of reproduction.

It seems to me that there is an important unwritten physiological chapter on the exact order of development and coming to perfection of the various tissues and organs of the body.

The importance of accurate knowledge on this subject consists, not only in its intrinsic value, but more especially in its pathological relations. One fact seems quite certain, and it is this, whatever tissues and organs come to perfection soonest, it is the higher nervous tissues and organs that attain maturity and perfection last. And of the nervous tissues themselves, it is the cells of the brain cortex, and their system of grouping and intercommunication by paths of fibres, that are the last tissue of the body to attain organic perfection. A red blood corpuscle is probably perfect in the second month *in utero*. A connective tissue cell and fibre and a fat cell are probably organically perfect at birth, while a cell of the cortex which subserves a mental function does not attain maturity of function till five and twenty.

*The long Period of Development of Function that succeeds
complete growth of Brain.*

There are some anatomical facts that have a bearing on the developmental neuroses. One of these facts is, that there seems to be less relationship between the gross bulk and weight of the brain and its energizing capacity at the different periods of development, than there is between the bulk and power of any other organ. Mass and energy have small relation to each other here apparently. I am not aware of the existence of any exhaustive series of facts showing the average bulk and weight of the brain every year from birth up to twenty-five, but Boyd's tables¹ give the weights with sufficient accuracy, though we do not get the exact time when the absolute maximum of weight is reached. Boyd and other observers agree, that at the age of seven the brain has attained about 90 per cent. of its maximum weight, and that the increase in bulk after fourteen is very slight indeed, while after seventeen or eighteen there is no increase at all. The nerve cells of the almost full-grown organ of seven, therefore, though almost as numerous as at twenty-five, must be very immature indeed in function, and their association and connexion very imperfect as compared with what they are to become. The unique fact about the nerve cell is the extreme slowness with which it develops function after its full bulk has

¹ *Philosophical Transactions*, 1861, p. 241.

been attained. In this it differs from any and every other tissue. We may say that after most of the nerve cells of the brain have attained their proper shape and full size, it takes them the enormous time of eighteen or nineteen years—one-fourth of life—to attain such functional perfection as they are to arrive at. This striking fact of such extreme slowness of development of complete function no doubt shows, as no other fact could, the height, complexity, and importance of the functions which the brain tissues subserve. It is not a mere question of the education of cells that have a certain innate power to be brought out; it is a question of a true development of a lower capacity into a higher, the size of the organ remaining about the same from beginning to end of this evolution of the higher functions. We know as a fact that all the higher emotional, intellectual, imaginative, and volitional qualities of the brain arise between fourteen and twenty-five, and that the absolutely new and tremendously intense feelings connected with reproduction arise *de novo* during that time. All that is worth doing or feeling in life is done after that time. It is during this long period of gradual coming to perfection of the nerve cell that its hereditary influences for good or evil come most into visible play. No doubt they exist before, but as yet we have no certain means of detecting them. I think it may be taken as a rule with few exceptions, that the tissues, the organs, and the functions which are of slow development, are those which hereditary evil tendencies are most apt to influence.

It is a profoundly interesting speculation, but as yet only a speculation, as to how long each individual cortical cell lives. Is it the same cell that fixed the vivid child sense impression, never forgotten, of a mother's smile, or is it the progeny of the cell which originally received that stimulus which can re-vivify it at ninety? If a nerve cell does not energize at all nervously for long periods of years, is it storing up more nerve energy all that time? What is the result of the rapid anabolic changes in the child's brain if the proper nerve energy of the cells is not manifested during katabolism? How subtle and physiologically intense must be the energy which it has taken ten years for a cell to transform out of other energies, and store up all that time! It seems to me that we must assume a certain

basal nerve energy, common to motion, sensation, and mind, which if not expended in one form will transmute itself into another, to explain the facts.

Three great Factors during Development—Age, Onset of Function, and Heredity.

In studying the diseases incidental to the period of development, there are three things that have always to be kept in view. The one is the age of the patients affected, not merely in years, but particularly the functional and critical ages, such as the crisis of birth, the age of suckling, that of dentition, that of fastest increase of brain weight between four and seven; that of puberty; that of greatest proportional increase in general body bulk, height, and weight next to the first year of life between fourteen and seventeen; that of the gradual and steady maturity and solidification of the bones and tissues generally between eighteen and twenty-five; and, finally, the period of the completion of the organism, structurally and functionally, sexually, reproductively, and mentally, about twenty-five. The second thing to be kept in view is the evolution of the different functions. The trophic and organic functions of the brain are first involved and come to perfection earliest. They are well developed before birth, and show their greatest activity in the first year of extra-uterine life by the growth of $7\frac{2}{3}$ inches in height then attained by the average infant, an increase of height which we never find in any subsequent year. Sensation, common and special, comes next, soon after birth, and we have reason to believe that its peripheral receptive apparatus and brain centres rapidly acquire perfection, though its future mental interpretation is a gradual and slow process. Most of the motor processes are more gradual in coming to perfection, and, indeed, cannot be said to have arrived at that stage till adolescence is nearly completed. The process of perfecting motor co-ordinations cannot be said to be complete while the awkward, ungraceful motions of hobbledehoyhood last, and until we reach the grace and poetry of body motion of the maiden of twenty-three, and the dexterity, force, and swiftness of co-ordination of eye, hand, and body, seen in the male cricketer or lawn tennis player of five and twenty. The sexual

and reproductive functions, and the time of their normal appearance and coming to perfection, are of primary importance in any study of the disorders of development. The gradual onset of the reproductive nisus, and the slowness of the process of coming to sexual and reproductive maturity, are physiological facts that are by no means sufficiently realized. That normal reproductive capacity needs twelve years to come to full perfection after its first appearance, though demonstrated by statistics, at least in the female, by Matthews Duncan, many years ago, is by no means an accepted piece of knowledge, either popularly or by students of sociology, or by medical men. The onset of the function at puberty is too much considered, and the gradual coming to perfection for the next ten years, with the influences on the trophic, motor, and mental functions which it exerts during that long period, are far too little considered. It is as if the period when the future artist first awakened to a vague sense of the beautiful were solely regarded, to the exclusion of the long period of training before he is able to create the beautiful himself.

The philosophic and protoplasmic views of the individual as being organically one in structure and function with his ancestry and his posterity must always be kept in mind. They are not even links in a chain; links are separate from each other, and may have been forged from different pieces of iron; they are only one in function, whereas a man is just as much a part of his ancestry, and his posterity of him, as the root and stem are parts of one tree. The philosophic view of reproduction is, that it is but one incident in a continuous protoplasmic life. Whatever theory of heredity we adopt,—Darwin's or Weissman's, or any other possible theory,—that is and must be so. The two essential and necessary instincts of organic life,—that to maintain and that to reproduce life,—are the foundation of every other function, mental and bodily.

The period during which reproduction gradually comes to perfection is, beyond question, one of the most important of all developmentally. The periods of the development of the various mental functions and capacities have by no means as yet been studied from the physiological point of view as the importance of the subject demands. The physiological chapter which will clearly relate the stages of mental development from birth to

the age of twenty-five, and the relation of its various stages to the organic, the sensory, and the motor functions, has yet to be written; and we are yet far from the time when it can be written. This view of the continuity not only of life in general but of tissue life and of reproductive life, enables us at all events better to grasp the idea of heredity being, not a mysterious law with scarcely any conceivable foundation in any visible or measurable qualities of tissues, but as being one of the ordinary vital laws like that which makes the hepatic cell produce other hepatic cells during the continuance of the life of the liver. I do not say that we, in the least, understand either law, but that of one cell producing another like it is a fact so familiar to students of life that it seems comprehensible to any one. Few of us have the time or opportunity of studying in detail elaborate treatises on heredity like that of Weissman, so as to master the latest and most definite theories in regard to it, but we can all realize a continuous cell life.

The Occasions that bring out Hereditary Defects.

We are yet in profound ignorance of the real causes which determine intra-uterine embryonic defects. Any one looking through a treatise on Teratology must realize that. Most of them, no doubt, arise out of a bad heredity, but there is no very definite proof as yet that a heredity towards the more ordinary developmental post-uterine neuroses, such as convulsions, epilepsy, or insanity, is the cause of the trophic intra-uterine defects, such as hare-lip, cleft palate, malformations of limbs or organs, and more especially the great brain failure of genitous idiocy, though a certain relationship is proved. That a tendency towards idiocy is hereditary may be accepted, but this hereditary defect differs so far in essential quality from the heredity towards the functional neuroses mentioned, that the two do not seem to be very often interchangeable. The inability of the embryo to complete the formative process through which each organ and the whole organism attains the normal type, must represent a far more initial and radical hereditary formative weakness than a defect which determines the undue explosiveness of the brain cortex in adolescent epilepsy. They have probably a real

connexion. Many facts, pathological and physiological, point to that. What we need to ascertain is the nature of the kind of connexion between them. This original formative process during embryonic life *in utero* is the first occasion when hereditary defect is brought out visibly; and looking to the dominant influence of nerve over nutrition, it seems reasonable to attribute even early formative failures and the malformations of body and limbs in some degree to deficient trophic-innervation. The defects of this kind are innumerable, but the chief are,—acephaly, hare-lip, cleft palate, spina bifida, and deformed palate, and above all, genetous idiocy. The next occasion is the crisis of birth, at which the great test occurs, whether independent life is possible under totally different conditions from those which have existed previously. We know that multitudes of infants don't stand the test, and die from innate defects of adaptation to the new circumstances. The next period that brings out the effects of a bad heredity is that of the rapid growth of the brain in bulk up to seven or eight years of age, which comprises dentition, and includes the development of muscular co-ordination generally and speech. Convulsions, squint, stammering, backwardness of speech, night terrors (*pavor nocturnus*), liability to high temperatures, and to delirium at night at temperatures from 99° to 101° , infantile paralyses of all kinds, tubercular meningitis, hydrocephalus, rickets, a few rare cases of child melancholy and mania, deaf-dumbness, and some varieties of idiocy and imbecility, are the chief failures, chiefly neurotic, which occur then. Every one of these can be connected with the immense brain growth of the period, with the development of certain essential brain functions at the time, such as speech, equilibration, and the other essential muscular co-ordinations, with the intense trophic activity, and with the rapid metabolism of every tissue, with education of function of the special sense organs and their brain centres—all these processes taking place under unfavourable conditions of heredity. The next period is when muscular motion becomes co-ordinated fully with emotion, as seen specially in facial expression, from seven to fourteen. We have then chorea, some cases of epilepsy and somnambulism, megrim, asthma, and some eye defects.

The next period is the onset of reproductive capacity at puberty, and the gradual perfection of this capacity, with all the trophic, motor, emotional, and moral developments that centre round this period. At this period we have epilepsy, megrim, and Friedreich's disease, hysteria, eccentricity and certain forms of emotional and irrational wilfulness and moral perversions, immorality and impulsiveness, and, above all, adolescent insanity, of most of which I shall have to speak more fully in the second and third of these lectures.

The following is an attempt to classify developmental defects and diseases, most of them being neurotic in origin.

1. *Formative and Embryonic Stage*.—Acephaly, Hare-lip, Cleft Palate, Deformed Palate, Spina Bifida, Talipes, Buphthalmos, Fibroma Molluscum, Malformations of Organs, some kinds of Genetous Idiocy, &c.

2. *Period of most Rapid Brain Growth, Special Sense Education, Motor Co-ordinations, and Speech*.—(From birth up to 7 years.)—Rickets; *Pavor Nocturnus* (Night Terrors); Convulsions of Teething; Infantile Paralysis; Epilepsy; Stammering; Backwardness of Speech; Hypermetropia; Convergent Strabismus; Lamellar Cataract; Choroiditis Disseminata; Strumous Ophthalmia; Ichthyosis; Xeroderma Pigmentosum; Dermatitis Herpetiformis; some varieties of Idiocy and Imbecility; Liability from Neurotic Causes to sudden rises of Temperature; great susceptibility to attacks of all Micro-organisms and Zymotic poisons; Night Febrile Delirium of Children at Temperatures from 99° to 101°.—Child Melancholy, and Child Mania (very rare.)—Tubercular Meningitis—Friedreich's Disease—Hydrocephalus—Deaf-Dumbness, &c.

3. *Period of Co-ordination of Motion and Emotion*.—From 7 to 13—Chorea; Epilepsy; Asthma; Somnambulism; Megrim; Myopia; Convergent Strabismus, &c.

4. *Puberty and Adolescence*.—From 13 to 25.—Epilepsy; Asthma; Chlorosis; Menstrual Defects; Hysteria; Friedreich's Disease; Interstitial Keratitis; Megrim; Adolescent Insanity; Adolescent Stupidity, Impulsiveness, Dipsomania, and Perversion of the Moral Sense and Volition; Incompatibility of Temper; Frothy Religionism; Perverted Sexual Instincts; Unfounded aversion to Relatives; Arrested Body

Growth (Dwarfishness) ; Adolescent Ugliness ; some kinds of Joint Diseases ; Ingrowing Nail ; Acne ; Valgus Douloureux ; Subungual Exostosis of great Toe ; Nasal Pharyngeal Polypi ; Beardlessness ; Barrenness ; Phthisis ; Acute Rheumatism, &c.

*The Relationship of the Development of one Function
to that of other Functions.*

In the consideration of development from the pathological point of view, one of the most important considerations is the relationship of one great function of the brain to others, and the times at which perfect co-ordination of different functions occur, for those are the times at which many of the neuroses appear. The reflex function of sucking, with its causative nerve centres in the medulla and basal parts of the brain, like the organic function of respiration, has been perfected *in utero*, while most of the other motor brain centres are undeveloped. It must have immediately followed the development of the trophic and vascular centres and the respiratory centre. It had a direct relationship to the existence of intra-uterine organic life, and therefore must be in a perfect condition the moment a peripheral stimulus is applied in the shape of the mother's nipples. But it is in no way connected with volitional movement with special sense function, with feeling, or with any act of reasoning. The muscles put into action in sucking and their nerve centres have no relationship to the co-ordinating nerve centres for the motor acts of speaking or walking. A brain whose capacity of future development is so low that it is never to give in the future its possessor the power of speech or of equilibration, as in some forms of idiocy, yet may have developed perfectly, and at the proper intra-uterine period of life, the apparatus for sucking. In the same way the co-ordinating centres for walking and for alert and complicated movements of the fingers, hands, and arms, may become developed in due order of time and in average perfection, and yet the speech centre may be incapable of development in the same subject, as we see in the deaf and dumb, and in some kinds of microcephalic idiots who exhibit never-ceasing movement, and are most alert with their hands and legs, but cannot speak.

Dr Shuttleworth thus describes such a case:¹—"Look at this lad 'Freddy,' now nearly twenty years of age, but only 55 inches high; his head measures in its greatest circumference no more than 15 inches. We have had him here nearly fourteen years, and during that time his stature has increased from 40 to 55 inches, but his head circumference only from $14\frac{1}{8}$ to 15 inches. His forehead rapidly recedes, and his occiput is small; his features are, however, shapely, his eyes large and lustrous, and his nose of Roman type. Like the so-called Aztecs, he has an aspect which reminds one of a bird. He is active in movement; and, though he can say but little, he is fairly observant of all around him, and makes his wants known by persistent gesture. He is somewhat pugnacious (a tendency, by the way, I have observed in some other microcephalics). He has improved to some extent in habits, but very little in intelligence and industry."

In such a case it is clear that the speech development was retarded along with the retardation of the great function for which speech exists, viz., mentalization. Yet this co-equal retardation and non-development of two functions dependent on and directly related to each other, like speech and mentalization, does not always occur, as we might expect would be the case. The lesser functions of speech and its brain centres may be developed at the normal time, and yet the greater function of mind, which it subserves, may be retarded and remain in a permanent condition of very imperfect development. Many congenital imbeciles can speak quite well, and yet are entirely weak in mental power. The following is an example:—

J. W. was first admitted into the Asylum at the age of fourteen. Insanity was denied in the relatives of the previous and present generation. He has always been weak-minded and unteachable, except in regard to music—for he was taught to play the flute—but he learned to speak at the proper time. He had epileptic seizures when about seven years old. They soon ceased. He became gradually more mischievous and unruly, and was sent here on that account. He is now aged forty-four. He looks like a comfortable small tradesman or artisan. He has a well-shaped head, and his

¹ *British Med. Journal*, Jan. 30, 1886.

features are good, except a slight dissimilarity in the shape of the ears. His hard palate is high, but has a fine dome; the soft palate is slightly deformed. His expression is pleasing and quiet. There is no undue restlessness of expression or manner. He sits with his legs crossed and his hands clasped, with the air of a man who has just finished a piece of work. He is not ungainly in his movements. His gait is purpose-like and at times vigorous. He is fond of dancing, and keeps time to the music. He keeps himself noticeably tidy and clean. Yet he says his age is sixteen, and will make it two hundred if one prefers it so. He never manifests deep feeling about anything, and never gets excited. He does not originate, and would sit in a corner for hours doing nothing. He can do no work except the simplest, and that under observation. He says four times six are sixteen, and that six and five are five, and cannot tell what his mother's name was. He answers "Yes" and "No" to questions without regard to truth. In short, his mental condition is one of well-marked imbecility, but with perfect speech and a good face with a fairly expressive eye.

The combined trophic development and motor apparatus that give the outward form and expression of the face and eye should be developed in strict relationship to the mental functions of which the face and eye are the mirrors. Yet it is not uncommon to have a beautiful and expressive face and eye in an idiot. I have seen many such faces and eyes in children who could not speak, did not feel, could not be taught to count ten, could not keep themselves clean, and who could not reason, as in the case of the following boy:—

R. M. T., æt. fourteen on admission. His father had been insane, and from birth he had been "backward." He could not be taught to speak, but was mostly harmless and amiable till just before admission, when he had assaulted his brother. He had a sweet face and a pleasant smile. He was fairly well formed. His eyes were very expressive, his features regular, and his skin soft and clear. His movements were a little grotesque and quaint rather than awkward, though his finer muscular co-ordination was not good. He could walk and run fairly well. He had many rather pretty ways, coming up touching you, and smiling as you looked at him. But he could

only say "Pa, Ma," "Baby re," and did not use even these as language to express their meaning, but rather as signs of recognition. He could not be taught any work except the simplest, such as carrying the rake, &c., for the attendant, of which he was very fond, and did ostentatiously, as if proud of it. His head was normal in size; he had a high palate, but it was not very deformed. He grew up here until he was an average-sized lad, but no beard or sexual hair appeared, and he was evidently devoid of sexual desires. He was amenable to discipline and orderliness, and was cleanly. This was an example of a hereditary arrest of development of the mental cortex alone, while the trophic, motor, and sensory centres acted almost normally. It was an unrelational development of the most marked kind, to have no reasoning power, no emotion, small social faculty, and no power of attention, no speech or further capacity for mental improvement, yet an exceptionally sweet face, fine expressive eyes, wonderfully good walking, and a well-formed body. The face and eye of such an idiot tell lies when they thus express mind.

Here is another such case, but with both beauty of expression and speech, yet with undeveloped mind.

J. D., aged seventeen, has been only a year in the Asylum. She is a remarkable example of non-correlated development, and seldom have I seen so fine a form and face masking so poor a mind. Of her mental state, which is congenital, it may be said she is fit for nothing, and she does not perform even the simplest duties. She seldom or never speaks except in answer to a question, and when she does, her remarks are incoherent and silly. In spite of this poor mental development, her movements, her mannerisms, her face, and her form would attract pleasing attention anywhere, especially when she is passing through one of the attacks of excitement to which she is subject. She is a brunette, with a roundish face, and thick, dark, wavy locks. Her expression is lively, with just a flavour of "cheekiness" in it, and she is always happy and smiling. No coquette ever cast "sheep's eyes" from under her eyelashes with a more finished grace than J. D. does with her black eyes. All the pretty feminine ways and tricks J. D. has in perfection, and a poet might compose a sonnet on her artful glance, on the scornful toss of

her head, on her affectations, and on her silvery laugh. She is also musical, and sings very well. This case, however, shows that there is an index which may warn one of the masked neurosis—the palate—which is distinctly of the deformed type.

Nature, in fact, had practised a deception in these children. She had provided a perfect apparatus for expressing mind to the outer world when there was no mind behind to express; and what is more common than to find the anomaly and contradiction of a beautiful face in a very mindless man or woman? Such a combination is just as much a developmental *lusus* as an idiot who speaks well; but the consequences are, alas! far more serious to the race in the one case than in the other; for the deception leads to love, marriage, and many future generations of mindless beauties. Normal development certainly consists in the production of a due relationship of structures and functions as to use and time. The use of speech is to express mind, and the time for its development should just precede the higher mental operations. And in families with a neurotic heredity, we very commonly find children whose speech is long in being developed. I saw a child the other day who could not speak at four years of age, and yet who, on as careful an examination of mental state as I could make, without speech to aid me, did not exhibit any marked mental defect. Thus again defective heredity exhibits itself in a defective *relational* appearance of related function.

If we look at the different mental faculties, they should have, if normal, a developmental relationship to each other. The power of attention, memory, emotion, reasoning, and volition may vary, no doubt, considerably in their relative capacities and in their order of appearance, in any individual, and as between different individuals, without passing into what can be counted the abnormal; but there are limits to such variations, beyond which we must reckon them pathological. If a boy of eight develops such capacity as to be able to solve amazing arithmetical and mathematical problems, like the American calculating marvel Zerah Colburn, who, though totally ignorant of logarithms, was yet able, in a few seconds, working mentally, to raise a number of one figure to the twelfth or thirteenth

power ; or if a child of five is capable of such keen painful feeling that when his mother dies he tries to commit suicide ; or if a sound intelligence is developed at the age of fifteen, but so little sense of feeling or sense of right and wrong, that a girl murders in cold blood her little brother to save herself the trouble of looking after him, and cannot be made to feel sorrow or remorse in any form,—these are all examples of departures from Nature's normal laws of relational development, and they all throw some light on the study of the more ordinary developmental neuroses. Zerah Colburn had six fingers on each hand, and turned out a dull Methodist minister. I believe that a careful study of development in children will in the future be one of the modes through which the liability to nervous disease will be ascertained at early periods of life, and through which, therefore, it may be possible to adopt measures of prophylaxis. Child mathematicians, child musicians, and child poets are rare, and we know they are all more or less pathological. We cannot do much in the case of such surprising abnormalities except to discourage exclusive and special work, and advocate measures for promoting general development and strengthening general health. But if we find a case such as one I once saw of a boy of seven, who at first became abnormally supersensitive to special sense impressions, not being able without pain, and almost passing into convulsions, to bear loud sounds or strong light, then became hyperæsthetic morally, fearing he was "doing wrong" in every simple act, then melancholic, and, finally, suicidal ; when in such a case there was a highly neurotic but not an otherwise morbid heredity, the stock being on both sides intellectual, sensitive, and artistic, surely we could, even in the present state of our knowledge, give directions in diet, education, and modes of life, that would tend towards the growth of muscle and bone and fat, and the restraining of the use of the higher cortex which was showing such signs of premature and unrelational development of over-sensitiveness and instability. And if the parents were warned that the continued procreation of such a progeny was done at a terrible risk, surely this was not an unjustifiable act of medical prescience. It was not surely surprising that the neglect of such warnings was followed in the case of this boy, who was over-cultured and put to a highly-stimulating employ-

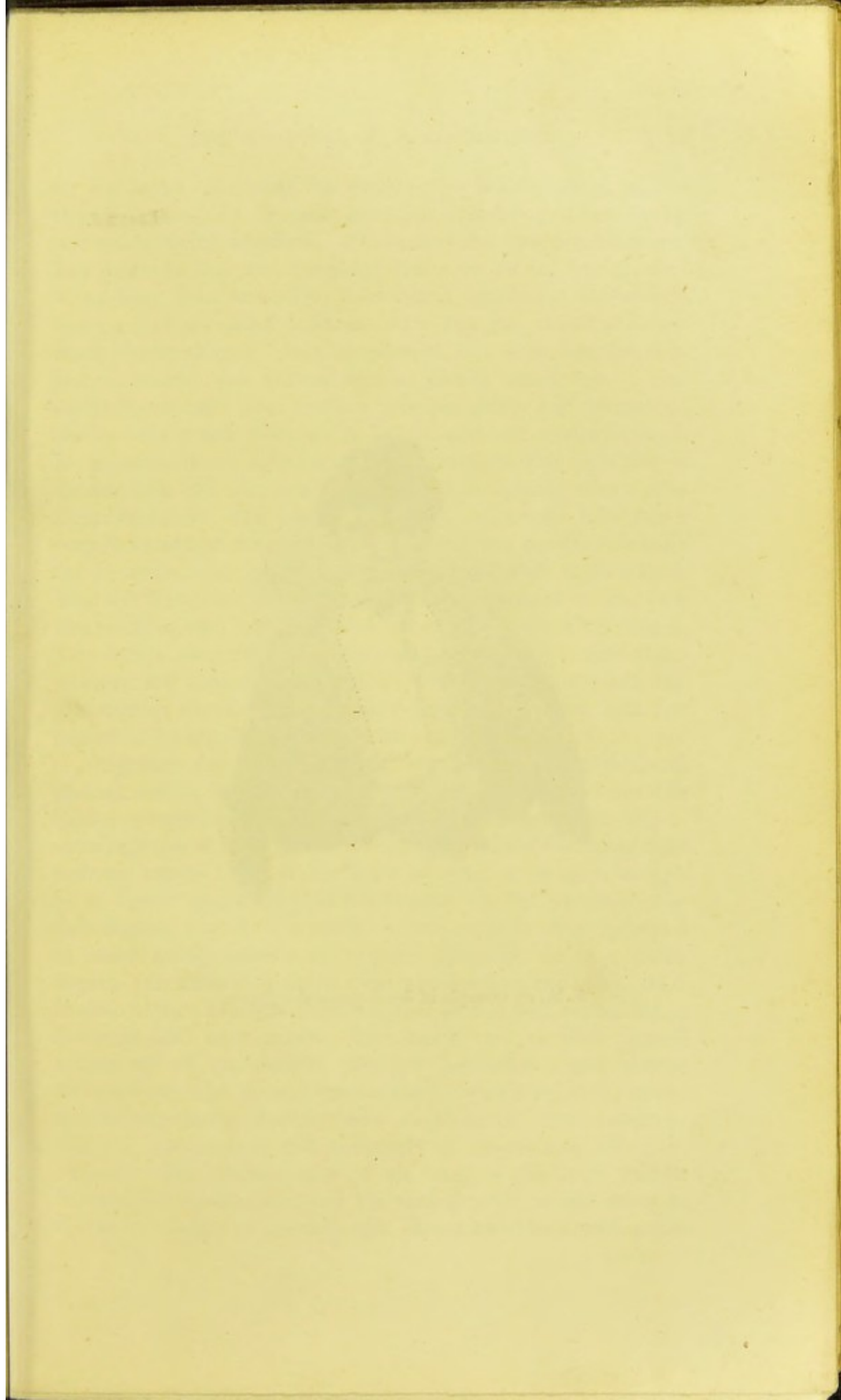
ment, by an attack of adolescent insanity at seventeen, and that the succeeding children of the same family born afterwards were, one of them choreic and another idiotic. No doubt the premature development of sensitiveness, moral and of the special senses, was almost immediately followed here by actual disease in the shape of melancholia and suicidal tendencies; but I think that development of any faculty or power in a boy or girl, in a lad or a maiden under twenty-five, that is premature in time, or that is clearly out of proportion to other faculties and powers, should be carefully watched and looked on with much medical suspicion. We all know how bad it is to stimulate sexual and reproductive trains of thought and feeling too soon. It is often unfortunate when such masterful qualities as courage, obstinacy, and self-confidence arise too soon, before there is judgment enough developed in a youth to regulate them. Looked at from this point of view, how many there are of family discords, of school and college escapades, of accidents fatal to life, that arise from a development of qualities at fifteen that should only have come to maturity at twenty-four! It may seem fanciful or absurd to place in the same category, and to attribute to the same causation, two such diverse things as idiocy from premature ossification of the bones of the cranium, and a boy's running away from home and going to sea at fifteen; but both result from a premature development of something that would have been most useful and necessary ten years later in life. Both result from premature and unrelated developments. Ossification of the cranial bones is an absolutely necessary process, but if it comes too soon it is fatal to mental life. The energy and independence that must have an outlet in sea roving have made the British Empire what it is, but they should not come except as accompaniments of approaching manhood. Development of organ and faculty, mental and bodily, must be in proper sequence, must be in right relation to each other, and must be on the lines of ultimate organic perfection for the individual, and of normal reproduction of the species. Basal qualities, tissues, and organs, essential for the life of the individual must come first; qualities that relate to the reproduction of the species should come after in order of development.

Departures from the normal order of development may take

the form of facial and body ugliness or dwarfishness, of each of which the following cases are examples:—

J. R. is now forty-two years of age. She is the child of a drunken father who took fits; her mother being a healthy old lady of eighty, still living, and she has three healthy brothers and one healthy sister. She was a seven months' child (her mother had two miscarriages). At first she seemed to have been free from marked ugliness or deformity, but there can be little doubt that the beginning of her present physical defects must have existed at birth. She first began to take fits about eight years of age, but there is no clear history of when she first showed the slight weakness of the right side which she now has. She was an intelligent child, sharp, cunning, mendacious, and wanting in all moral feeling, or any feminine sense of decency. Occasionally she became excited and dangerous. As she got older she became uglier. Her mental state got worse, until it reached her present condition. She had to be sent to the Asylum three and a half years ago on account of her violence. She was quarrelsome, obscene in language, and quite unmanageable, and tried to burn the house down. She was very cunning, too, and as she looked like a witch, she took advantage of her reputation to act as a "spae-wife" and tell fortunes, which the presumably sane people of Leith paid for to this imbecile epileptic!

On admission, and ever since, she has presented the following characteristics:—Mentally she is intensely selfish, very untruthful, very superstitious, telling fortunes, and believing in her power of cursing and blessing, especially of cursing. She delights in obscenity of language, and in shocking the nurses and her fellow-patients when the medical officers are present. She has no friends, and very many enemies in the ward. She has many fights, and has a curiously ingenious instinct in finding out the tender mental corns of her fellow-patients. She likes money, and knows its value. She is very irritable, and cannot bear to be chaffed, flying into a passion at once. She shows no sense of propriety or of the ridiculous in her conduct. She will dance with rage when angry. Physically she presents a perfect picture of ugliness of face, of a misshapen form, and of awkwardness of movement. There is no line of beauty anywhere, nor any trace of female grace. She could sit for the picture of an old witch,





J. R., an example of developmental ugliness.

for she looks older than her years. Her head in shape, and in the way it is set on the neck, gives the impression of her having just missed being acephalic. Her neck is short and bent forward. Her brow is low and beetling; her eyes small, ferrety, and Mongolian. She has slight convergent strabismus, her nose is broken, and its point bulbous. Her lips are thick, and her mouth badly shaped. Her complexion is muddy, and her skin greasy, coarse, and the sebaceous glands prominent. Her palate is normal. Her body is stumpy, short, and uncomely. She is only 4 feet 7 inches in height, and she stoops forward. In movements she is awkward and ungainly. Her right arm is weaker than the left, and her right leg in walking also shows slight weakness. Her walk is waddling. Her right hand has a very short, almost miniature, useless thumb that can be bent back far, its metacarpal phalanx being only about half an inch long. The left hand has the ring finger three-quarters of an inch shorter than the forefinger, and shorter than the little finger. The hands altogether are small and misshapen. She takes epileptic fits almost every night. Her appetite is good, her digestion is excellent, her bowels regular in action, and her menstruation regular. (See Picture.)

Altogether this is an extreme example of a developmental process which has departed in all respects away from the female physiological ideal in mind and body. She represents ugliness of body and unloveliness of mind from hereditary neurotic causes. She is the acme of what is common enough in a lesser degree. Unattractiveness in her is manifestly pathological, but it is equally so and equally developmental in many young women of neurotic heredity, but in a lesser degree. In them it does not depart so far from the ideal. Her trophic centres have produced a coarse skin, a bad expression, a deformed and ugly person; her motor centres have caused inharmony of movements, epileptic explosions, and partial hemiparesis. Her mental centres have, through the same essential developmental failure, been so built up, that morality, affection, self-control, and sweetness of disposition are non-existent. The strong point of her body is the mere animal function of alimentation, and the strong point of her mind is the lower instinct of cunning and clever mendacity, with a low

shrewdness in estimating the weak points of her fellow-creatures otherwise more highly endowed than herself. Body and mind run on the same lines, and those are of ugliness. This never came to a full head till after puberty,—this being the time when, under the influence of a good heredity, nature normally produces beauty of form, grace of movements, and attractiveness of mind. All physicians and all observers will recognise the same thing in a lesser degree in scores of young women whom they know, who, from the age of thirteen, steadily got less attractive in mind and body. A careful inquiry into the family history and heredity of such cases will usually show the existence of some hereditary neurosis.

D. B. was admitted into the Institution on 19th July 1890. His heredity on the maternal side is not good. Nothing is known of his father's relatives. His maternal grandfather was deaf and drunken, and the grandmother died of "paralysis." A brother of his mother was a somnambulist, and two others died in infancy—one of hydrocephalus, another from an unknown cause; a fourth was still-born. The mother herself was congenitally deaf and nervous. She had fits as a girl at school, and has had eclamptic seizures with all her pregnancies. The father was drunken, and of violent temper. The following is an account of their offspring:—

1. First born twenty-six months after marriage; had spina bifida; died when seven days old.

2. Fifteen months later, twins; one still-born; the other died young, cause unknown.

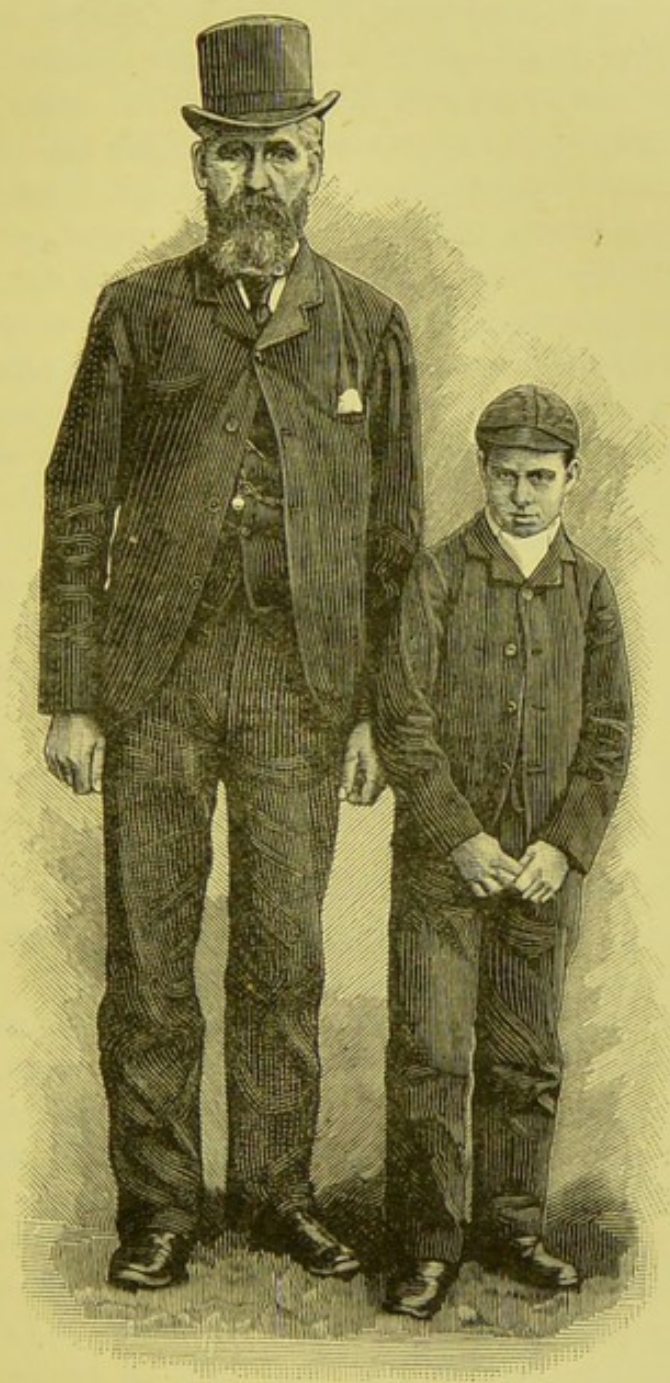
3. Three years and four months later, a girl, now aged nineteen; very anæmic, under 5 ft. high, very thin.

4. The patient, a seven-months' child.

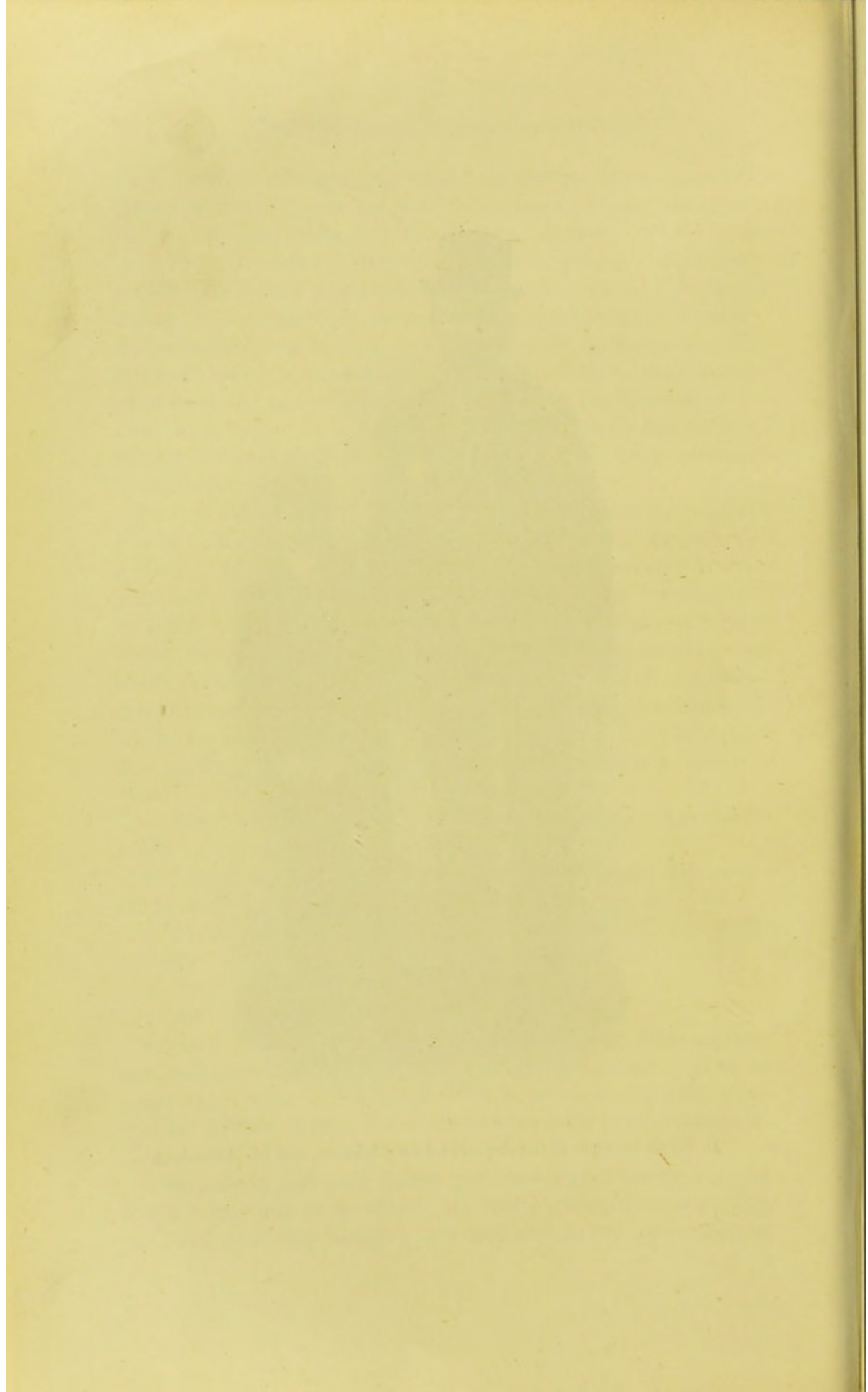
5. An eight-months' child; lived only four days.

6. and 7. Miscarriages at second or third month. The mother was then thirty-six years old. Her husband did not die until eight years later (from hæmorrhage from a varicose vein), but they had no children in that time. They were both of about average size.

The patient had convulsions one day when sixteen months old, but has had none since. He had night-terrors as a child, and had a violent temper. He has not grown appreciably in



D. B., an example of developmental dwarfism, and his Attendant.



height since admission, and is very diminutive. He was then aged sixteen; his height was 4 ft. 7 in. = 55 inches; his weight, 4 st. 4 lbs. = 60 pounds; stretch of arms from finger-tips to finger-tips, 53½ inches; circumference of head, 19½ inches; circumference of chest, 26 inches. His ears are rather large and not flat enough; the alæ of the nose are sunken and the upper-lip too prominent; his teeth are much decayed and pitted. His hands are too large; his feet small. His genital organs are well developed, but the pubic hair is very scanty. (See Picture.)

He left school at the age of thirteen and became a stable-boy, but some months before admission he entered the employment of a horse-trainer, and was in the country in training for a jockey.

This is a case where this terrible neurotic heredity caused, no doubt, the early functional neuroses of eclampsia and night-terrors, but it resulted in the far greater trophic defect through which the whole body was arrested since twelve years of age, and there are no signs of its ever going on any further,—this neurosis is, in fact, dwarfishness developmentally.

*The Normal and the Abnormal in Nervous and Mental
Development.*

No fact is more or sooner impressed on the student of neuro-mental development than the present lack of accurate knowledge in regard to it. I do not mean that what one may call, without in the least underrating their importance, the coarse facts of embryonic development and teratology have not been most carefully studied by observers of the very highest power. Indeed the wealth of such facts is confusing in its vast ungeneralized extent to one who is not an embryologist. It is the development of function and the relationship of this to the growth and development of structure that the physician takes most interest in, and this is precisely the department of the subject where as yet he gets least help from the physiological and anatomical observers. It seems as if some departments of Medicine could not advance on a sound basis without more observations on this wide aspect of development. It seems, too, as if the pathological as well as the physiological facts of this development must be observed at the same time and in relation-

ship to each other. Each throws such light on the other that they cannot be fully understood apart. The physiological and the pathological so shade off into each other in nervous development that it is impossible to tell where the one ends and the other begins. And the higher the nervous function the more subtle is the distinction, the more impossible is the line of demarcation. One cannot go far in one's observations in regard to the physiology and pathology of development without having to take into account the facts of another science that is yet in its infancy—that is, heredity. One has merely to take an actual case to see how immensely difficult the problems of development are, as they present themselves to the physician, and how hopelessly impossible of right solution some of them are in the present state of our knowledge.

A boy has an attack of infantile paralysis in his first year of age, followed by impaired growth of bones, muscles, and other tissues, with weakness and contracture of the right arm and lameness of the right leg. Otherwise he develops in mind and body fairly well, though slowly. At puberty he becomes asthmatic; at nineteen he becomes thin and anæmic, the asthma ceases, and he has a bad attack of excited melancholia. That lasts for six months. As it passes off, and the nutrition of the body improves, the asthma returns. Coincidentally with his recovery from the melancholia there is a change in the appearance of the body in the direction of completed manhood, the beard growing, and the general appearance changing from that of a thin boy to that of a weedy man. In face, form, muscular actions, and mentally he presented markedly the features of the neurotic diathesis, so far as that has yet been defined. He has a very high "V"-shaped palate. His sister had an attack of developmental insanity at twenty-one, and recovered. His uncle was insane, but his father and mother are well-developed, healthy-looking people. It is difficult to get a hereditary history further back. A whole series of questions, physiological, pathological, and in regard to heredity, arise out of this case. Did a vessel or vessels rupture in the brain and cause the infantile paralysis? If so, as is probable, what was the cause of such rupture? Was it a developmental trophic tissue failure in such vessel? If so, as is possible, what caused it at that age when the arteries are normally very

elastic and not prone to rupture? Was the trophic nerve supply to that vessel, through which it should have developed normally, imperfect? And if so, what was the cause of this? Or, as is equally possible, and in my opinion much more probable, was the intra-cranial apoplexy caused by a local epileptiform nervous discharge in the regulating vaso-motor centre of the vessel or portion of brain supplied by it, this discharge being followed by the vaso-motor paralysis of reaction, which allows uncontrolled dilation of the vessels, non-resistance to the blood-pressure, and subsequent rupture? If that was so, what caused such vaso-motor explosion? Then many physiological and pathological questions of the highest interest are involved in the retarded and incomplete development of the right side of the body subsequent to and consequent on the infantile paralysis. Why was not this boy idiotic or epileptic, or both, after the paralysis, as so many other children are? What was the significance of the asthma—a spasmodic explosive condition, probably, of the pneumogastric centres—coming on at puberty? and of the excited melancholia at nineteen? Why were lower and nutritive centres affected first during the most active period of growth?—and then the respiratory centres?—and then in order the mental centres during reproductive and higher mental development? And why did the asthma cease when the melancholic attack came on? Why was there a failure in the nutritive power of the whole body, as seen by the loss in weight and want of appetite before the melancholia began? Why did he recover from the melancholia instead of passing into dementia, as so many cases of the insanity of adolescents do? Why did the asthma return? Did its return save him from dementia? What was the significance of the high-arched palate in his development? Why did his form, his tissues, and his organs all follow the type of the neurotic diatheses? Why did his sister break down mentally at twenty-one? Why had she not infantile paralysis like him? Why should two apparently healthy parents procreate children that during their growth and development were subject to these grave neuroses? Why were he and his sister coincidentally with their recovery from their attacks of insanity developed into a man and woman, fully formed and matured?

This case opens up many developmental problems that I shall refer to in this course of lectures. If many of them cannot as yet be solved, yet it is well to face them, so that observers in various fields and with varied experience shall record the facts, without which future successful generalization cannot be done. The facts of development, whether physiological, pathological, or hereditary, can never be all observed by specialists. The general practitioner has far more chance of getting access to the facts in the infantile period and to the factor of heredity than any one else. The questions of development are most eminently practical ones, for we must surely look to the preventive medicine of the future in some degree to combat bad heredity by good conditions of life—this, in fact, must be the great problem after we have cleaned the drains and provided plenty of good air and water to every inhabitant; and if the physiologist can teach us exactly how the marvellous process of development proceeds normally and typically in all its stages, from the impregnated ovum up to the perfect man and woman, we shall be able to note when failures of normal development are beginning, and possibly to take measures for the early combatting in some degree of such failures.

Speech Development in Relation to Mind.

The question of the development of speech in relation to and concurrently with mind is one of the very highest interest. It has occupied the attention of physiologists and psychologists much more since Broca's famous localization of the third frontal convolution of the left side as the speech centre than before that time. It occupies a foremost place in all scientific treatises on idiocy and other forms of congenital mental defect, and educationalists are paying more attention to it than they did. All psychologists now agree with Max Müller and Spencer, that no kind of generalized ideas could have originated without language or speech, and that humanity could not have evolved far without it. It is, in fact, next in importance to mentalization. This is not the place for any exposition of the physiology of speech development, except as that is illustrated by various stages of arrestment during the growth of the brain from birth up to seven

years of age. My purpose will best be effected by relating a few cases showing a gradual rise from no speech at all up to perfect articulation, but with "mental defects of speech." The first case is that of an idiot girl, of whom this is a short description:—

C. B., aged twenty-seven, has been over three years in the Asylum, and is the most poorly developed being under my care. Of her heredity nothing is known, and both her parents are dead. She is dwarfish, being only 4 ft. 8 in. in height, and she has a small, badly-shaped head, with flat features. She has been quite deaf from birth, and the right side of the body is weaker than the left side. She is an illustration of a person whose brain development has been so low that she is unable to speak an articulate word. When under the influence of strong emotion she groans and utters harsh cries, much more like a lower animal than a human being. Of course the deafness has placed an impediment to the development of speech, but altogether apart from the sensory side, the mental functions are of so low an order, and the motor functions so ill co-ordinated, that it is almost certain she could never have acquired language. She has never been able to be taught even simple sign language. The production of a slightly accentuated emotional state seems to be almost the highest act of her brain, and the condition of her mental development may be judged from her habits. Though at an age when women have families and households to look after, she occupies herself with three most miserable looking dolls. These she puts to bed at night, and if any one strikes them she utters a harsh scream and looks very unhappy. The presence of this single altruistic emotion is the noblest element in her character. It must also be said that she has a regard for tidiness, and keeps an eye on the rug at the fireplace to see that it is straight. Her mental development is not equal to that of a child of three, and the faculty of speech, which may be called the handmaid of the mind, has not become developed, because there is no mind to express. Of the higher emotions few traces exist; the lower, as represented by anger and fear, are seen. The expression of the emotions is most coarsely performed—her face seems rather to be distorted by a grimace than expressing a human emotion. When a comparatively simple reflex act of this description is so badly per-

formed, one could hardly expect the presence of complex vocal movements.

In the following case we get a step up the ladder in speech development:—

C. H., aged twenty, has been four years in the Asylum. She is decidedly in advance of C. B., as she possesses the power of articulate speech, though of a low order. In her hereditary history no neurosis was discovered, but she is known to have taken epileptic fits since she was three years old. She has a small head, pleasant, happy features, and is very vivacious. She has some difficulty in walking, and cannot perform delicate movements with her hands and arms. Mentally she is considerably in advance of C. B., and though, like her, she still amuses herself with dolls, the scope of things she takes an interest in is greatly increased. She watches who comes into the room, she is sociable, and likes to be taken notice of and to play with some one; she asks for almost everything attractive that she sees in her own language; she demands sweets, she claps her hands at the sparrows, and she points to the pussy-cat, or "puss-ca," as she calls it. With this degree of mental development we would expect some power of speech, and we find that C. H. can talk, but only in her own language. Some of her words are obviously imitations or attempts to pronounce our words, though others seem to be "original." Her vocabulary is very limited, and does not contain more than fifteen words, but she makes these words do a lot of work. She always repeats the word over and over again till she is satisfied, and this is done in various tones of voice, denoting the intensity of her feeling, and almost always *accompanied by gestures*. By this means she can convey much meaning; and her nurse gives most complex explanations of what she wishes to express, this being usually wants. Thus, not only is the word to be considered, but the exact tone and the gesture, if one wants to know the precise shade of her meaning. Thus *pia* means give, and *munna* is the name she calls herself; and if she wants anything she points to it, and cries *pia-pia-pia*, etc., with an occasional *munna-munna-munna*, with varying degrees of loudness and rapidity of utterance, till she gets what she demands. The development of her faculty of speech is in the very lowest stages, and it illustrates very well

the first step in the ladder, beyond which some savage races seem scarcely to have advanced. "We learn that among the lowest men inadequate words indefinitely combined are also imperfectly pronounced, as, for instance, among the Akka, whose speech struck Schweinfurth by its inarticulateness. . . . And, thus prepared, we need feel no surprise on being told that the Zuui Indians require 'much facial contortion and bodily gesticulation to make their sentences perfectly intelligible;' that the language of the Bushmen needs so many signs to eke out its meaning, that 'they are unintelligible in the dark;' and that the Arapalios 'can hardly converse with one another in the dark.'"¹ The following is the most of C. H.'s vocabulary:—

Mamma is the nurse.

Munna is her own name.

Pia is give.

Pa-pia denotes that she desires to go to the w.-c.

Puss-ka is the pussy-cat.

Bigana are birds, chiefly sparrows.

Aye is yes.

No is no.

Fia denotes that she is afraid.

Tukka. She utters this when she desires to attract attention and to play.

The next two cases to be described (examples of a large group) have been the subjects of infantile hemiplegia. In both cases a coarse lesion has occurred in or on the left hemisphere of the brain, with the result that trophic development on the right side of the body has been considerably impaired. The upper and lower limbs in each case are smaller than their neighbours, tending to be deformed, and the motor functions are most imperfectly performed. In addition to interfering with the trophic and functional development of the right half of the body, the development of the mental faculties has been impeded; both cases show mental defects. In addition, the dynamical state of the cerebral cells has been injured, and both cases suffer from epilepsy, the effects of which are more marked in the right side of the body. As may be expected, with a coarse lesion of the

¹ *The Principles of Sociology*, by Herbert Spencer, third edition, vol. i. p. 134

left side of the brain, the speech is affected to a greater or lesser degree in these cases. The speech deficiency in these cases is to be regarded as due to the imperfect development of the motor functions of Broca's convolution, as the mental deficiency does not account for it sufficiently. It is also to be regarded as strictly analogous to the imperfect movements of the right hand and leg.

The first case, L. M., is the lesser developed. She is twenty-three years of age, and has been here over ten years insane. She is irritable and ill-tempered, is unsociable, and does no useful work. Her right arm and hand are very undeveloped, and possess little co-ordinate movement. As may be expected, her speech is in just a similar state of imperfection. She exhibits in a marked degree the defect known as "Calling," which so often accompanies mental enfeeblement. In her case the most prominent characteristic as regards the consonants is the invariable substitution of T for K (hard C) and D for G. In addition, even the vowel sounds are pronounced thickly and impurely, owing to an awkward and slovenly co-ordination of the necessary movements. The combined results of her defects of speech are such that no one, unless intimately acquainted with her, can understand a word she says. This is clearly a case of motor defect, because the mental power, though deficient, is there, and is struggling hard to express itself.

J. N., age thirty-one, has been nearly three years in the Asylum. She is, as a rule, a quiet, industrious person, of a happy disposition, but at times gets very emotional and excited. It was owing to these epileptiform outbursts of excitement that she was sent to an asylum. Her speech is obviously very much affected, and in much the same directions as in the last case, but yet distinctly a step in advance. She exhibits "Calling," and makes the following substitutions,—T for K (hard C), D for G, Th for S and Sh, and D for Z and Zh (as in leisure). She also stammers over the explosives T, B, P, when these occur at the beginning of a word, and endeavours to get over the difficulty by drawback phonation. Although she presents more individual defects than the previous case, and also stammers, yet owing to the clearness with which she pronounces her vowel sounds, one has comparatively little difficulty in understanding what she says. The

advance in her powers of speech accompanies a corresponding advance in mental development.

Both these cases illustrate the non-development of the intellectual and motor sides of the function of speech, owing to destruction of greater or less extent produced by a coarse lesion in childhood.

The next case illustrates a speech further up the developmental ladder, in which the convulsive muscular phenomena of stammering are a prominent feature.

R. D. was admitted on 7th November 1877, and is thirty-eight years old. Nothing is known of his heredity, but he is a good specimen of a "Kalmuc" idiot. His height is $62\frac{3}{4}$ inches; his weight, $166\frac{1}{2}$ lbs. His cephalic index is 86.2; the circumference of his head, $20\frac{3}{4}$ inches. The palpebral slits are oblique, especially the right. The nose is broad, but not flat. The tongue is large, and very much marked by large transverse and oblique fissures. His palate is deformed, and very high; he has no wisdom teeth. The hands are broad and squat. He is orderly, good-humoured, and musical. His defect of speech is very marked—a pronounced stammer. He stammers over all the consonants, as initials. The explosives, both voiced and voiceless—B, D, G, P, T, K—give him a great deal of trouble; but he stammers as much, or more, over the letter L as an initial, and to a somewhat less extent over M and N. In his efforts to say the test-words he produces nothing but facial contortions, and perhaps a slight groan, until he gets the word out. He produces the aspirate and the vowel sounds correctly in the middle of a phrase, but he stammers if asked to say "Hallelujah," and there is sometimes considerable hesitation over even the simple vowel sounds when he is trying to say them to order. But he can say them all correctly if he is allowed to use a phrase to start his voice, thus—"It's 'Ah,'" "It's 'Oh,'" etc. If it is a phrase he is trying, such as "Peter Piper picked a peck o' pepper," he beats time with his hand, and that seems to help him. He sometimes substitutes wrong letters, words, or phrases suggested by meaning or sound. Thus, instead of "No money," he said "No honey;" instead of "Leezie Lindsay," "Leezie Duncan," the latter being a familiar name; and instead of "Tee-total templars," "Join the tee-total." When left to himself he can produce the right sounds in singing

without stammering ; but if asked to sing a line beginning with a difficult word, he hesitates at it, and sometimes also hesitates at a line beginning with a vowel sound.

The following case illustrates the connexion of ordinary stammering with a neurotic heredity and personal insanity at puberty, convulsions, and night-terrors :—

P. B., aged 16-17, was first admitted in December 1888 for an attack of acute mania, and again for a similar attack in April 1890. There is not much known of his ancestry, but there is no history of insanity in the family. His mother died of apoplexy. His father is weak-minded, badly-formed, and drunken. Two sisters and a brother died in infancy. A sister, who survives, is a subject of *petit mal*. The patient himself had fits early in the teething stage, and again when between two and four years old. As a child he was subject to night-terrors, and has always been excitable and bad-tempered. His speech-defect has existed ever since he learned to speak, and is for the most part a simple stammer. In addition, however, there is a "burr," so that he cannot roll an R-r-r-r-r ; his performance of a continued sibilant sound is also slightly defective ; and his soft palate does not meet the requirements quite efficiently, so that there is a slight nasal element where there should be none. His stammer is of the ordinary kind, the hesitation being most commonly over the voiceless explosives P, T, and K as initials, and to a less extent over the voiced explosives B, D, and G (hard). He, however, stammers occasionally also over the sibilant sound as an initial, and over the Wh sound. He sings fairly well, and has a good voice. When singing his stammer disappears, and only the other defects spoken of are noticeable. The stammer also becomes much less marked under the excitement of a mild maniacal attack. When well enough, he improves his articulation by putting his lips and tongue in the attitude required for a given word, thinking no more of the consonant, and emphasizing the vowel sound that follows.

The last illustration of developmental speech defect I shall give is one illustrating defect in the mental aspect of speech. Articulation is normal when slowly performed, but the moment ordinary speech begins the mental co-ordination is lost, and we

have a torrent of half-articulated words following each other like peas running out of a spout.

D. W. was first admitted into the Asylum in November 1870. He was then aged 29. He is a very mild case of congenital imbecility, but nothing is known of insanity or allied diseases in his relatives. He makes himself useful in the blacksmith's shop, sings at the West House balls, rings the church bell, and says grace with precision of language at dinner. His speech reminds one of the Lord Dundreary type, only it is much faster. His defect is not described or expressed by the term "stammer." He can pronounce all the consonants and vowel sounds without difficulty. He breaks down in attempting the more difficult test-sentences, but not much more than most of us do when we do them fast and unthinkingly. His peculiarity might be called a markedly hesitating speech. When calm and speaking slowly, he repeats short phrases well, but it is when he is a little excited that his defect becomes marked. He will then rush half through a sentence in a low monotone, come suddenly to a check, and repeat hurriedly the last word or few words until he gets another start, and then he rushes through another phrase until the next check comes. Quotations give no idea of his peculiarity. It is like a man speaking in the heat of argument or under strong feeling. He seems suddenly to find himself at a loss for a word, but his eagerness will not allow silence, and he lets himself out in an excited repetition of a word or phrase. His whole manner is characteristic, except when he suspects that one wishes amusement from him, when he assumes a dignified reserve. On ordinary occasions one can produce the desired effect by a few frank criticisms of his qualifications for the post of bell-ringer or hammerman. He is very emotional, and will shove his head close to his interrogator's, and with his eyes shut and his head nodding, and often with one's hand in his, he will sputter out a statement of his excellences or of the "daftness" of his masters and associates. All his speech defects are mental and of the same kind, only much exaggerated, as are the want of clear articulation, enunciation, and intonation which most ordinary persons exhibit, as compared with the ideal speaker and orator.

LECTURE II.

Some of the Morphological Signs of a Bad Neurotic Heredity that appear during Development.

IT is a truism that each age has its own beauty ; it is equally true that each age has its own deformity. A beautiful child may become an unprepossessing youth, because through hereditary influences the development of the countenance, the form, and the movements have not gone on the lines that make for mature beauty. There has been a lack of harmonious progress ; the bodily ideal of the age of adolescence has not been attained through the working of an evil heredity. Some features have been retarded in growth, some distorted, some overgrown. It is beyond a doubt in families with neurotic hereditary taint that we find marked ugliness, asymmetry, dwarfishness, hunchback, squint, ungainly movements, horse-laughing, hobbledehoyism, unconformable limbs, and such-like marked departures from the anatomical and physiological ideal. It is not always because they are unlike the rest of mankind and feel themselves contemned that such persons in youth are apt to become soured and peculiar in mind, and sometimes prodigies of vice. I do not think that in J. R.'s case (see page 20) moral obliquity was a sequence so much as a correlative of her ugliness. It is generally because the real origin of the bodily defects, being a hereditary neurotic one, the highest nervous function of mind suffers deformity in development as well as the body. All these defects show themselves chiefly during early adolescence ; they are, in fact, trophic developmental neuroses.

Taking one of the most common trophic defects not necessarily attended by disproportion or ugliness, viz., stuntedness of growth or dwarfishness, it undoubtedly occurs most frequently in neurotic families. It seems to show a general failure of the trophic energies of the brain to complete the organism on the ordinary type. Such deficiency of growth occurs among the

majority of idiots and imbeciles, some of whom never get beyond the boy and girl size. In such cases, too, ugliness, asymmetry, irregularity and coarseness of feature, awkwardness of gait and movement, and harsh voices, are almost universal.

Dr Leslie has favoured me with some notes in regard to the physical defects of the 200 pupils at present in the National Institution at Larbert. The height he finds much under the normal average. The body-weight also is less. The cranium presented marked abnormality, being usually smaller than normal, the type being commonly dolicocephalic, this being apparently due to imperfect development of the posterior region of the head. Microcephaly, scaphocephaly, and macrocephaly are all frequent, and asymmetry of head is very frequent. The eyes are often asymmetrical; sometimes they are obliquely placed (Mongolian). Strabismus is common (4 per cent. of the cases). The nose is usually short, and very seldom indeed really handsome. The ears are malformed, or asymmetrical, or lobeless, or abnormally small, or displaced in the majority of cases. The mouth, oral cavity, and their contents, were found to present many interesting and notable features, almost all being departures from the normal, the beautiful, or the typical. Of the deformities in the palate I shall presently treat, but Dr Leslie generally confirms the conclusions I have come to in regard to that organ in congenital imbeciles. He only found the teeth normal in the minority of the pupils at Larbert. The first and second dentitions are usually delayed. The teeth are often placed in two rows instead of one; they are often crowded; they are commonly short in number, ill-shaped—though typical "syphilitic" teeth are rare—and they decay rapidly. The tongue is often abnormally large, sometimes deeply furrowed and rough, especially among the imbeciles of Mongolian type. Inability to retain the saliva is very common from (1) malformation of oral cavity, (2) inco-ordination of lingual muscles, and (3) inco-ordination of labial muscles. In regard to the features, Dr Leslie's researches abundantly confirm what I have already pointed out regarding the tendency during development in most people with deficient or abnormal mental faculty to show also abnormality in the mental-index of the face. The muscular system he found to be feeble, and the general strength

much under the average, the fingers being commonly small and prehension weak. There was a frequent tendency towards useless rhythmical muscular action. The walking was usually delayed, the standing and attitudes poor. The speech was absent in 34 per cent., imperfect in 24 per cent., and good in only 42 per cent. The usual signs of struma were common. Of the whole number, 22 per cent. were epileptic.

A few exceptions there are, to which I have alluded, where there is an unrelational or unconformable development, where we see bright, beautiful faces with no mind, expressive eyes with no emotion to express, graceful movements, and well-grown, properly formed, attractive bodies in imbeciles where reproductive attraction, at least, is a great misfortune. I have already described (J. D., see page 16) an imbecile girl of seventeen, who is well formed, has a fine face and bright eyes, a pleasant voice, and sings simple songs sweetly, and smiles and acts in a coquettish way, but who can't count four or keep herself clean. Commonly such want of conformity between the mental and motor energy and their mode of expression is far more apt to exist in childhood and disappear during adolescence. The pretty imbecile girl of six becomes an unattractive maiden of sixteen. It is marvellous, from a physiological point of view, how the mental quality of modesty—an essentially sexual virtue—if it does not exist, and has no basis, therefore, in the emotional centres in the brain, will be reflected in such a case in a want of certain feminine qualities in the countenance and expression, the want of which makes a young imbecile girl unattractive or even repulsive, instead of being magnetic and pleasing, even though her features may be regular and her bodily conformation good.

The proper rate of growth at the different ages is mostly determined by the healthiness and heredity of the brain. There are many children who grow well up to eight or ten, and then cease to grow proportionably. The head ceases to grow, while the body and limbs go on increasing in size; or the body grows, while the hands remain small and like those of an idiot. Many lads and girls do not grow their normal great increase in height and weight from fourteen to seventeen, and so remain dwarfish. In many girls the breasts do not grow at the proper age, nor the beard in young men. One and all of these abnormalities in

proportional and sequential rate of growth I look on as commonly owing to a bad neurotic heredity. We all know that unattractive faces have covered up attractive minds, and that great intellects have been exhibited by men of dwarfish and stunted and even ugly forms; but this does not in the least disprove the conclusion I am stating, for in those cases the heredity has taken an outward trophic form, and left the higher brain centres of mind and emotion unaffected, they being, in fact, cases of unrelational development.

Doubtless by far the most important and subtle of the developmental defects are not those affecting the outward form of the body nor the visible shape of the organs, but are those affecting the self-nourishing power and energizing of the cells and the correlation of one nerve centre to another. Want of organic harmony in these centres, the lack of that essential solidarity which makes for health, sanity, and longevity, are defects that as yet we may not be able to detect by any physical or chemical tests we can apply. That brain, which is so constituted in its motor centres that it is subject to epileptic explosions from childhood, we should not probably, at two or three years of age, be able to distinguish from a normal brain in shape, size, or histology, though there is a reasonable hope that improved microscopic, physical, and chemical methods of research may in time enable us to connect every abnormal function with a corresponding change of structure—"structure" being used in a large sense to cover the whole physical constitution as tested by every possible method. But meantime we must be content to observe closely and note accurately the gross changes that occur during faulty development. The countenance of man with its infinite possibilities of emotional expression, his head, his body, his limbs, his movements, attitudes, and modes of progression, his gross size and weight, his rate of growth at different ages, all afford room for accurate observation. Certain pathological craniologists, of whom Benedikt of Vienna is by far the most notable, have devoted enormous attention and labour to a study of the convolutions and the form of the head as related to the neurosis of epilepsy, and to what he and other Continental criminal anthropologists reckon as the psycho-neurosis of criminality. He will boldly examine a patient's head, and say, "That is an

epileptic," from the outward appearance, size, and shape of the head, and the outward proportions of one part of the head to the rest. He will examine a brain, and say, "That belonged to a criminal," because it is "atypical," and presents the "stigmata of excess of evolution of the fissures, their excessive and atypical confluence and separation," and because the cerebrum does not cover the cerebellum. These pathological conditions, if they exist, and have the significance attributed to them by Benedikt, must arise during early growth and development. But they are not yet fully accepted facts. An acute observer like the distinguished Vienna Professor cannot be entirely mistaken, however, even though he may generalize too sweepingly. There must be some truth, if not the entire truth, in his observations and conclusions. We cannot yet accept the story told of Lombroso, the great Italian anthropologist, that of all the persons found by him to have the typical criminal head only one has up to this time remained honest.

By far the best types of the criminal body and mind are to be met with in our prisons; but as illustrating the process of physical and mental degeneration of a family which had been habitually criminal in nearly all its members for four generations, I give the following cases of P. F. and D. F. :—

P. F.'s father and grandfather had been criminals of the baser and thieving type, drunk whenever they could get money, in prison when hard up, and with apparently no sense of right and wrong, or power to follow the one and avoid the other at any time of their lives. He was a habitual drunkard and habit and repute thief. He often tried to murder his wife. At fifty he took an attack of alcoholic insanity, and was then very broken-down indeed. He was small and "ill-looking," and he suffered from ascites on admission to Asylum. He recovered sufficiently to be discharged from the Asylum.

D. F. was twenty-six on his first admission. He is described as having been devoid of any trace of moral sense all his life. The following is a more detailed description of him:—His face, and, indeed, his whole physique, expressed defective organization. His degeneracy was too great for concealment, and was revealed in feature, expression, manner, and gait. Taken all round, he was about the most ill-favoured male

patient in the Institution. His height was 4 ft. 10½ in., his stretch of arms 60 in.; his right arm measured 24 in., his left 23⅞ in., the left hand being ⅓ in. shorter than the right; circumference of chest, 31 in.; length of leg, 29 in.; length of foot, 9 in. There was no abnormality about his external genitals. There was some localized pigmentation on one or two parts of the body. The circumference of his head was 21¼ in., the cephalic index 80. The head was narrow in the frontal region, broad behind. The hair was dark, coarse, and straight, and always stood up. The palpebral slits were small and not symmetrical, and there was always a bleared look in his eyes, partly due to slight corneal opacities and chronic conjunctivitis, probably specific. The bones of his nose were big and broad, but sunken at the bridge, and rather short. The side-lines of his face were not rounded, but came gradually in from the broad temporal region to a fairly large, square chin. His mouth was large, and his palate markedly deformed. His teeth were serrated at the margin, irregular, and much decayed. His ears were too large, not symmetrical, and conspicuously low set, the upper border of insertion being well below the line of the eyes. His articulation was not distinct, and there was always the tone of nasal obstruction in his voice. When spoken to, he always answered with a silly smile, no matter what the tenor of his reply might be. His gait was awkward, and devoid of energy and purpose. The history of his whole life would be instructive, but unfortunately our information is limited. He had a bad heredity, including a drunken father, who for a time was in this Institution. In youth the patient was notably wanting in moral sense, and spent most of his time in reformatories and prisons. He had been in every prison in Scotland. His great weakness was thieving, and though the objects of his desire were generally of trifling value, such as sweetmeats, he evinced considerable cunning and stealth in their acquisition. These characteristics remained with him while in confinement here. Within a quarter of an hour after admission he stole a stomach-tube that had just been used for feeding another patient! He was very inactive, and did only such simple work as sweeping the paths or wheeling a barrow. He had been previously confined, and was discharged to be boarded out in the North. He left his

country residence abruptly, and when asked how he crossed the Forth, said he "swam over among the fishes." The following illustrates his conversational powers:—"Did you ever kill anybody?" "I think I did." "Who was it?" "I canna mind." "Were you ever married?" "I think I was." "What was your wife's name?" "I dinna ken." He had a curious exaggerated sense of his bodily strength. Though a small man, there was no weight, however heavy, by his way of it, too much for him to lift. He was a periodic masturbator, but his talk was not lewd. Withal he was a harmless creature, and was never seen to be violently angry or to strike a fellow-patient. The process of degeneration, which had begun in his great-grandfather, and had for the first two generations shown itself chiefly in moral defects, became in his father actual insanity, and at last reached in him the condition of mild dementia. Each generation seemed to have become smaller, uglier, and less capable of honest work.

Much has been talked of late about degeneracy and degenerations of tissues and organs; the words are used to denote the imperfectly developed organs and tissues, and the special tendencies to disease often seen in the descendants of criminals, drunkards, opium-eaters, and persons generally who have been subject to bad conditions of life, and the retrogressive changes that are met with in tissues and organs once normal, but that through alcoholic, malarial, or other poisons, disease, or other cause, have undergone nutritional changes away from the normal. In the former sense, the terms "degeneracies" were chiefly used by Morel and Moreau de Tours in their great works,¹ which laid the foundation of our modern knowledge of certain human physical degenerations and their causes. In that sense they may be mostly put down to trophic neuroses of a hereditary character; and they first appear during early growth and development, a point which Morel and Moreau de Tours both missed. One may take as examples the ill-shapen ears; the badly set, ill-shaped, and bad teeth; the prognathous jaw; the warts and polypi; the small, badly formed, ineffective hands; the clammy, ill-smelling feet; the asymmetries and artistic failures; the pigeon-breastedness so often met with

¹ *Traité des Dégénérescences de l'Espèce Humaine*, Morel; *La Psychologie Morbide*, Moreau de Tours.

in the children and adolescents of hereditarily neurotic and insane families.

The question of mental degeneracy, quite apart from idiocy or technical imbecility or insanity, is one of enormous social importance. For every idiot or insane person we no doubt have ten human beings in society, and weighing it down, who are so much below or away from even a minimum standard of humanity that they must be reckoned among the degenerate. Such persons are the despair of teachers and parents. They afterwards sink in the social scale through incapacity; they are left stranded in nooks and corners and eddies in the struggle for existence; they live at a lower level than average humanity; they are not an interesting class; they need help always and cannot help themselves; they easily are drifted over the border line that separates the criminal from the non-criminal; they fill poorhouses and are a heavy burden on the charitably disposed, for they cannot be taught to help themselves; they are only kept at work by their empty stomachs; they are fortunately and fittingly situated when they settle down into the grooves of hewing some of the world's wood and drawing its water; they are the grown up children of society who can never attain self government; they always do best under the rule of the strong and kindly; they are responsible to the law and have the liberty of men with the self-control of children, yet liberty in a complete sense is contraindicated for them by the tyranny of their organization. It is this class that unquestionably makes up a considerable part of General Booth's "submerged tenth." All of us can recall such men and women—families of them. If we are scientific enough or curious enough to hunt out their family histories we shall find the neuroses in abundance—idiocy, deformity, epilepsy, insanity, criminality, "ne'er-do-weelness," drinking, unpracticality, odd religiousness, and consumption. If we trace their mental histories up from babyhood, we shall find that their most marked deficiencies and peculiarities of body and mind were not very apparent till they got to the age of adolescence. I recall a family where the father is incurably insane and undersized, the mother undersized and not strong minded, all the children dwarfish, ill-formed, ill-favoured, one of them is little above an imbecile, two had attacks

of adolescent insanity, one falling into incurable secondary dementia, one has infantile paralysis, and another had chorea; they live as pigs would live, in dirt and disorder; they are asocial but not vicious, except an almost automatic masturbation be counted a vice. Several of them have taken intense religious emotional outbursts during adolescence, and the earnings of the whole family don't come to a pound a week.

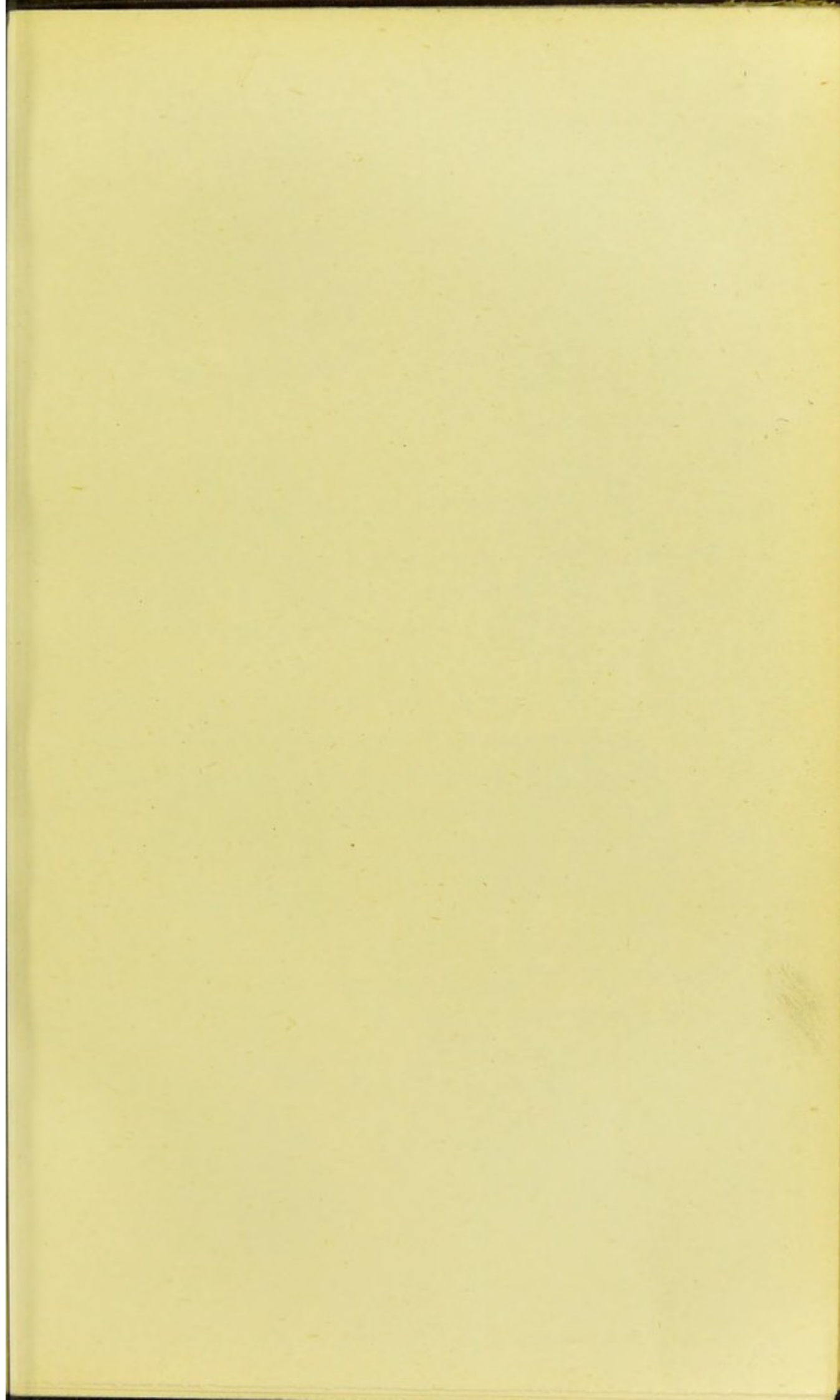
Dr Warner¹ has done good service by directing the attention of teachers, school-boards, and the public to the physical and mental signs of nerve weakness and degeneracy in such cases, and by pointing out the necessity for a more careful examination into the bodily and mental conformation of our school children. The relation of physical to mental characteristics are well brought out in his pictures of hands (pp. 53-59), and his whole chapter on "Observation and Description of Facts" should be read by every medical man and by teachers of children. The mere direction of the attention of teachers to the solidarity of body and mind must do good, and prevent many misapprehensions and mistakes.

The Palate and Upper Maxillary Bone in the Developmental Neuroses.

I do not propose to dwell on any of the teratological defects that occur in the formative and embryonic stage of life, except in regard to a very interesting, and, in my opinion, very important morphological accompaniment of many of the developmental neuroses, viz., a change in the normal shape of the hard palate. The importance of this change consists not in any direct effects of the palate, bad or good, but in the indication as to brain constitution which it affords. The palate when typical, both in lateral and antero-posterior sections and in the arch formed by the line of the teeth, shows somewhat regular curves. The dome is not very high, and forms part of a circle whose radius is much larger than the width of the mouth (see Plates III. and IV., 1. Typical).

Long ago it was noticed that in idiots the palate is very often

¹ *The Growth and Means of Training the Mental Faculty.* By Francis Warner, M.D.



DESCRIPTION OF PLATE III.

Figs. 1 to 3 are from photographs of casts, taken from patients in the Royal Edinburgh Asylum, showing the three types of palate which I used as my standard for—1. the "Typical;" 2. the "Neurotic;" and 3. the "Deformed" palates. Figs. 4, 5, and 6 are three common types of palate in adolescent insanity, 6 being an example of the palate "ridged" antero-posteriorly. Figs. 7 and 8 are examples of extreme "deformity" in palates.

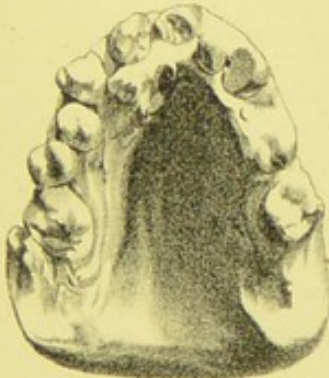
STANDARD TYPES OF PALATE.



1. TYPICAL.

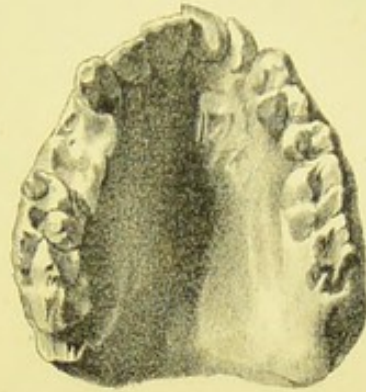


2. NEUROTIC.



3. DEFORMED,

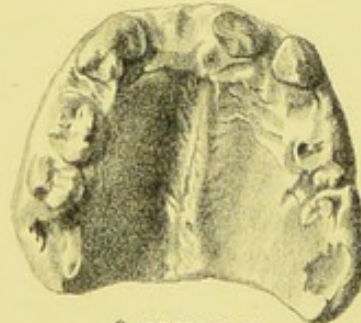
ADOLESCENT INSANITY.



4. NEUROTIC.



5. DEFORMED,

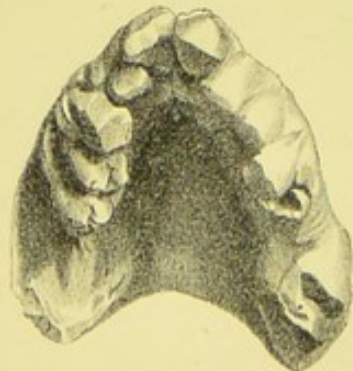


6. DEFORMED
with Central Ridge.

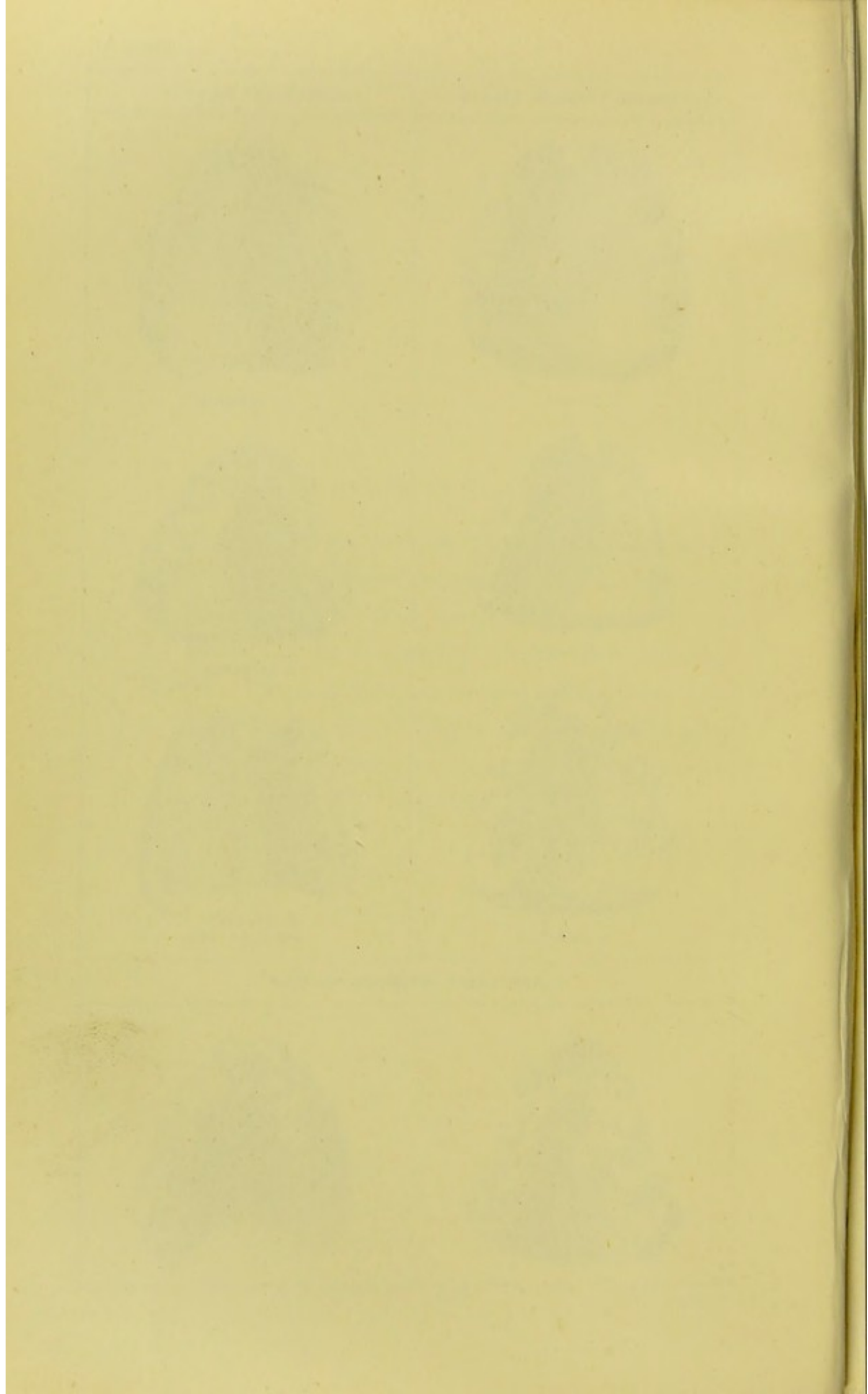
EXTREMELY DEFORMED PALATES.

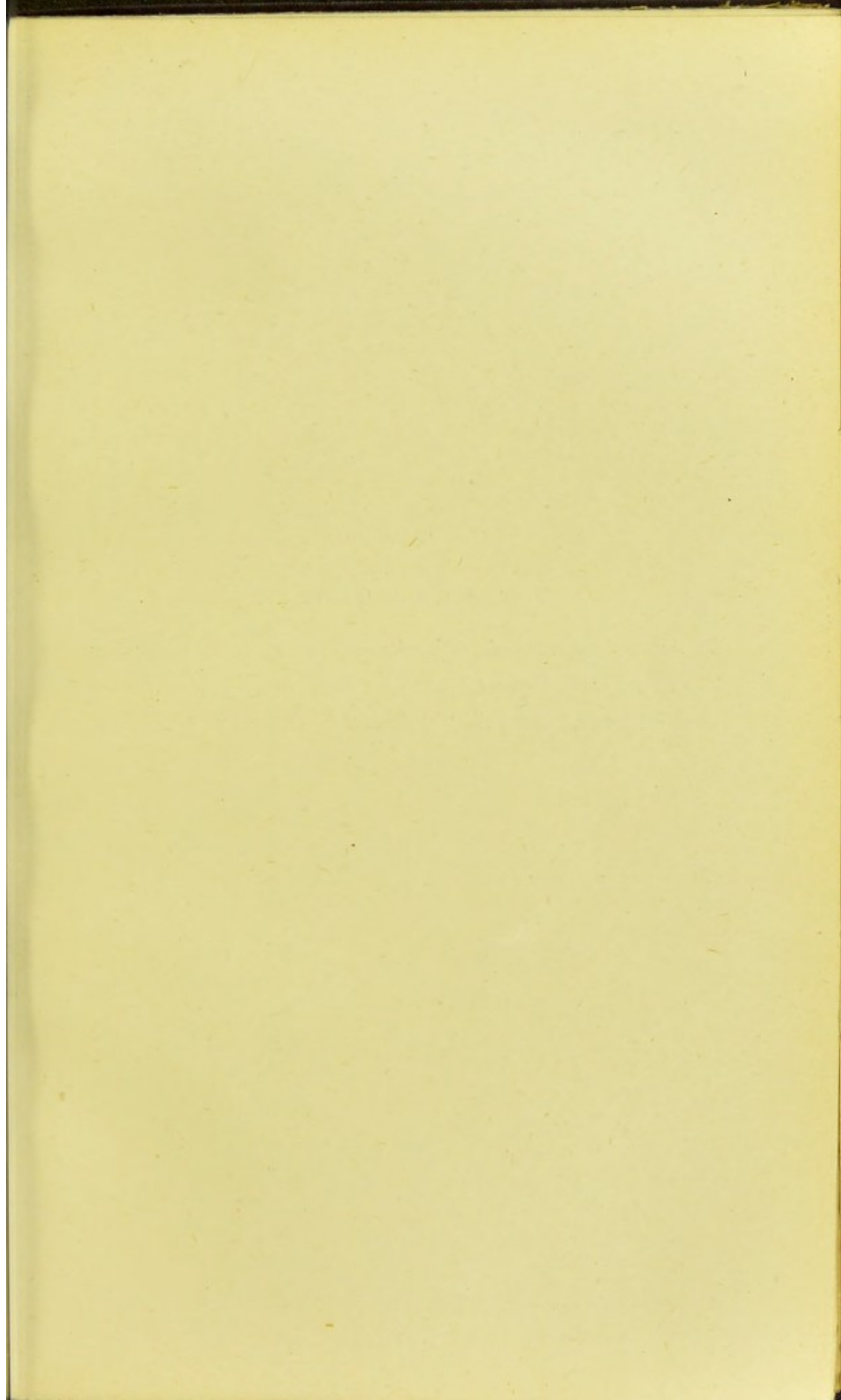


7.



8.

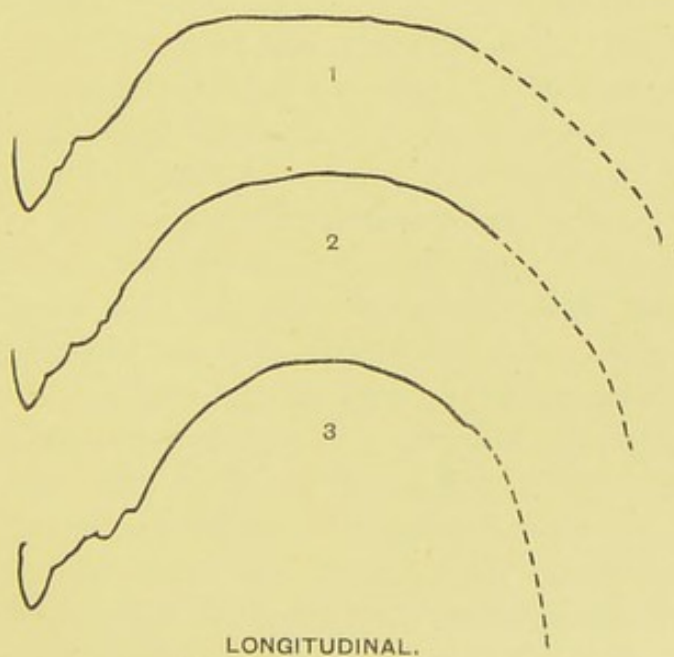
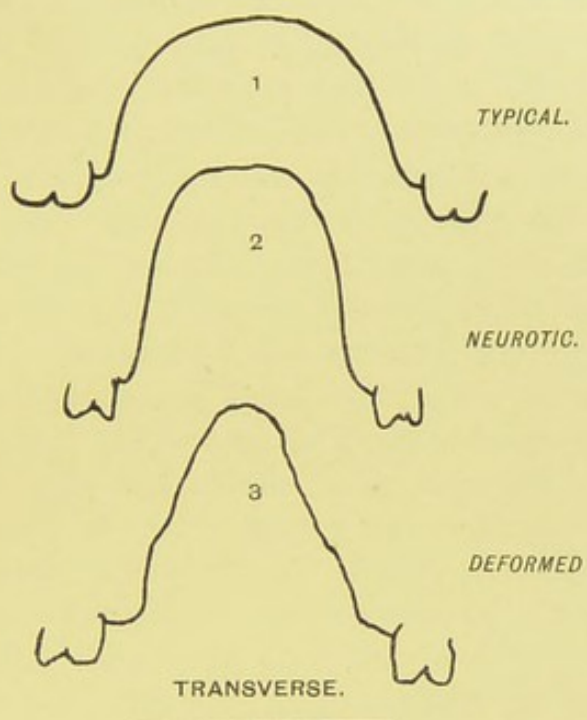




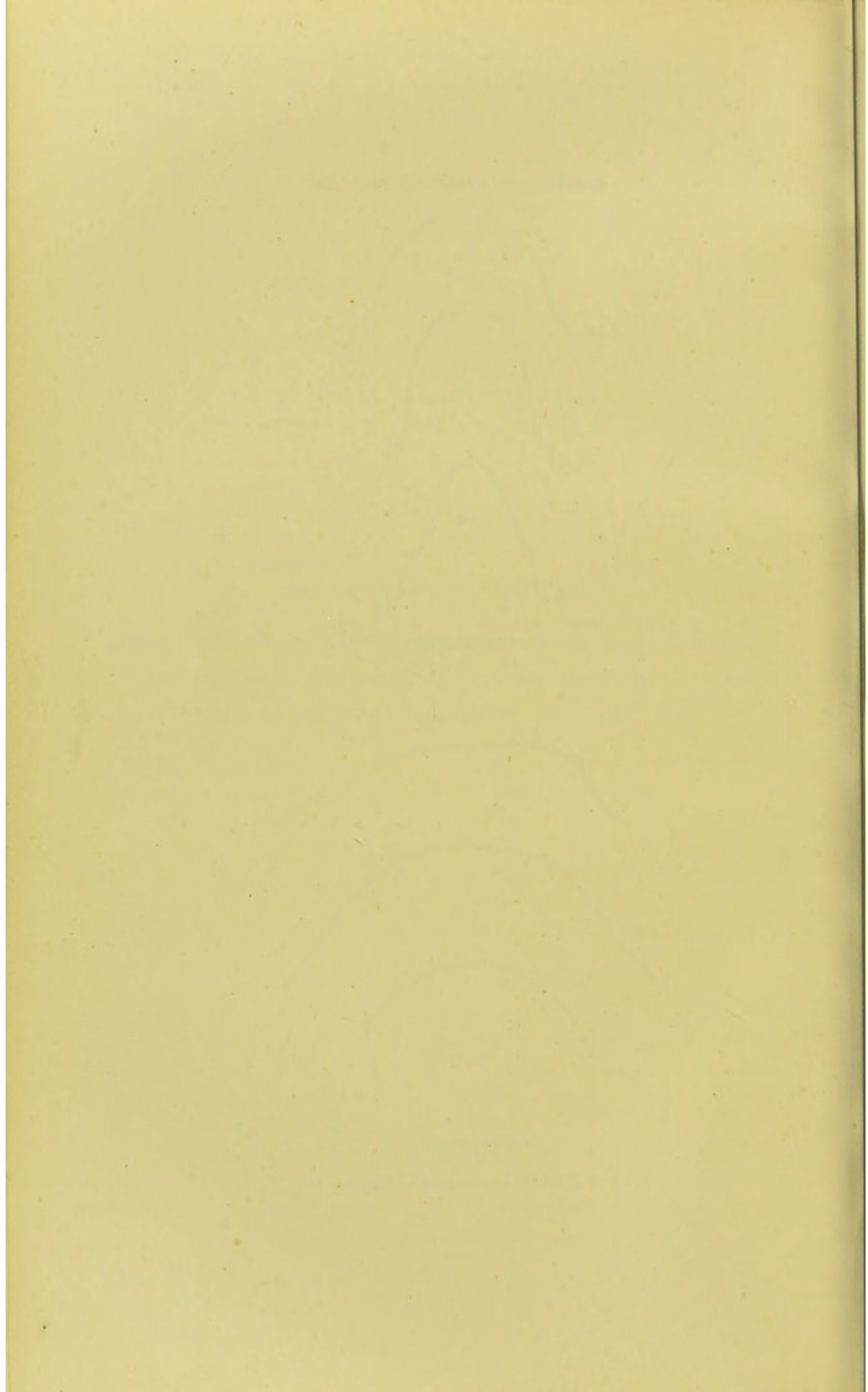
DESCRIPTION OF PLATE IV.

Shows sections, vertical transverse and vertical antero-posterior, of the three types of palate: 1 being the "Typical," 2 the "Neurotic," and 3 the "Deformed."

SECTIONS OF STANDARD PALATES.



The Soft Palate is represented by a dotted line.



not regularly arched, but "V" or saddle-shaped, and very high, while in this class the line of the teeth also is apt to be "V"-shaped instead of forming part of a circle in front round the incisors and canines (see Plates III. and IV., 3. Deformed). So much importance was attached to this abnormality, that it was put down by Dr Langdon Down as characteristic of idiocy and congenital imbecility. Further observations upset this theory by showing that many idiots had normal palates, and that many sane persons had high "V"-shaped palates. Dr Clay Shaw,¹ after a series of careful observations and accurate measurements in idiots, came to the conclusion that "there is no necessary connexion between a high palate and the degree of mental capacity of the individual." He pointed out that a high palate is invariably associated with a narrow pterygoid width and a narrow skull, and that it has "nothing to do" with premature synostosis of the skull base. But Shaw's measurements are manifestly incomplete and done on wrong principles, and his conclusions are only partially true, and clearly go beyond his facts. The next generalization about the palate I find in *The American System of Dentistry* (Leitch), in the article "Dental and Facial Types," by Robert S. Ivy, D.D.S., who looks on them as being part of the morphology of the temperaments. He says, "the shape of the alveolar arch and the dome of roof of the mouth, also the articulation of the teeth, and the manner in which the gum is festooned over each tooth, are all indicative of the several temperaments, and present varieties worth attention.

"The arch of the bilious temperament from cuspid to cuspid is almost flat, the lines backward from these points slightly diverging in an almost straight line. The dome of the mouth is high and almost square. When articulated, the upper central incisors overlap the lower, and are closely locked. In general form the teeth are large, the corners tending to squareness, and are rather long in proportion to their breadth; in texture they are dense and strong. The proximal surfaces are in close contact two-thirds of the distance from the cutting edge to the neck, rendering the festoon of the gum short and heavy.

"The sanguine arch resembles a horse-shoe in shape. The

¹ *Journal of Mental Science*, July 1876.

dome of the mouth is high and semicircular. The articulation of the teeth is close and firm, and their structure is dense. The masticating surfaces of teeth in this class frequently bite edge to edge, and as age advances they are gradually worn down to the gum unless protected by artificial means. In general form they are well proportioned, length predominating in less degree over breadth, and their outlines are rounded and curved. The distal and mesial surfaces are in contact a little more than half the distance from the cutting edge, and the festoon is long and delicate in outline.

“The arch of the nervous temperament presents a strong contrast to either of the two preceding, and is sometimes spoken of as Gothic, from its pointed character. From the central incisors, which often overlap for want of space, the line of the remaining teeth continues backward with a slight curve, the greatest prominence being between the cuspid and first bicuspid. The roof of the mouth partakes of the same curve and angle as the arch. The articulation of the teeth is not close but long, and the teeth belonging to this temperament are of average density and structure. In shape, length predominates over breadth, the distal corner of the centrals is rounded, giving the whole tooth almost the appearance of a lateral, and the cusps and cutting edges are long and fine. The point of contact of the proximal surfaces is near the cutting edge, giving a long, delicate festoon to the gum.

“The lymphatic arch is almost semicircular in its outline, and somewhat resembles that of the sanguine temperament. The dome or roof of the mouth is flat and low. The articulation is irregular and the front teeth are apt to protrude. In shape, breadth predominates over length, and the normal depressions and elevations are either entirely absent or undefined. The festoon of the gum is thick and indefinite in outline. The lateral on either or both sides is frequently out of line.” He gives figures to illustrate his ideas.

Now, I do not believe this generalization is altogether reliable, but, like the others, it contains some truth. I think I can supplement this literature of the hard palate by some further facts that I and our assistant-physicians at Morningside—Drs Robertson, Elkins, and Wilson—have brought out in an investigation

into this subject that we have made during the past year, and I have also to acknowledge my great obligations to Dr Smith, Mr Bowman Macleod, and Mr Ezard, of our dental profession in Edinburgh. After a very careful preliminary examination of many hundreds of palates of the sane, insane, and idiots, I concluded that both Clay Shaw and Oakley Coles's¹ modes of trying to measure the palate accurately were incomplete, and therefore misleading methods. To express the differences and agreements in size and shape of a series of irregular ovoid cavities, like the hollows of the palate in different cases, by lines across or round special parts of them, seemed to me impossible; for in one case the greatest height is just behind the incisor teeth, in others where the hard and soft palates meet; in some the lines of the alveoli that form the two sides of the cavity are almost parallel, in others they are divergent; in some the arch begins at once from the teeth on one side and passes over in a regular semicircle to those of the other side; while in others there is a sort of shoulder next the teeth on each side, with a narrow, high, saddle-like, acute arch between (see Plate IV., 3); while in others again the palate rises in two straight lines at an obtuse angle from the teeth, meeting high in the middle, and forming a "V"-shaped cavity. In the case of some palates, a horizontal section through the two posterior bicuspid, in others behind the incisors, in others through the posterior molars, would give the best impression of their shape, while in others a longitudinal section in the middle would have done so. Some palates were so unsymmetrical that no sections could have exhibited their peculiarities. After very careful consideration I considered that the simplest and the best way was to adopt a classification that most of them seemed to me to fall into naturally. That was, to divide them into three groups. The first I would call the "Typical" or "Normal" (see Plates III. and IV., 1). It corresponds to Ivy's section of the "horse-shoe arch," and low but regular and wide dome of what he says is characteristic of the "sanguine temperament." The second I would call the "Neurotic," for reasons to be given. It has a more Gothic arch, with the alveoli tending to run more parallel for a greater distance than the "Typical," and with a much higher and narrower dome, the roof of which is formed by

¹ *Deformities of the Mouth.* By Oakley Coles.

a larger part of a smaller circle (see Plates III. and IV., 2). The third class I would call the "Deformed" palate. It is of various shapes, all abnormal, but the most common form is very high, very narrow, and at the top either "V"-shaped or saddle-shaped, on account of the shoulder on each side of the teeth I have described (see Plates III. and IV., 3). In this class I would include, in addition to the more common or saddle-shape, all the marked asymmetries, marked central bulgings along the line of ossification (see Plate III., 6), great depressions where the intermaxillary bones join, and the cup-shaped hollows which we find in some cases in the centre. By far the majority of the third, "Deformed," class were "V" or acutely saddle-shaped, however. In some of both the "Neurotic" and "Deformed" the jaws projected forwards so as to cause prognathism, but this seemed to me to have no necessary connexion with the shape of the palate.

I need hardly say that, like all things in Nature, the three classes ran imperceptibly into each other with no abrupt line of demarcation, so that there were a number of cases where one simply had to use one's best judgment in determining the class they were to be put into, and two persons might, in regard to those cases, have classified them differently (see Plate V., 1 to 6). These were too few, however, to affect the general result, most of the palates we examined falling readily into one or other class.

The first thing in this investigation was to ascertain how the palates of the general population stood in this classification. For this purpose we examined all the officials and servants of the Asylum, all the boys in an advanced school for the more educated classes, and Mr Bowman Macleod kindly allowed me to use the casts of the palates in 363 patients of his which he had by him, and which had been taken for the ordinary purposes of dentistry. This made up 604 persons of different classes and ages. Of these we found 40·5 per cent. to be "Typical," 40·5 per cent. "Neurotic," and 19 per cent. "Deformed."

We next, by the kindness of Dr Leslie and Mr Skene, examined all the inmates of the National Institution for Imbeciles at Larbert, containing patients exhibiting every degree of idiocy and congenital imbecility. No doubt the very worst and most untrainable class of idiots are not fully represented there, so

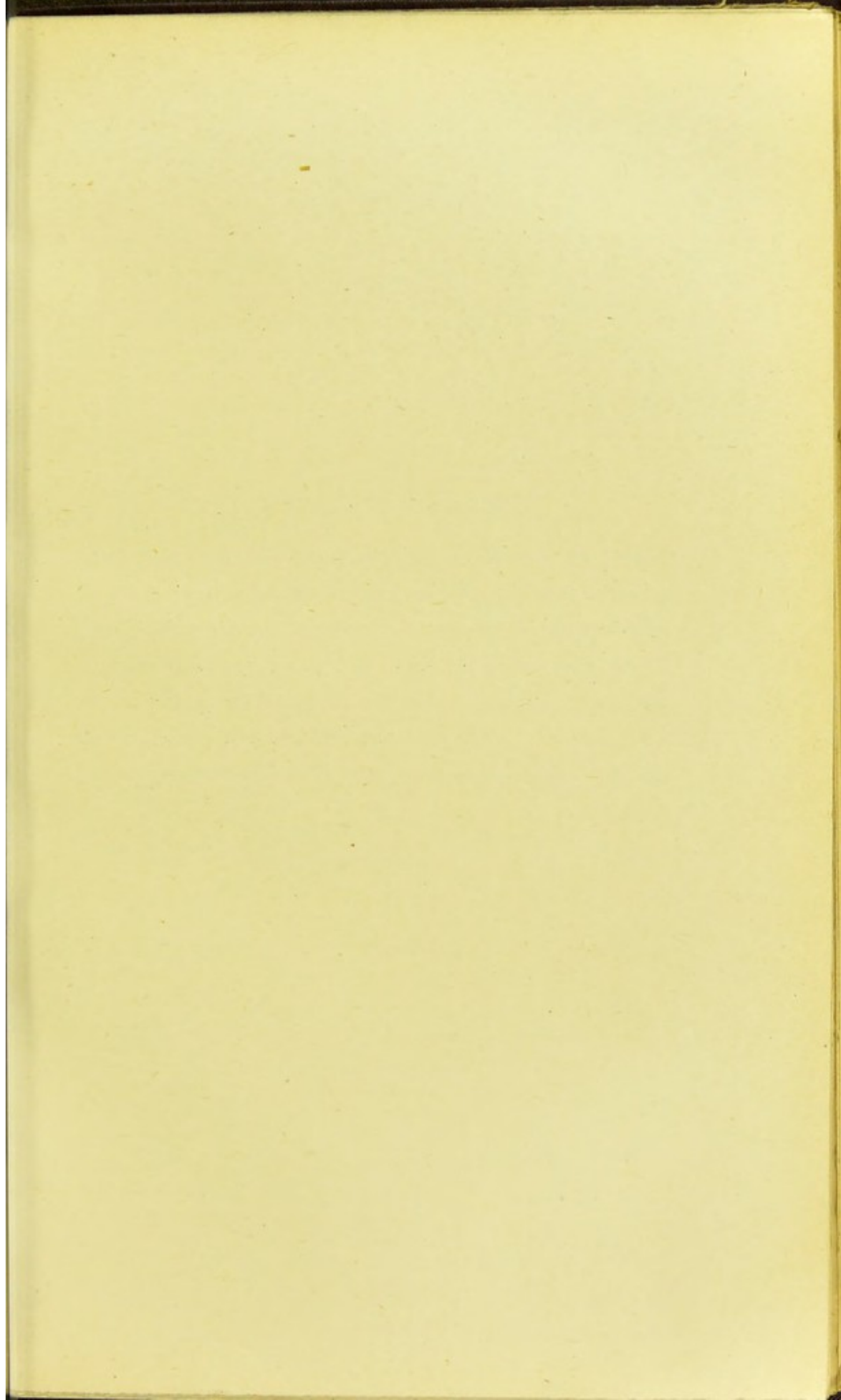
that the results I am to state might be still more striking. To the Larbert patients we added our congenital cases in the Royal Asylum, making altogether 169 cases of congenital mental defect; of these 11 per cent. were found to have "Typical" palates, 28 per cent. were "Neurotic," and no less than 61 per cent. "Deformed,"—the average degree of abnormality in the deformed being far greater than the abnormality among the general population, that is, we found the worst palates of all among them. In Plate III., 7 and 8, are seen photographs of two of the very worst examples of deformed palates.

No one considering the enormous difference between the congenitally weak-minded and the sane, and taking into account the close and necessary relationship of the upper maxillary bone to the base of the skull (see Plate VI.) and the necessary dependence of the skull-base and palate on the brain, can have any reasonable doubt that we thus have in the shape of the hard palate some index of the brain development, and a fact of very great importance to the anthropologist and the physician. There are over three times more deformed palates among idiots and congenital imbeciles than among the sane, and only one-tenth of the idiot palates were typical, while over two-thirds of them were deformed. Less than one-fifth of the palates of the average population are deformed.

These results naturally suggested an examination of the palates among the insane suffering from acquired insanity. We found that out of 592 patients examined in the Royal Edinburgh Asylum, only 23 per cent. had "Typical" palates; in 44 per cent. they were "Neurotic," and in 33 per cent. "Deformed." The "Deformed" cases seemed to comprehend by far the majority of the patients where a strong neurotic or mental heredity was known to exist. I had for several years noticed that the palates of those labouring under "adolescent insanity" appeared to be high, and as I had long ago demonstrated that this was the most hereditary of all the forms of mental disease, I took every case that was labouring under either acute adolescent insanity, or under the secondary dementia in which many of such cases end if they do not recover, and tabulated them separately from the rest of my patients. We had 171 such cases, and of these I found 12 per cent. only with "Typical" palates, 33 per

cent. with "Neurotic" palates, and no less than 55 per cent. with "Deformed" palates. In the number of "abnormal" palates, therefore, the adolescent insane approached closely the congenitally weak-minded (55 against 61 per cent.), though the average degree of abnormality was much greater among the idiots and imbeciles. In Plate V. I have shown six sections, transverse and antero-posterior, of a series of average cases of adolescent insanity. The figures show the gradation from deformed to almost normal. They were taken from nature by means of thin pieces of lead. In Plate III., 4, 5, and 6, pictures of three of those from photographs of casts are shown.

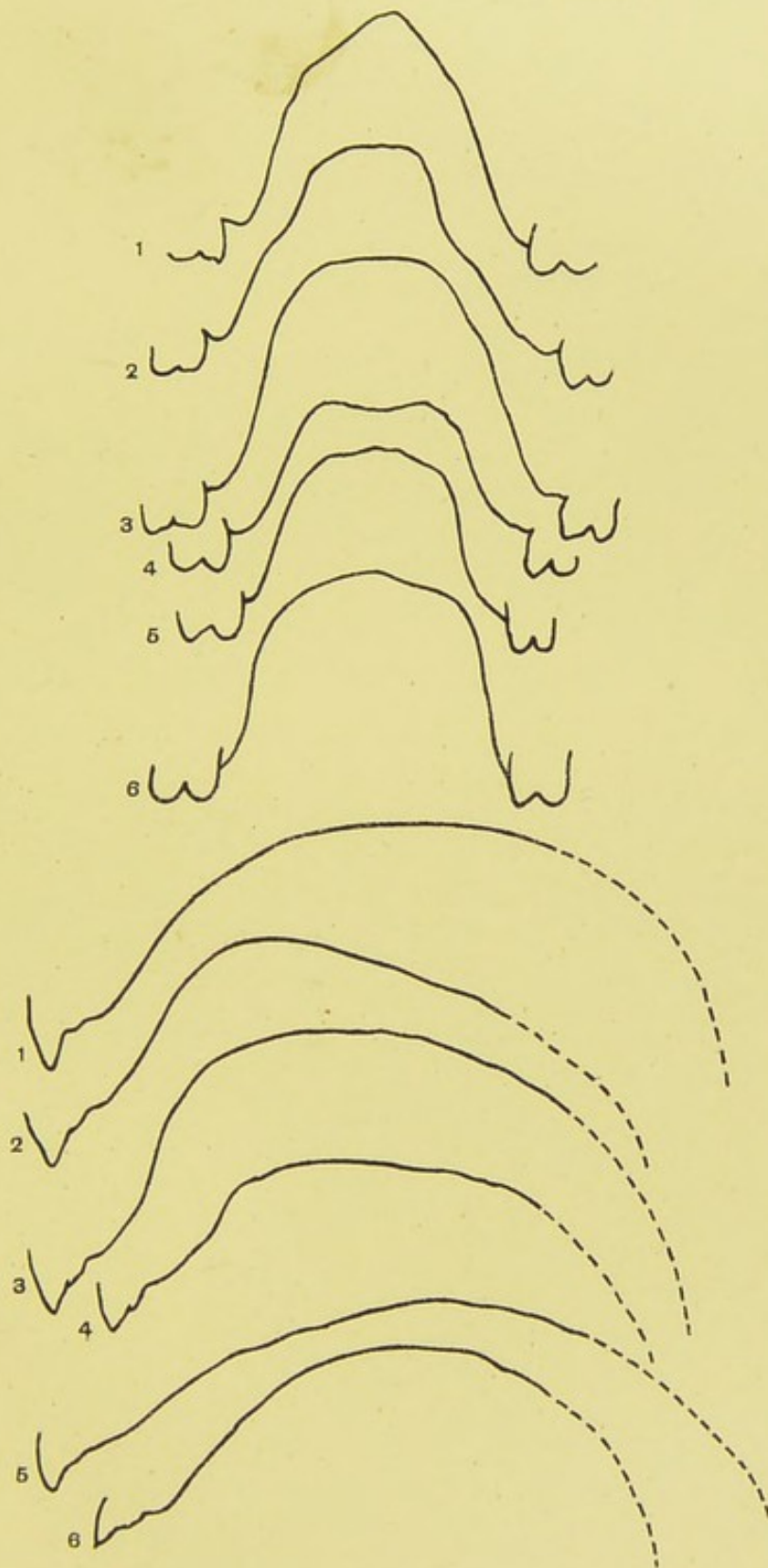
By the kind permission of the Commissioners of H.M. Prisons for Scotland, I was allowed to examine all the prisoners in the Edinburgh Prison on the 29th October and 3rd November 1890. These are chiefly short-sentence prisoners, whose offences have been mostly of the minor kind—theft, assault, disorderly conduct, etc. They are many of them habitual and reputed criminals of the less dangerous kind, and a large proportion of them are of the "degenerate" class bodily and mentally. Fully two-thirds were, in face and stature and appearance, far below any average standard of human development. They seemed to me to be a fair example of the lesser criminal and "degenerate" class of our large cities. They were 286 in number, and 22 per cent. of them had "Typical," 43 per cent. "Neurotic," and 35 per cent. "Deformed" palates. In so far, therefore, as the palate is any index of brain and mental development—which need not necessarily be synonymous with brain and mental action in detail—the criminals and the lunatics stand alike. In so far as it goes, this confirms some of the conclusions of the Continental criminal anthropologists, such as Despine, Lombroso, and Benedikt, but it does not confirm Lombroso's idea that the habitual criminal is a "reversion" to the savage type of man, for, as we shall afterwards see, savages commonly have good palates. There happened to be six babies under a year old in the prison with their mothers, all women of a degenerate class, and of these four had "deformed" palates. Thus early this small bodily defect seemed to foreshadow an undue liability to crime, degeneracy, insanity, or idiocy for these four innocent occupants of the prison cells, which in their case were no unfit type of the hard fate and the unyielding

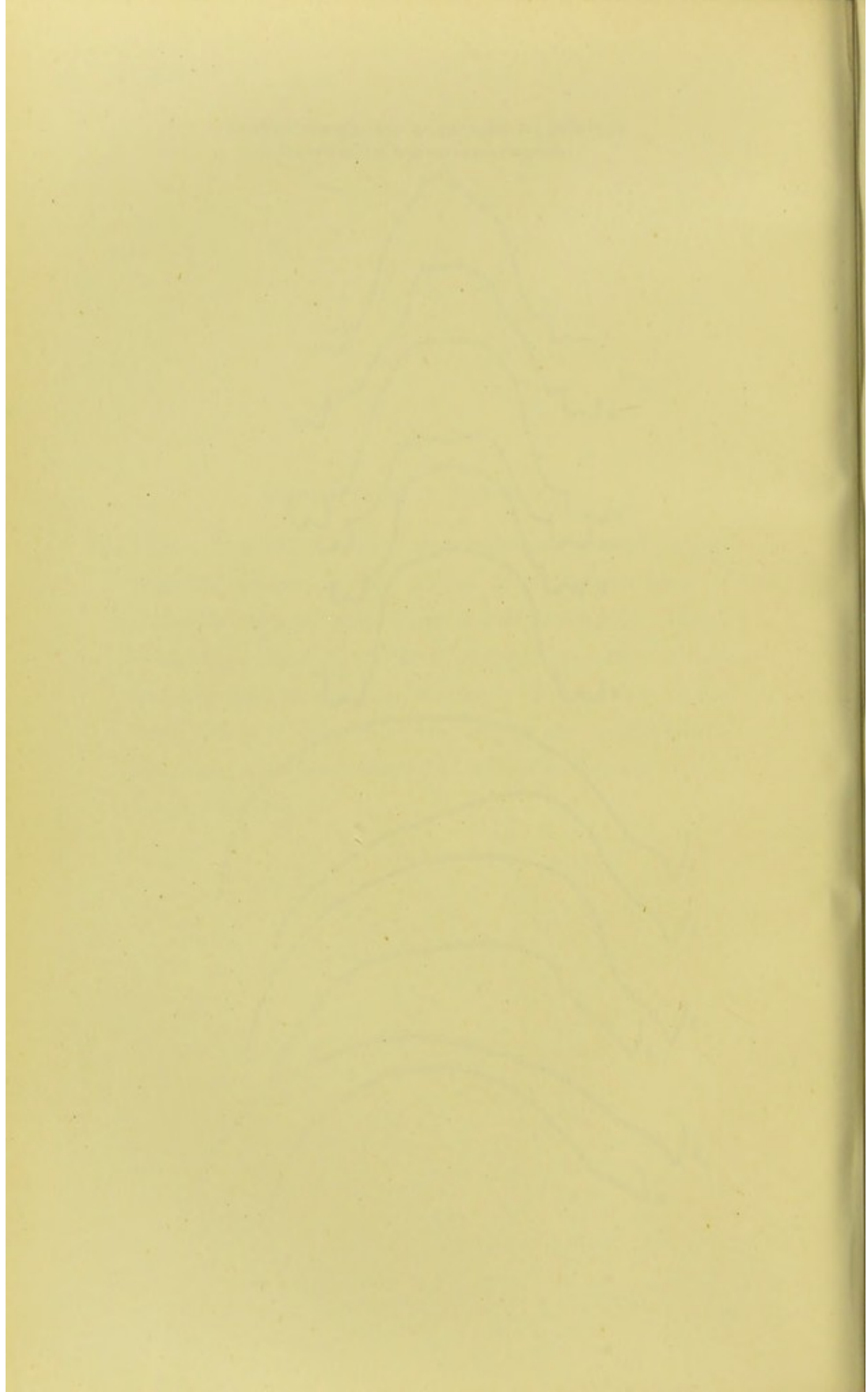


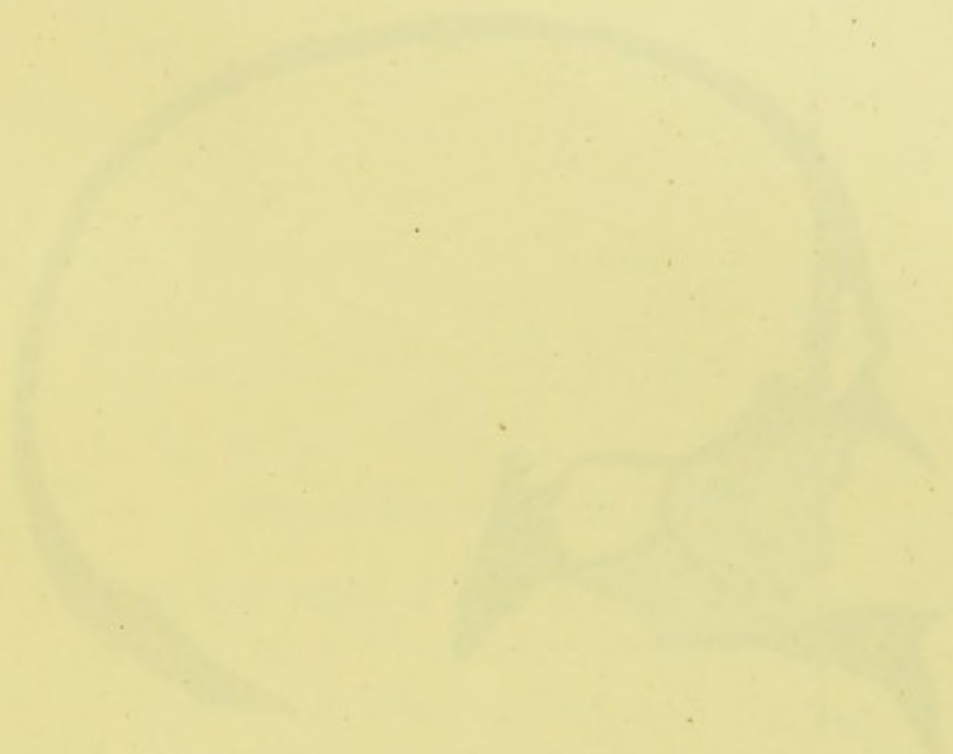
DESCRIPTION OF PLATE V.

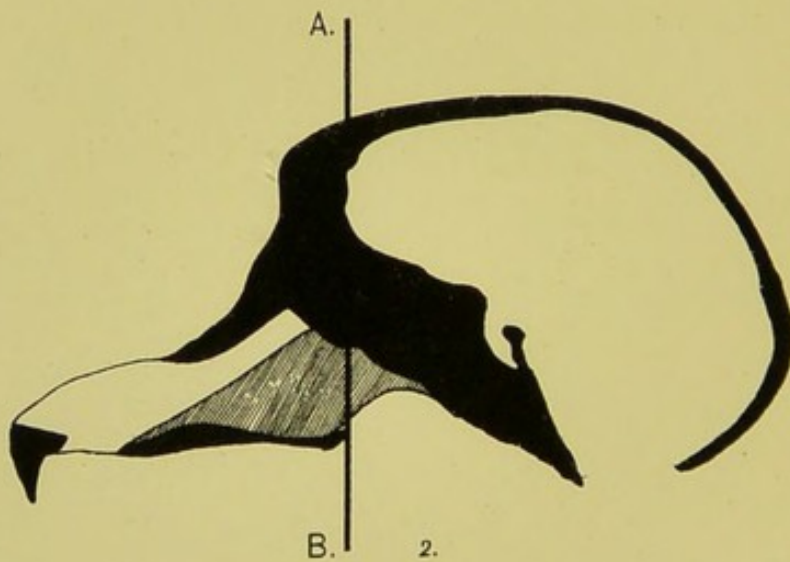
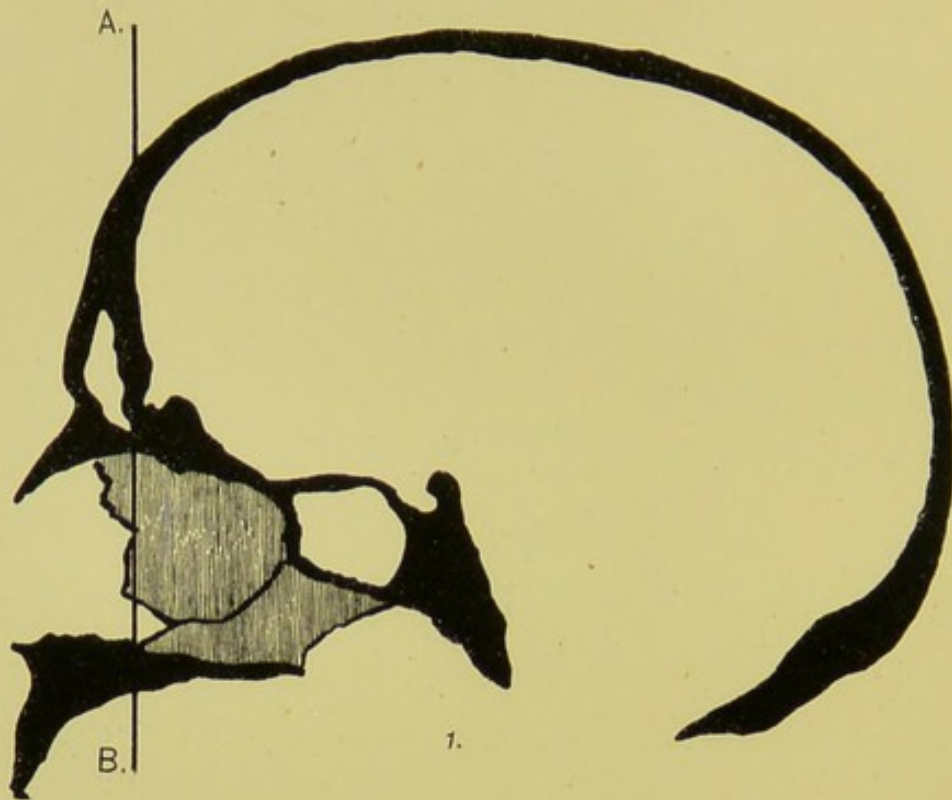
The Figs. 1 to 6 show vertical transverse and vertical antero-posterior sections of the palates in six typical cases of adolescent insanity now in the Royal Edinburgh Asylum. These were taken by Dr G. R. Wilson, by means of thin pieces of lead moulded to the shape of the palate in the living subject. They show the varieties and gradations of the palate, both transversely and antero-posteriorly, in this form of insanity.

SECTIONS OF PALATES IN ADOLESCENT INSANITY
(Vertical transverse and antero-posterior).





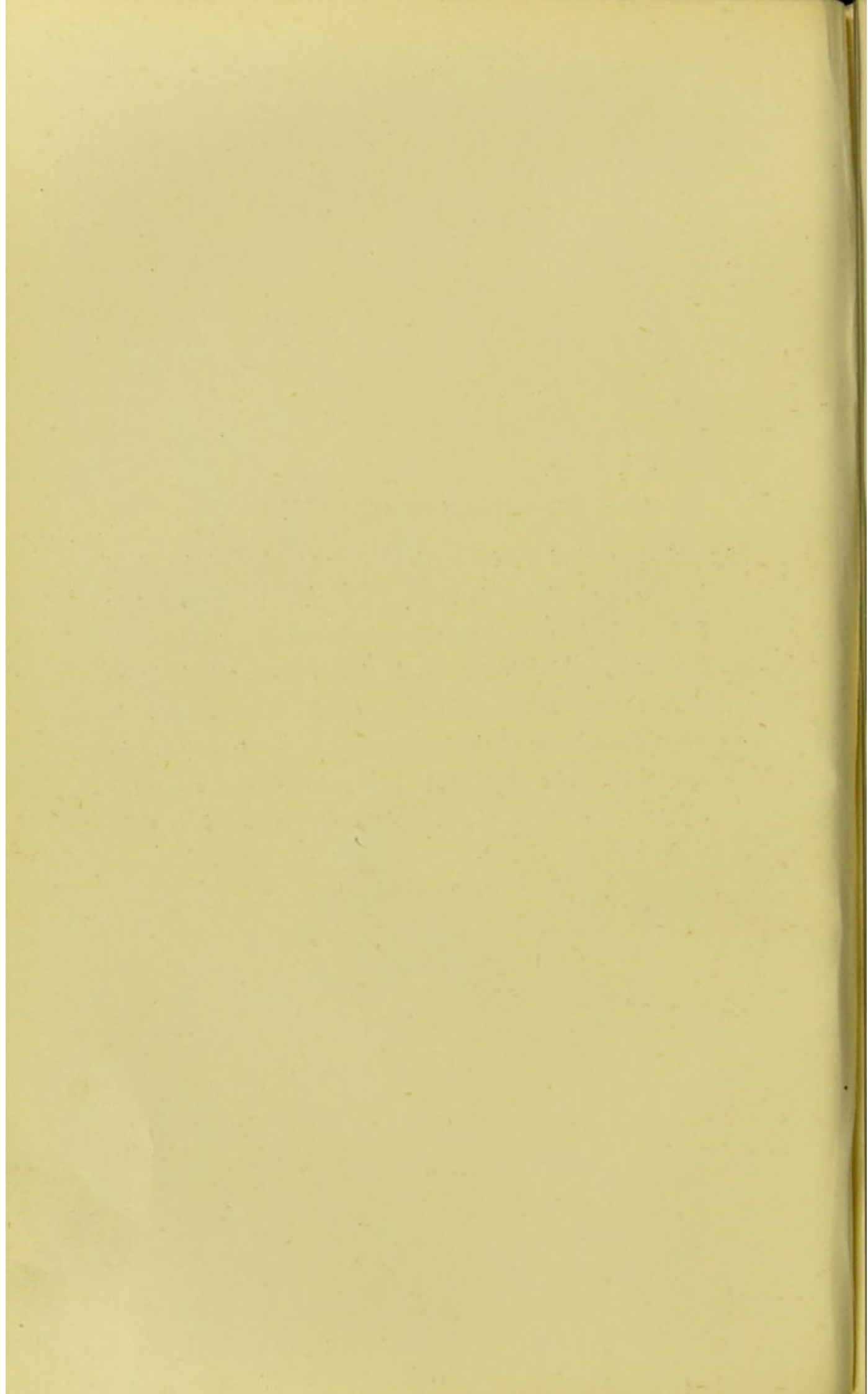




Vertical Mesial Section of Human and Monkey's Skulls,
to show relation between hard Palate and Brain.

DESCRIPTION OF PLATE VI.

Fig. 1 is a vertical mesial section (after Quain) of the skull in man, and Fig. 2 is the same section in the monkey from a skull in my possession, both drawn by Dr G. M. Robertson. The line A B is drawn perpendicularly to show the anterior margin of the brain in each case. It shows the relation of the hard palate to the brain base in each skull. The whole of the hard palate in the monkey is seen to be in front of the brain, while in man it is right under it.



tyranny of their heredity, from which it seems as if it will be as impossible for them to escape as it was for their mothers to burst their prison bars.

We examined specially the 34 epileptics in the Asylum, and found that 20 per cent. of them had "Typical" palates, 43 per cent. the "Neurotic," and 37 the "Deformed," thus differing little from the rest of the insane.

By the kind permission of Dr Carmichael and the Governor of the City Poorhouse, we examined its inmates, but so many of them were very aged persons who had lost all their teeth that it was very difficult to classify their palates. The absorption of the alveoli in very old age quite alters the shape of the palate. The accompanying table shows the above facts.

Frequency of the Occurrence of the Three Types of Palates in Various Classes of Persons Examined.

The Different Classes of Persons.	No. 1. "Typical" Palate.	No. 2. "Neurotic" Palate.	No. 3. "Deformed" Palate.	Number of Persons Examined.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	
The general population, . . .	40·5	40·5	19	604
Criminals (the degenerate), . .	22	43	35	286
The insane (acquired insanity), .	23	44	33	761
Epileptics,	20	43	37	44
Adolescent insanity,	12	33	55	171
Idiots and imbeciles (congenital insanity),	11	28	61	169

In considering the palate and upper maxillary bone, one must take into account the following considerations, viz. :—

1. Its relation to the base of the skull in man. This relation is seen to be close and absolute as compared with the lower animals (see Plate VI.—1. Man; 2. Monkey). The perpendicular line A B, which marks the most anterior point of the brain, is seen to fall in man through the centre of the hard palate, while in the monkey it only just touches its posterior margin. In man it thus has a direct relationship to the brain base, and its shape would be dominated by the width of this, while in the monkey it is merely a part of the alimentary system, having little relationship to the base of the brain at all. No one can compare the two without seeing that its conformation in man will naturally

follow any changes that take place during development in the skull-base.

2. If the skull in its growth, its size and shape, its dome and base, is absolutely dominated by the brain which it defends and contains, then the brain growth will in this way secondarily determine the shape of the upper maxillary bone and the palate.

3. The brain unquestionably deriving its shape and size and qualities from ancestry, and a bad heredity determining a bad brain, we see how a bad nervous heredity would naturally determine an abnormal palate.

4. The theory that a high palate may be a "reversion" to a lower animal form, or to the form in lower races of mankind, seemed to be largely disproved by a careful examination of the palates of most classes of animals, and of different races, from the European to the extinct Americans and the Australians and Hottentots, which I made in the Anatomical Museum of Edinburgh University. Where dolicocephaly and brachiocephaly is a matter of race and not of disease or degeneration, they make no difference in the palate dome. There is no such thing as a high "V"-shaped palate in any animal nor in any race from the Australian aborigines upwards. In one way only can the "V"-shaped palate be connected with a reversion to the animal type. Apart from prognathism, the sides of the palate, that is, the lines of the bicuspid and molar teeth on each side tend to run parallel to each other. Now, supposing the lines of the teeth in man during development were approximated and made parallel by a formative reversionary process, the palate would be pushed up in the centre, the line of least resistance, into the nasal cavity. Those palates where the deformity consisted in a ridge down the centre antero-posteriorly, seemed to show that in them the deformity took place at a later period than in the other deformed palates, when the nasal septum was getting stronger, and kept the centre of the palate down while on each side of it the palate was drawn up, making two vaults side by side instead of one.

5. The theory that the shape of the palate is dependent on the nasal cavity, of which it is the floor, seems to me to be without any valid foundation whatever. The upper maxillary bone is related to three functions, viz., alimentation, smell, and

facial expression. There is no proof that either smell or mastication is interfered with by a high dome or by a pointed alveolar arch, but unquestionably facial expression is greatly influenced by any change in their form ; and facial expression is naturally related directly to the development of the mental part of the brain, and is dependent on it. Speech, I found, is affected slightly by the shape of the palate.

6. The theory that "Deformed" palates are due to "thumb-sucking" in infancy is utterly baseless. Idiots notoriously don't suck well.

7. Prognathous jaws certainly seem to be a "reversion" to an animal and lower human type, but they do not necessarily imply a high palate.

8. Virchow's theory of premature or irregular ossification of the skull sutures, though it may explain some few cases of idiocy, does not seem to me to explain the high palate any more than I think it explains the dolicocephalic or brachiocephalic types of head, or the types of cerebral sulci.

9. The deformity of the palate occurs during brain growth, early in life, probably *in utero*.

10. We must refer the high palate to a bad initial neurotic heredity, just as we refer a bad type of face or irregular teeth, or an asymmetrical head, to such heredity. Mere accidental changes in the head shape are quite consistent with good brain development. The brain in its growth, if artificially confined in one direction, will expand in another, and not suffer in function thereby. The savages who make their children's heads square by pressure don't alter the mental or motor functions of the brain thereby.

11. The vaulted palate and altered dental arch must be taken with other changes in the head, and especially in the face expression, as one of the morphological indications that show a tendency in the person to whom it belongs and in his family towards developmental neurotic diseases, notably idiocy, congenital imbecility, stuntedness of growth, deformity, epilepsy, adolescent insanity, and that organic lawlessness and lack of mental inhibition or weakness of mind that distinguish the criminal classes. It thereby is one of the marks of a family that is tending towards mental death and extinction.

12. As regards the exact mode in which the palate deformity arises, I cannot find any help in a study of the mode of ossification of the upper maxillary bone through its four centres, except in the cases where deformity consists in a depression, or two depressions where the four centres of ossification meet.

13. If the anterior lobes of the brain, and that is the part of the brain that lies above the palate, become contracted through hereditary brain deficiency, and the skull base in front is therefore narrowed, while the jaw must remain large enough to hold the normal number of teeth, it might naturally assume more the shape of the bow of a boat than a horse-shoe, the alveoli of the bicuspid and molars on each side being drawn together by the narrow skull base from which they hang, and this process would throw up and deform the palate. Clay Shaw's measurements of the skull base and the pterygoid arch give much support to this hypothesis. In congenital mental defect, it is the anterior lobes that are chiefly found deficient, and in the microcephalic and Kalmuck classes of idiots, where the brain has undergone most developmental lessening, the palate is found to be highest and most deformed.

14. Taking all the facts into account, it seems proved that the condition of the palate may be a most important index of brain development, and of liability to the developmental neuroses. My second class of "Neurotic" palates is apt to go with a nervous temperament, often with a neurotic diathesis; often with high mental qualities, but not all-roundness of capacity; often with keen sensitiveness or supersensitiveness of bodily feeling and emotion, and frequently with liability to the lesser functional neuroses, such as hysteria, neuralgia, migraine, headaches, etc. It seemed to me, too, that the consumptive are more apt to have neurotic, and many of them deformed, palates than the sound in body.

15. I did not find any connexion, hereditarily or otherwise, between my "deformed" palate and cleft palate. They seem in a way to represent formative tendencies *in utero* in opposite directions. In the case of the ossifying centres in cleft palates, they had not been able to meet in the centre and close in the floor of the nares through, perhaps, excessive width of skull base, while in the latter, as we have seen, there was a greater width of

palate bone than was needed to stretch across, and so it had to rise up in the centre and form an acute angle or a high arch.¹

Arrested Development from Traumatism.

Most authors on idiocy and congenital imbecility assign traumatism as one of the causes of these conditions. This cause is admitted to be rare, though it embraces a great variety of injuries. Ireland² says,—“We have to do with injuries to the unborn child by attempts to procure abortion, as well as injuries during labour by abnormal narrowness of the pelvis and the use of forceps; we have to deal with concussion as well as compression, hæmorrhage from the meninges as well as destruction to the gray or the white matters of the brain. Sometimes the injury to the mental power is permanent, sometimes it disappears more or less slowly; in some cases a trifling injury causes grave disorders, in others what appears to be a great injury leaves no visible effects behind. Hereditary predisposition has no doubt much to do with this.” This reduces traumatism in most cases to one of the rare exciting causes of arrestment of normal brain and mental development, the heredity being after all the real and determining cause. The nations who, by artificial means, distort or compress the heads of their children do not thereby cause mental arrest. The old Peruvians did so in the case of almost all their children, yet they were not the least civilized of the South American aborigines. The use of the forceps has attracted much attention as a possible cause of idiocy, but Dr Langdon Down has shown that in only three per cent. of idiots was the forceps employed, and in nearly all of these there was a neurotic family history. Sir Arthur Mitchell, as the result of a very exhaustive examination in 494 idiots and imbeciles, came to the conclusion that tedious labours and the use of forceps were causes of those conditions,³ and first showed the large proportion in the number of idiots who were first-born children. Dr Down

¹ Since my investigations were made, Mr Ezard has sent me the *Dental Cosmos* for July 1889, in which Dr Talbot has an article on the hard palate in various classes of persons. As he did not adopt my classification of palates, his results cannot be accurately compared with mine, but in some points we seem to agree remarkably.

² *Idiocy and Imbecility.* By W. W. Ireland, M.D.

³ *Med. Times and Gazette*, 12th July 1862 and 30th May 1863.

is also disposed to attribute many cases to the pressure on the child's head during the prolonged labours of primiparæ. With Dr Ireland, I am a little disposed to discount those causes. It is, in my experience, a marked characteristic of maternal psychology, that in the case of any malformation or any defect, bodily or mental, of offspring, it is prone to find a cause in any "accident," while it resolutely shuts its eyes to manifest hereditary weaknesses. It seems to feel that an insane or a drunken father would be a disgrace and evoke no pity, but the reverse; while a fall in infancy or a bad labour is an excusable accident, and will secure sympathy. Ireland says, parents are extremely ready to attribute the idiocy of their children to an "accidental fall or blow." Who ever heard of a paralytic or an undeveloped limb in a child among the richer classes that was not the result of a careless nurse letting it fall, or some such accident?

Making allowance for these sources of error, however, there are left certain cases where traumatism must be put down as the exciting cause of arrest of brain development. This is intelligible enough when the traumatism has resulted in a gross lesion of the brain, in an apoplectic clot compressing it, or in an inflammation the products of which interfere with normal brain growth. It is less intelligible, but still must be accepted as a fact, that sometimes a fall or a blow in childhood is immediately followed by a change in the normal development of certain of the brain functions, this arrest being on special lines of its own, and not altogether on the lines of a purely hereditary case. The arrest is more partial in such a case, and does not affect the whole of the brain functions. Especially the traumatic cases are apt not to be so mentally idiotic, nor are they commonly speechless. Their facial expression is apt to be far better, their teeth not affected in the same way, and the movements of the body are more natural as compared with the common hereditary types of idiocy and imbecility.

The following example of traumatic idiocy illustrates some of the points I have referred to:—C. I., age seventeen, was admitted into the Royal Edinburgh Asylum in August 1890. She had previously been admitted in 1883, when ten years old, but had been boarded out in a private family. She is a girl of small stature, of a lively disposition, but with a pleasing but "weak"

expression. She has light brown eyes and fair hair. Her palate is of a strongly-marked "neurotic" type.

One of her grandmothers is said to have been exceedingly peculiar, and one of her brothers had died of hydrocephalus.

Her mother states that up to the age of eight she was a cheerful, lively girl, just the same as other girls, and quite as intelligent as her three elder sisters. At the age of eight, however, an accident befell her; her clothes caught fire, and she was badly burnt about the chest, arm, and thigh, and since then she has "never done a day's work." When her clothes were on fire she got into a paroxysm of extreme terror and lost all reason. She screamed at the pitch of her voice, and struggled violently in quite a purposeless manner. She was taken to the Infirmary, and nothing could be done to quiet her. Extreme animal terror seemed to have taken thorough possession of her senses. In the course of a day or two she became more reasonable and quiet, but yet her mind had not got over the shock. Any sudden noise, or any suspicious action, or the mere presence of a stranger, was quite sufficient to overthrow her reason and produce a paroxysm of terror. She gradually became more and more settled, yet still, and for a long time after, of all things fire, or even the sight of a match, most readily upset her, and most easily produced these fits of terror. Patient's mind can never be said to have returned to her previous healthy condition. She was always excitable and nervous, and her attention and powers of comprehension were weakened. A steady decay or dissolution of her mental powers was observed to be gradually taking place. It was noticed that she was not so intelligent and did not use her brain so much as formerly, and she was very apt to do most stupid and silly things, which any child of sense would not have done. She also became a more disobedient and naughty child, and was inclined to be passionate and violent under very trifling provocation. These fits of passion began gradually to be more and more uncontrollable, till finally they developed into one of the most objectionable elements in her character. She gradually lost all the decencies, not to speak of the refinements, of life, and all the education she had received also disappeared. Her memory very notably became greatly

impaired. Finally, she also became incoherent, and answered questions in a silly, thoughtless manner. At ten, she had a slight attack of excitement, which made her more difficult to manage, and she was sent to the Asylum. She soon got over this attack, and remained with a private family in the country till she was seventeen. She, however, in course of time got more and more degraded in her habits, more and more full of mischief, more tricky and more violent, so that it became impossible to manage her out of an Asylum.

Apart from the marked imbecility which is present, what most strikes one are the many brute-like habits she has spontaneously adopted or reverted to. She has become most suspicious in her conduct, and at the same time she is very cunning. She is often very bad-tempered and sulky, and screams and makes a great noise. When in this condition she is destructive to the furniture and to her clothing, and should any one come near, even with a friendly attitude, she bites and scratches savagely. She has absolutely no sense of decency, and is most repulsive in her personal habits. She always seems to be ravenous in spite of all the food she eats, and she pounces on her food and steals that of others in a beast-like way. When she is excited, it is perfectly useless to attempt to reason with her; coaxing her fails, but a slice of bread and cheese may quieten her for a few minutes, even though it is soon after a meal. It seems that by this channel alone can her conduct be influenced.

With the universal decay of the intellectual fabric language has also become affected, and, unless when under excitement, she talks indistinctly and with difficulty. All gracefulness of movement and of attitude has also been lost, and her favourite postures—usually near the fire—are very unconventional. During the last two years her bodily health has been gradually deteriorating, but muscularly she still remains very strong.

Infantile Paralysis.

We have lately had put before us almost all that is known as to infantile paralysis by Osler.¹ From the point of view of the relationship of the neuroses, Osler's book is

¹ *The Cerebral Palsies.* By William Osler, M.D., 1889.

disappointing, but good records of cases like his always show more than the author intended. The record of heredity in these cases is also strikingly weak; but the following neuroses are recorded as having existed in the parents of the subjects of infantile paralysis, viz., insanity, chorea, drunkenness, traumatic brain injury, and phthisis.

The following are the neuroses that preceded, were coincident with, or followed the palsies in the children affected, viz.,—convulsions immediately preceded or accompanied them in most cases, squint, chorea, talipes of every sort, "spasms," epilepsy (most common), mental deficiency or some form of psychosis in most cases, rickets, "brain fever," teeth grinding, aphasia and speech difficulties of all sorts, "fits of despondency," vaso-motor disturbances, "spells of sickness," nystagmus, hydrocephalus, night terrors, laryngismus stridulus, and asphyxia neonatorum. The mere enumeration of the list, after what I have said, is sufficient to show the connexion of the graver disease, infantile paralysis, with the other hereditary and developmental neuroses, some of them being of the lesser and functional sort. Fourteen per cent. of Osler's 110 cases were congenital, and other 74 per cent. occurred within the first three years. The disease is beyond any reasonable doubt a sequela of cerebral vaso-motor convulsion during the era of greatest brain growth in most cases, and the explosive and convulsive diseases precede, accompany, and follow it in almost every case.

The following case shows its relationship to mental weakness and other neuroses:—

A. M., æt. forty-eight, has a remarkable history, hereditary and personal. His mother and her relatives were not robust, but there is no history of the neuroses or apoplexy on her side. On the paternal side the grandfather died suddenly; cause unknown. The grandmother was "paralyzed on one side" for fourteen years. An aunt was imbecile. The patient's father died, æt. forty-eight, of cerebral apoplexy. A brother of the patient died of hydrocephalus when eight years old. Another brother, older than the patient, is "weak in body, and has got very nervous of late." A third brother died in infancy "in a fit." A sister is eccentric.

The patient himself is said to have been healthy and strong

until four years old. At that age he suddenly lost his power of speech, and, though evidently conscious of his surroundings, he remained inarticulate for about two hours; then he recovered. His lips and eyelids were in a state of constant tremor at that time. Next day, while in a warm bath, he became quite insensible, and remained so for some hours. When he regained consciousness it was observed that he had lost power in his left arm and left leg. He gradually regained the modified use of his limbs, but about six months later he began to have convulsive seizures. These fits have persisted more or less regularly ever since that time. As he grew older, much mental impairment became manifest, so that he was unable to do anything to earn a living. Added to this weak-mindedness there were the usual accompaniments common in epileptics—religionism, irritability, and violence. At the age of twenty he married a girl who was paralyzed in the lower limbs. Three children were born of the union, all of whom died soon after birth. The fits and the attacks of impulsive violence became more frequent after marriage, and he was admitted into the Asylum in December 1869, *æt.* twenty-six. For the last year the fits observed have averaged about ten in the month; they occur generally at night, and the convulsions are most marked on the left, the hemiplegic, side. As a rule, he is quiet and silly, calls himself "a minister," but occasionally becomes pugnacious.

The following is the pathological report on M. M., another case of the disease, *æt.* forty-nine, paralyzed for forty-three years, whose father was also insane and a patient in the Asylum, and very like the preceding case of A. M. in most respects. The appearances are typical in a case that has lived long. There was contracture of left leg, much talipes varus of foot. Right leg was not contracted, but there was talipes equinus.

Measurements of Arms.	Right.	Left.
From tip of acromion to internal condyle, .	11 $\frac{3}{8}$ "	12"
„ internal condyle to styloid process, .	9 $\frac{1}{2}$	10 $\frac{1}{4}$

Encephalon, 34 $\frac{1}{2}$ oz. Skull-cap irregularly thickened. Dura mater slightly adherent all over. There was a large cyst of the left hemisphere, causing complete disappearance of the first temporo-sphenoidal, part of the third frontal, and the upper wall

of the Sylvian fissure right back to and including the angular gyrus. It involved the whole thickness of brain substance down to and including the wall of the lateral ventricle, and about a third of its roof. The choroid plexus was visible lying on the base of the cyst. At the margin of the cyst there were small islets of atrophied tissue. The left middle cerebral was about $\frac{1}{8}$ in. in diameter, and this appeared to be the anterior deep branch alone. On the right side there was a small recent sub-pial hæmorrhage between ascending and horizontal frontal convolutions. The convolutions showed no abnormality apart from the cyst already described. The heart was normal.

The pathological appearances in a somewhat similar case were as follows:—

J. L., æt. thirty-four, died 6th Nov. 1884, paralyzed for thirty years. Left arm and leg were very poorly developed; the left arm and hand were also pronated and flexed. Lower limbs were rotated inwards at hip-joint. Skull-cap asymmetrical outwardly. The bone projects along the right orbit $\frac{3}{8}$ in. more than left. On removal there was found to be considerable general thickening of the whole skull-cap, but more on the right side than the left. The diplœ was specially well marked. The frontal sinuses were much enlarged, the crista galli broadened, and the whole sphenoid bone hypertrophied. The right middle fossa was smaller than the left, owing to compensatory bone hypertrophy. As to the brain; the right ascending frontal and parietal convolutions had almost disappeared, being represented only by gray-coloured fibrous-looking material. There was adhesion of the pia mater over the upper end of the fissures of Rolando. In the floor of the left lateral ventricle was a cyst, probably the site of an old hæmorrhage.

Friedreich's Disease.

The developmental character of Friedreich's disease is one of its essential attributes. It begins in some cases in early childhood—certainly as soon as four years; and there are no authentic cases of onset after the twentieth year.¹ Its hereditary character is equally essential. Friedreich himself described as one of its

¹ Ladame, *Brain*, 1890, p. 510.

essential symptoms an arrest of development of the spinal cord. In addition to its outstanding character of many cases of the disease being apt to occur in the same family in the same and in different generations, it is proved to have hereditary and personal relations to the following neuroses, viz.,—insanity, locomotor ataxia, atrophy and paralysis of limbs, nystagmus, insomnia, drunkenness, hysteria, convulsions, chorea, and megrim. By far the greater number of recorded cases have a history of insanity in parents or grandparents. The only two cases I have seen belonged to families saturated with an insane heredity, but this special relationship to insanity in ancestry is not sufficiently accentuated by the authors on the subject. The insanity was frequently of that marked sort that ended in dementia. Two of the genealogical tables given by Ladame in *Brain* for 1890 (p. 496) illustrate these points.

Rickets; Night Terrors; the Febrile Delirium of Children at Temperatures from 99° to 101°; Infantile Eclampsia; the "Hysterical Affections" of Childhood.

These are all neuroses incidental to childhood from birth to seven years. The best account of them is to be got in Hensch's books on children's diseases, so admirably translated by Dr John Thomson.¹ They are all most closely connected with each other, and often occur, two or three of them in succession, in the same child. They all occur in children of a neurotic heredity far more frequently than in other children. They are all referrible to weakness of inhibitory function and instability in the brain cortex at an era when the organ is rapidly growing in size, its convolutions deepening and expanding in even greater proportion than the rest of the brain. Rickets occur in 80 per cent. of the cases under two years of age, and in 90 per cent. under three. It is clearly a trophic neurosis, probably due to want of sunlight sufficient to give stimulus to the central trophic nervous centres which innervate the bones, but many of the other tissues are also ill nourished. It is the earliest of the grave neuroses that are chiefly due to outward exciting causes. But these exciting causes of want of light and bad city conditions of life generally

¹ The New Sydenham Society.

will not produce rickets in the children of healthy country-born parents. That the brain cortex is affected is evident from their common neurotic accompaniments—trophic, motor, sensory, and mental—retardation of the whole body growth, the special stoppage of facial development, hydrocephalus, and a tendency in some cases to a precocious and unhealthy mental advancement which stops short of full mental growth. Jenner in this country, and Hensch in Germany, attribute the “so-called convulsions of teething” far more to rickets than to dentition. I would be inclined to attribute both to a common cause, viz., a trophic neurosis. The first motor sign of the instability of any brain is a tendency to convulsions during the first dentition. In a few cases this instability is so great that the first strong stimulus of the oxygen breathed directly by the lungs sets up convulsions which at once terminate the scarcely begun extra-uterine life. As we all know, convulsions are a very common affection; they should not, therefore, be disregarded. Though they are got over in the majority of cases as growth and development proceed, they mark thus early the quality and the morbid tendencies of the kind of brain that is prone to explosiveness in its motor cortical centres. A very considerable number of the cases of developmental epilepsy will be found to have had convulsions during teething, and some of the cases of adolescent and other forms of insanity also had this child trouble. The same kind of unstable brain becomes delirious at night, and in some cases during the day, at very low febrile temperatures, say between 99° and 101° . There are certain children who will either take a convulsion or become delirious, or both, whenever anything indigestible is in their stomachs, or whenever the temperature rises in the least. In fact, the rise of temperature may in them be another neurotic equivalent for a convulsion or a short delirium, because it is itself a neurosis.

There are also the children that take “night terrors,” or are subject to the so-called “hysterical affections” of children, affections that are really psychical, and are equivalent to short attacks of insanity, or uncontrollable impulsive acts in older people. Hensch describes them as consisting largely of loss of consciousness, hallucinations, *pavor nocturnus* and delirium, catalepsy and stupor. The “night terrors” are, I am convinced, strictly

equivalent to a convulsion occurring in the mental areas during sleep. If the true heredity is really discovered, we find always neuroses in the parents or some near relatives. I am impressed with the number of the children of my insane and epileptic patients who have been subject to all these affections during their age of greatest brain cortical growth, from birth up to four years of age. But, so far as I am aware, we have no definite statistics in regard to the frequency and the heredity of these child neuroses. The heredity of rickets, much as has been written on the subject, is most imperfect. It is to the family doctor we must look for accurate information on these matters. He only has the means of ascertaining the facts; and if these lectures in any way stimulate such inquiry, by directing attention to the close affinity of such developmental neuroses, their interchangeability, and their import as a guide to the essential hereditary qualities and to the future risks of the brains that exhibit them, they will have fulfilled their main object.

The following is a case in which night terrors in infancy was the prelude to dipsomania during adolescence, followed by mania with the motor symptoms of a speech so tremulous that it closely imitated general paralysis in its early stages, and has ended in chronic delusional insanity.

R. G. was admitted into the Royal Edinburgh Asylum in February 1877, *æt.* twenty-six. He came of a stock in which no insanity nor epilepsy was acknowledged. At the age of five he suffered from night terrors. The attacks were always of a similar nature. He would start suddenly from his sleep in the early part of the night, and, with a frightened cry or look of great alarm, would jump out of bed and run to his mother and bury his face in her lap. At these times he had unpleasant hallucinations of sight. Commonly he saw a soldier with a red coat on and a sword in his hand coming to cut his head off. These attacks passed off in a year or two.

Later, and just before puberty, he became subject to epileptic attacks. The convulsions were frequently preceded by unpleasant hallucinations of sight, and seemed to produce considerable mental disturbance afterwards. These fits did not persist after puberty. In the adolescent period the neurotic tendency

manifested itself in the development of the alcoholic habit, and in a few years he was a confirmed drunkard. At the age of twenty-six he was sent to the Asylum, labouring under an attack of mania. He had delusions of great wealth, and many motor symptoms, such as muscular tremors of all the facial and speech muscles and inequality of the pupils.

His hearing and sense of smell were both defective—recent developments—and he was liable to impulsive violence in language and act. He is now an incurable case of delusional insanity, with an unusual number of motor symptoms even for a patient with alcoholism as one cause of his mental disease.

To recapitulate the sequence of neuroses in this case,—night terrors at five, epilepsy at puberty recovered from, dipsomania during early adolescence, mania at end of adolescent period, and incurable insanity during the rest of his life.

Chorea.

Chorea is a developmental neurosis of the greatest interest. It occurs in 75 per cent. of the cases between the ages of six and fifteen, and in only 14 per cent. during adolescence. It is therefore an ante-reproductive disease, and yet one not prevalent during the period of greatest brain growth, before seven. It stands, along with certain cases of epilepsy, with spasmodic asthma, somnambulism, megrim, and certain eye diseases, such as myopia and divergent strabismus, as incidental to the intermediate period of life between the periods of greatest brain growth and of highest functional advance. Looking to the physiological and psychological development of the brain, I have called this period that of the co-ordination of motion and emotion. Sensation, special and common, and its organs have been developed; muscular co-ordination has progressed far; many of the mental faculties, such as memory, fancy, and emotion, have all acquired some strength, but muscular action has not been fully co-ordinated with feeling, and this is the period of life when this co-ordination takes place. The inco-ordinated movements of chorea show themselves first and most in the mind-muscles of the face, those of expression. Many cases are confined to the muscles of the face. Mental and emotional impressions are very potential

causes of the disease. Like hysteria, the disease is mostly confined to the emotionally impressionable sex. It is a disease like hysteria, of towns and town life and of civilized races. It has close relation to the rheumatic diathesis, and in certain cases to acute rheumatism. It is often found in phthisical families, but still more in families where epilepsy and insanity prevail. The most reasonable hypothesis as to its seat is, in my opinion, that the basal ganglia are at fault, and this occurs just when the co-ordination of their motor functions with mind is being perfected, and when their full use as motor servants and ministers to the rapidly developing higher mental centres in the cortex is being completed. It has, I think, always a neurotic heredity even in the rheumatic cases; a combined rheumatic and neurotic heredity seems its very strongest predisposing cause. It has almost always mental accompaniments of a mild kind, consisting of inco-ordinated mental action, disturbances of feeling, and often hallucinations of hearing, these in a few cases being very severe and acute, and so forming a distinct variety of insanity. It is usually a transitory neurosis; and we can see, as bodily development proceeds, that it tends to terminate naturally in recovery. I constantly meet with chorea in the children of my insane patients, in the children of dipsomaniacs, and of epileptics. Its relation to epilepsy is very close. I have known a girl who had convulsions during the first dentition, chorea at eleven, hysteria soon after, and who at eighteen seemed perfectly well in nutrition, nerves, and mind, having through the process of further development alone got over all tendency to these neuroses of early development—she had literally “outgrown” them.

The following case illustrates the developmental character of chorea and its relationship to other neuroses of the period:—
M. A., æt. fifteen on admission to Asylum. No neurotic heredity was admitted. At fifteen months old she had begun to take convulsions, and these settled into regularly recurring epileptic fits till she was seven years old. They then ceased, but her mental power was left weakened and did not at that time develop. She was described as “imbecile” for a time. Her left leg did not develop quite so well as the right, and was not quite so strong. At thirteen she began to be slightly choreic, the symptoms gradually increasing. Along with chorea maniacal symptoms appeared at fifteen,

for which she was sent to the Asylum. The choreic movements were general, affecting all the voluntary muscles. Especially speech was difficult and interfered with. She was on admission a thin, weakly girl, undeveloped in body and mind, anæmic, had not menstruated, and she was quite incoherent, maniacal, sleepless, and tossed all about the padded room into which she had to be put at first. Under nourishing diet, fresh air, tonics (of which arsenic and iron were the chief), nursing, and moral treatment, she steadily improved in mental and bodily state. The choreic movements diminished and the mania disappeared. She gradually improved in intelligence and amiability; she began to menstruate, got stout, handsome, and attractive; her breasts developed, her muscles grew strong—in short, the process of development into full womanhood was completed, and after eighteen months she was discharged recovered at seventeen, one of the nicest and sweetest looking girls one could see, and she has remained well now for six years.

The sequence here, of eclampsia and epilepsy during greatest brain growth up to seven, of trophic arrest of left leg, of undeveloped mind up to seventeen, of chorea, becoming active, from thirteen to seventeen, of mania at fifteen, and of recovery in body and mind coincident with full physiological female development at seventeen, is an exceedingly instructive one.

Asthma.

Spasmodic asthma must now be certainly reckoned among the neuroses, and is, as all practitioners know, most frequently found in the children of neurotic families. Like other functional neuroses, it often disappears when other nervous diseases appear. I have seen it disappear where epilepsy supervened. An attack of hysteria or chorea will often stop asthma. The sudden influence on asthma of subtile changes of atmosphere and climate prove it to be a functional neurosis, if proof were needed. Asthma arising at ten will often be recovered from after fifteen, but it is unfortunately unlike chorea, in not being commonly a transitory neurosis. No doubt its seat is in a disturbance of the pneumogastric centres, which are, from hereditary causes, unstable and prone to explosive and irritable

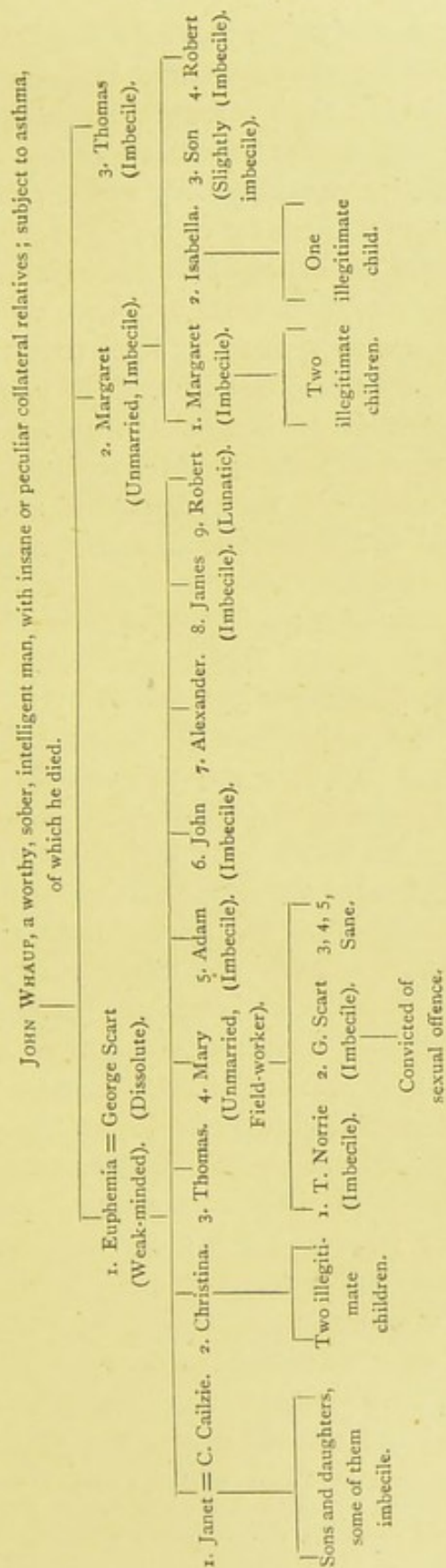
action. Like many of the sensory and mental neuroses, its attacks are aggravated at night, the time of lowest nervous energizing and least resistiveness. Nervous heredity as a predisposing cause is specially dwelt on by Salter, Riegel, and Powell, and the last-named author makes epilepsy, insanity, neuralgia, chorea, and hysteria all interchangeable with it in the same families. Salter's statistics conclusively prove it to be very largely a disease incidental to the period of growth and development. Of his 225 cases, in over 55 per cent. the disease made its first appearance before the age of twenty-five, and in over 30 per cent. it had appeared before the patients were ten. It is in no appreciable degree incidental to the retrogressive and senile period, for only 8 per cent. of the cases began after fifty. I have seen many cases where it alternated with mania, and Savage¹ refers to similar cases. Its relationship to mental disease and to neurotic heredity was strikingly shown in the case which I have related (p. 24). Its occasional relationship to imbecility and to immorality and criminality is illustrated in Ireland's terrible family tree, which I have copied from the *Journal of Mental Science*, October 1881, and have made slightly fuller from private information since received. (See page 67.)

The Barking Cough of Puberty.

The following is an account of this rare affection by Clark. It must be regarded as closely allied to asthma, and one of the developmental neuroses that seem to be coincident with puberty:—

"In 1868 I was consulted by a clergyman residing in the East of London about his son, who was supposed to have some grave but obscure disease of the lungs. The boy was thirteen years of age, well nourished, fair, with all the characteristics of a nervous temperament and the history of some minor nervous troubles. The parents and their relatives were nervous, and the father, subject to involuntary movements of the right arm and hand, had occasionally found difficulty in writing. The boy's malady consisted in daily recurring violent paroxysms of convulsive barking rhythmic cough, which produced considerable exhaustion and distress, and had provoked on one occasion an

¹ *Insanity and Allied Neuroses*, by George H. Savage, M.D., p. 400.



involuntary discharge of urine, and on several occasions vertigo. The affection had begun six months before, and latterly there had been some loss of flesh, strength, and colour. No school would keep the patient, the members of his family were distracted, and the father was despairing and perplexed. Repeated examinations of the patient by myself and by others failed to elicit evidence of the existence of structural disease in any part of the body. All that I could discover was a somewhat bizarre condition of the nervous system, and all that I could say was that the malady was nervous, and that it was devoid of permanent peril to life or to health. In this case the affection lasted nearly three years ; but then recovery was complete, and through a careful regimen, strict discipline, and change to the seaside, the bizarre condition of the nervous system disappeared."¹

Somnambulism.

This interesting neurosis begins about nine or ten, and commonly ends during mid-adolescence, though in the worst cases it goes on through life. It has close hereditary relation to epilepsy, hysteria, and insanity, though a far less intense neurosis than any of these. In the worst case I ever saw, that of Simon Fraser,² who murdered his own child during a condition of somnambulism, there was an enormous amount of epilepsy among his relatives. It has the closest analogy to the condition of hypnotism, which is always more easily induced in persons of neurotic and unstable brains than in ordinary constitutions. Both are conditions of half sleep. Convulsions often and delirium in most cases are night diseases too, when the brain energy reaches its diurnal nadir. Somnambulism is so in all cases, but it differs from these in occurring only during sleep, when many of the powers are still further depressed. For its production is needed a concurrent series of conditions, viz., a nervous heredity, a neurotic constitution of brain, which produce that state of brain cortex which tends to automatic rather than volitional action, the pre-reproductive stage of development, the time of night, and the condition of sleep, every one of which

¹ "Remarks on the Barking Cough of Puberty (*Cynobex Hebelis*)," by Sir Andrew Clark, Bart., M.D., LL.D., F.R.S., *The Lancet*, December 20, 1890.

² *Journal of Mental Science*, 1878, vol. xxiv.

represents a lowered brain energy as compared with its full normal force. It has been described as a form of insanity, but with this I emphatically disagree. It is a form of sleep—if you will, a pathological sleep—but it can only tend to confusion in medical psychology to call it an insanity.

Megrim.

Megrim is a disease of extraordinary interest to the student of the neuroses. It is essentially a sensory disease, with only the motor accompaniment of sickness and vomiting, and with a wonderful variety of accessory nervous symptoms and affinities. Hereditarily it is, like insanity, commonly derived from ancestry that have suffered, not from neuroses generally, but from it alone, though in 15 per cent. of the cases some other neurosis occurs in ancestry, such as insanity, neuralgia, asthma, laryngismus, pertussis, chorea, and gastralgia. Its commoner neurotic accompaniments, in addition to headache and sickness, are visual symptoms of all sorts, especially hemiopsia, tingling, giddiness, hallucinations, somnambulism, and mild psychological disorders. It is one of the purest of all the developmental neuroses, and is localized in the pre-reproductive and adolescent eras, for it almost never appears before seven and never after twenty-five. It has three periods of onset—the first between seven and thirteen, the second precisely coincident with puberty, and the latest during adolescence. About one-third of the cases begin at each of these periods. After it has set in it commonly remains during reproductive life, and then ceases in nearly all cases. By far the most probable theory as to its pathology is that it is an explosive disease that results from instability in the optic thalamus during the period when this great basal organ is getting solidly organized in its sensory functions, the explosions spreading quickly to the pneumogastric centres. As a great sensory ganglion it necessarily has close relations to reproduction, which function in man is largely dependent on sensory impressions. Liveing¹ has given us an almost exhaustive account of the disease so far as our present knowledge goes, and he dwells particularly on its heredity, the age at which it occurs, and its neurotic affinities. Like asthma and many forms of neuralgia,

¹ *On Megrim, Sick-Headache, and some Allied Disorders*, by Edward Liveing, M.D.

it commonly disappears during an attack of insanity, and alternates with such attacks. It is more allied to melancholia than to mania in my experience. I have seen a case of *folie circulaire*, the elevated stage of which was always ushered in by a violent attack of megrim. The patient was a woman, and the period of recurrence was a menstrual one.

The following is a case where megrim was the initiating neurosis, and was followed by other and still more serious nervous and mental symptoms:—

B. D., æt. thirty-eight. Her mother suffered from megrim; a maternal aunt was eccentric. She was a perfectly healthy, strong child, but in her girlhood—probably about fifteen—began to be subject to “bilious” attacks, which have recurred at periodic intervals ever since. With this exception she had good health up to thirty years of age, except that she was neuralgic at times. She menstruated at thirteen, and continued to do so regularly up to nearly thirty. At that time she was overworked, had far too much standing on her feet, and she became anæmic and ceased to menstruate. In spite of treatment she has only menstruated once during these eight years. After the amenorrhœa she began to be subject to attacks, of which the following were the symptoms:—She first has the feeling of “fluttering” over her cardiac region; then she begins to experience “a bad smell.” After this has lasted for a period of from a few minutes to half an hour, she begins to have an intense headache. With this there is a great flushing of her face. Then she gets sick, and sometimes vomits. Along with these symptoms she is confused and stupid in mind, forgetful and inattentive, and in a dreamy condition. If she lies down she will pass into a sort of half sleep, out of which she cannot be roused; but she says she never quite loses consciousness. These “fits” come on several times a day for several days, and then she will be for a fortnight or three weeks free from them. She has never been convulsed. Her mental state in between these attacks has been gradually becoming one of more irritability of temper, and her memory is not so good as it was. She is well nourished, being a good deal better in that respect than she was some years ago, and she looks strong and healthy. She is intelligent, and in no way technically insane.

To get the effect of a change of air a few years ago—since her

illness began—she went to the sea side on the East Coast. She was at once attacked with spasmodic asthma of a very severe character, which lasted several months, but gradually passed off when she returned to her inland home. During the time the asthma lasted, the other forms of neurosis entirely ceased. As the asthma passed off, the periodic pains, bad smell, and sickness returned.

This very interesting case illustrates many pathological facts concerning the neuroses:—1. The heredity of megrim, this being usually from the same sex. The neurotic heredity in this case is accentuated by the mentally peculiar aunt. 2. The developmental character of megrim, usually coming on before or at puberty. 3. The relationship of megrim, like all the periodic neuroses, to the normal periodicity of reproduction. 4. The aggravations of the megrim symptoms after the amenorrhœa began, and the determination of the times of the attacks to the periods when normal menstruation should have occurred. It seems as if the common neuroses of menstruation had become transformed into the aggravated pathological neurosis of megrim. 5. The accentuation of a neurosis through disturbed menstruation in the female. 6. The association of a disturbance of smell with megrim, which is unusual. Is the bad smell caused by a trophic change in the Schneiderian membrane, or is it central in origin? 7. The transformation of megrim into asthma. Both are very much allied diseases. 8. The damage that is apt to occur to the higher cortical mental function through the long continuance of every explosive neurosis. The present tendency to pass into those dreamy, half-sleepy conditions, the irritability of temper, and the partial loss of memory, are the proofs of this.

I now have several patients in the Asylum, all melancholics, who had been subject to megrim before they became mentally affected, and who now have ceased to have the headaches. One of them, J. T., is a woman of fifty-three. She had been subject to megrim from the age of fourteen till she was forty-one. She then became melancholic, and the attacks of megrim ceased. When she recovered from the melancholia, the attacks of megrim began again. She has since had four attacks of melancholia and one of mania, and on each occasion her megrim has ceased when the mental attacks began, and has reappeared

when they were recovered from. This is another illustration of the transformation of the neuroses.

Visual Neuroses.

It might be expected that during the development of the brain, and the mighty changes that each successive period of such development brings, the organs of special sense would suffer in hereditarily weak subjects along with the cortex which they especially serve and educate. The eye and the function of vision are especially apt to suffer during development. Dr Argyll Robertson has most kindly given me a list of no less than twelve such affections of a serious kind that occur during infancy, at puberty, or during adolescence, and at almost no other times of life, with a short description of their times of chief occurrence. *Hypermetropia*, seen first between one and four, probably from arrested development, with its consequent *convergent strabismus*, is one of these. *Myopia* is another, between five and twelve, advancing up to twenty-one or twenty-five, with its *convergent strabismus*, which comes on between twelve and twenty-four. *Retinitis pigmentosa* occurs very early in life, and has direct relationship to deaf-mutism and the offspring of neurotic cousins. *Lamellar* or *zonular cataract* occurs in very early life, and is constantly associated with infantile convulsions. *Interstitial keratitis*, due to inherited syphilis, usually occurs between eight and twenty-four, and is often associated with *choroiditis disseminata*. *Nystagmus* is usually dependent upon some diseased condition affecting clearness of sight occurring at an early (infantile) period of life. *Fascicular keratitis* (*phlyctenular ophthalmia* or *strumous ophthalmia*, with corneal ulcer) is specially a disease of early life—three to twelve years of age—particularly affecting strumous children, or children whose health has been reduced by some debilitating disease, such as the exanthemata. *Buphthalmos* (or *kerato-globus*), an enormous distension of the anterior chamber, with fluid and globular projection of the cornea, associated usually with increased size of eyeball, is generally either a congenital condition or one occurring in infancy.

Hearing and its organs Dr M'Bride does not consider subject

to many developmental diseases, though adenoid vegetation is a very common cause of deafness under twenty-five, and is sometimes self-cured after that age.

Skin Diseases.

The liability of children and adolescents to many skin diseases from which adults are either completely or comparatively free is a well-known fact to every mother and to every practitioner of medicine. I have referred to the non-resistive condition of the child's skin to the invasion of the ringworm spore. That is a typical example of a parasitic disease. The "eruptions" of children are innumerable. But I shall quote a note kindly given me on the subject of development and heredity in skin diseases by Dr Allan Jamieson.

"Heredity has considerable influence in the production of *psoriasis ichthyosis* in the generalized form, and more particularly in a form localized to the palms and soles. I have seen one case where this was marked in two generations, and Unna has recorded one where it ran through five. *Scleroderma* is apparently due to some trophic nerve influence, but the hereditary element is obscure. Some forms of baldness are hereditary. I cannot say, however, that much has been done to connect any forms of skin diseases with nervous diseases and conditions *in ancestry*. The hereditary nature of leprosy is held by some and denied by others. I think evidence is against it. *Acne* is the most common developmental disease. *Psoriasis* is rare before three years, and appears, perhaps, most commonly between five and fourteen for the first time, but it *may* appear for the first time at any age. *Ichthyosis* usually first appears towards the end of the first year of life. It is held that *fibroma molluscum* is congenital, though the tumours may develop later; and Hebra has pointed out, and this has been confirmed by others, that in some instances the intelligence is weak. The peculiar condition called *xeroderma pigmentosum*, or Kaposi's disease, is certainly developmental. It begins in the second year of life, and shows a family prevalence though not a hereditary tendency. Several children in one family and in related families are affected, and usually those of the same sex in each—all brothers or all sisters. Many cases have occurred in

Jews. Then some cases of *dermatitis herpetiformis* are developmental, and begin in early childhood. There are also cases of nodose hairs, or beaded hairs, which seem developmental, and occur in several members of the same or related families."

Developmental General Paralysis.

I have always held that general paralysis is, in its essence, allied to old age. "I look on it as being equivalent to a premature and sudden senile condition,—senility being the slow physiological process of ending, general paralysis the quick pathological one."¹ The most frequent age for its occurrence, in my experience and in that of nearly all authors, is between twenty-five and fifty. From forty to forty-five the actually greatest number of cases occurred. It is usually a disease of retrogression and decadence therefore. But several authors in this country, in Germany, and in France have published a few exceptional cases occurring from twelve to twenty.² Most of these cases seemed to have no relationship to the common causes of the disease, viz., sexual excess or excitement, drunkenness emotional strain or shock, traumatism, or overwork. Though I published one such case in 1877³ which began at the age of fourteen, and Dr Turnbull published another case that occurred in this Asylum, and began at the age of twelve,⁴ I did not at the time look on them as being developmental and hereditary in their character, as Friedreich's disease is, nor as due to hereditary syphilis. My present study of the neuroses in their developmental, hereditary, and relational aspect to each other, and the careful study of the two cases (A. K. and J. F.) which I am about to relate, have brought me to the conclusion that in certain rare cases it occurs as a neurosis in the course of, and having a direct relationship to, the developmental process at the time puberty should occur. The arrest of all symptoms of puberty in the following two cases, the non-occurrence of menstruation, and the arrest of body development, together with the strong heredity and the age at which the disease occurred, all concurred in bringing me

¹ *Clinical Lectures on Mental Diseases*, 2nd edition, p. 384, by the Author.

² Mickle, *On General Paralysis*, 2nd edition, p. 249.

³ *Journal of Mental Science*, Oct. 1877, p. 419.

⁴ *Ibid.*, Oct. 1881.

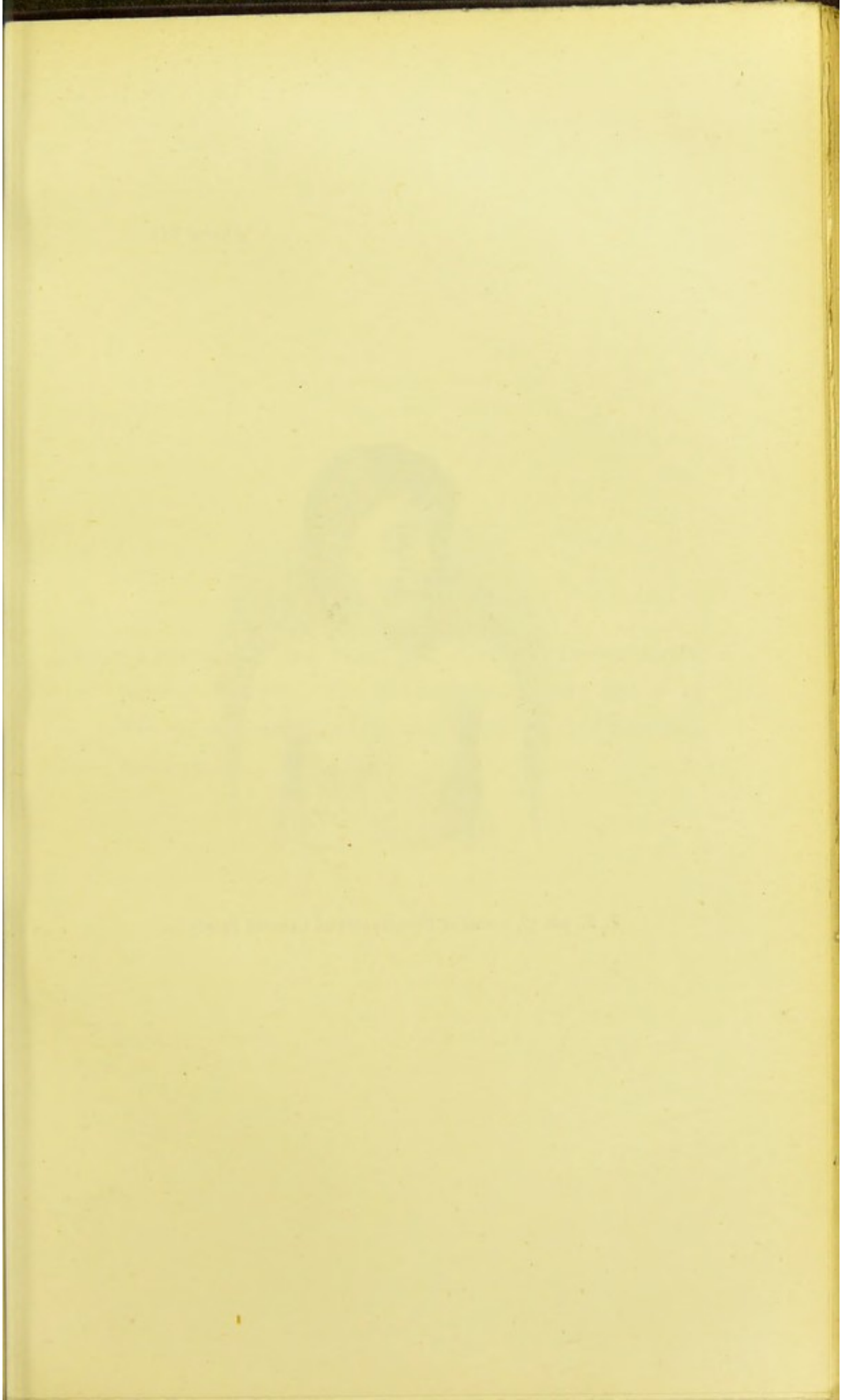


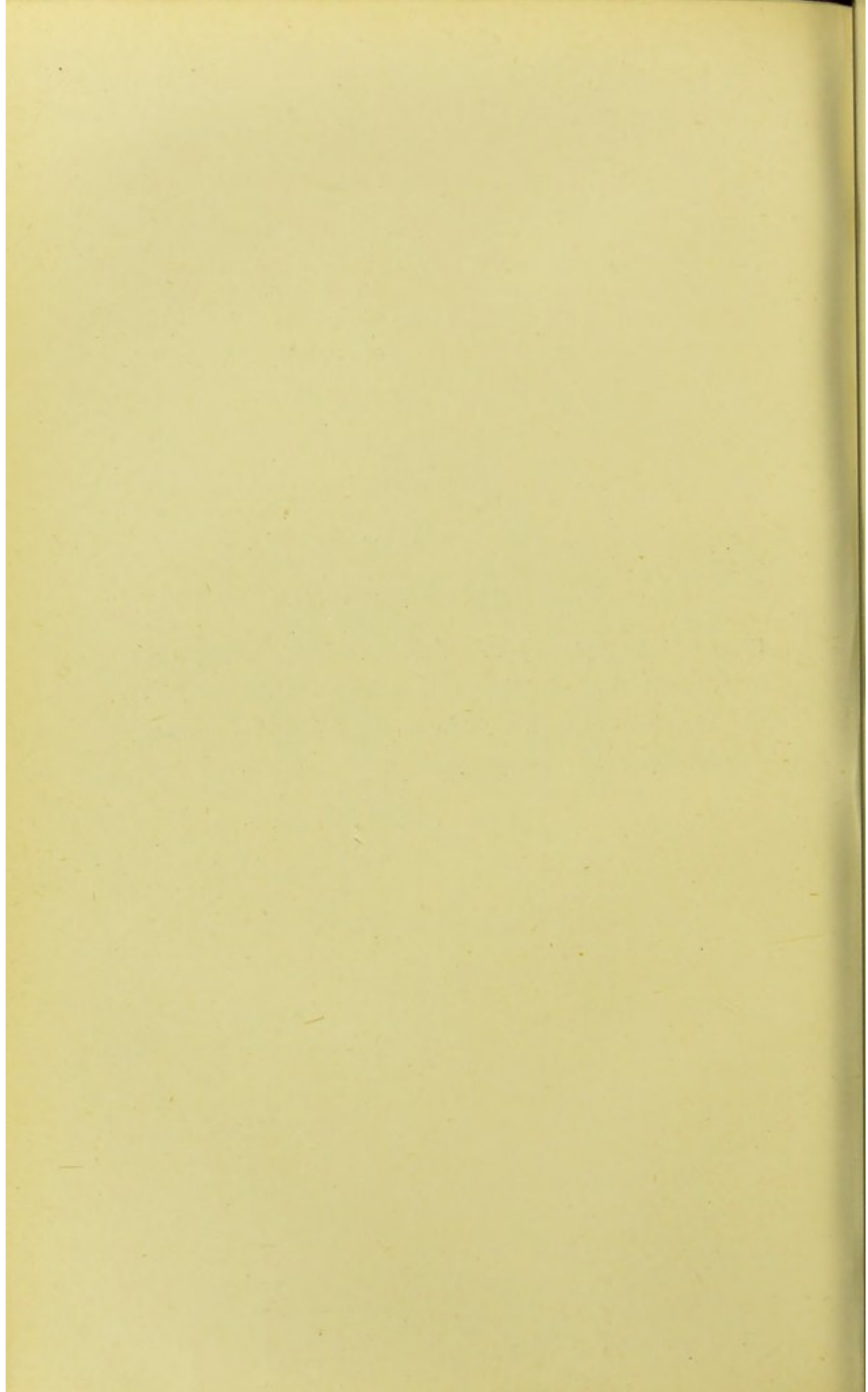
PLATE VII.



J. F., æt. 17, a case of Developmental General Paralysis.

DESCRIPTION OF PLATE VII.

From a Photograph of J. F., æt. 17. A case of Developmental General Paralysis. The disease began at the age of 15. The girlish appearance is shown, and the want of mammary development.



to this conclusion. I have no doubt the hereditary syphilis was also one cause, possibly the chief one, of the disease in those cases. Hitherto general paralysis, unlike the developmental neuroses, has been looked on as not a very hereditary disease.

I am indebted to Dr G. M. Robertson for the description of the two following cases, and to Dr J. Middlemass for the account of the pathological appearances in A. K.'s brain.

The first is a case of developmental general paralysis who is still alive.

J. F., a female patient, was admitted into the Royal Edinburgh Asylum, Morningside, in July 1890.

On admission she was sixteen years of age, of small size and very childish appearance. She was 4 ft. 8½ in. in height, and she weighed 5 st. 10½ lbs. with her clothes on. Her face was very undeveloped (Plate VII.), and quite childlike in appearance. The expression was vacant and silly, with just a tone of sadness. Her body was slenderly made, and her hands were delicate and small, like a very young child's; they were almost always very blue and cold. Her features, though markedly childlike, were good; her eyes were blue, and she had rather a scanty supply of dark, fine hair. The lobes of the ears were deficient in size. Her teeth were very carious, and their enamel seemed thin, and was marked by ridges; they suggested Hutchinson's syphilitic teeth. Her breasts were markedly undeveloped (Plate VII.), and she had never menstruated.

Her father is forty-five years of age, and is prematurely gray. He is 5 ft. 5 in. in height, and looks quite healthy. The only diseases he has had have been erysipelas and syphilis. There is no neurosis in his family he says.

Her mother was a woman about 5 ft. 1 in. in height, who died in childbirth. She suffered at one time, shortly after patient's birth, from very severe neuralgia, and for a short time she was affected in her mind, and had delusions about the Prince of Wales. In the mother's family there is said to have been no neurosis.

Patient is the third of a family of eight, of whom five were still-born. The eldest is a female, aged twenty-one, who is married and healthy. She was taller and smarter than the patient.

The second was still-born.

The third was the patient.

The fourth, fifth, and sixth were still-born.

The seventh is a girl, aged twelve, who is rather small, but is clever and healthy.

The eighth was still-born.

The child born immediately before, and the three born immediately after the patient were thus still-born. She was a strong, healthy infant, and had no convulsions at teething. She grew up into a lively and playful girl, and at the age of six went to school, which she left at the age of thirteen, after having passed the sixth standard. She was regarded as being very clever at school, and was a good reader, writer, and arithmetician. After leaving school she acted as a servant for some time, and then became apprenticed as a compositor, but only served two out of four years.

About a year before admission the first symptoms of her illness were noticed. Her father dates her illness from a severe attack of eczema of the head she had about that time. When this had disappeared, he found that she was becoming more and more stupid and forgetful, that she was lazy and indolent, and that she would either lie in bed all day or sit over the fire. It was very difficult to get her to do anything, and she had become so silly that she did the simplest things wrongly; for example, if asked to bring a tumbler of water, she would bring the tumbler without the water. She gradually lost her power of originating work, and unless asked to do things never showed any desire to work. Subsequently she became distinctly delusional, and fancied, among other things, that she had money. When she found she had none, she accused her younger sister of stealing it. She also fancied that she could not swallow, and that her teeth were all falling out. She also had hallucinations of sight. She then got more irritable, and showed some signs of excitement. She would very easily lose her temper, often over some fancy, and she would get into a state of hysterical excitement, and would scream for a long time. At times the mere fact of speaking to her would excite her so much that she would roar and cry. In her habits she also became very uncleanly. During all this time a gradual deterioration in her physical health was manifesting itself, and this was especially

so in the muscular system. There was a marked weakness observed in her strength, she was not so strong in the hands and arms, and she could not walk nearly so well as before. She had also an impairment and an impediment in her speech. She at length got so troublesome to manage, at times being so excited, and at other times so uncleanly, that she was certified as an insane person. The following are the medical certificates of insanity :—

(1.) "She has a stupid appearance ; she is very slow in answering simple questions ; she is very weak mentally, and cannot say the alphabet ; she acknowledges that she takes fits of temper, but can give no reasons for them." (2.) "She has a vacant, somewhat idiotic expression ; she has difficulty in comprehending simple questions."

The father stated to the certifying physicians that she was subject to uncontrollable fits of violent temper and passion, and that she injured herself by tearing and scratching her face, and that she was dirty in her habits.

On admission patient's most marked mental symptom was great enfeeblement of all the faculties. She showed a great want of origination and of spontaneous voluntary movements. She was exceedingly slow in all her mental operations, and her movements were also very slow and listless. When asked simple questions, instead of answering, she, as a rule, repeated the words slowly after the questioner ; and if asked any complicated question, she simply stared blankly, or answered at random, "Aye." Her memory had become very much impaired, and she had forgotten permanent facts of the most simple description. She did not know where she lived, she did not even remember the town she lived in, and she had no idea of day, month, or year. She, however, seemed to be able to recall simple recent facts.

She was unable to say the alphabet correctly, though she endeavoured to do so, and she was only able to read a few simple words. Her arithmetical faculty did not go beyond counting a score, and all sums were equally impossible for her to do. Emotionally she did not seem happy, but at the same time she had some delusions of a grandiose nature, that she was acquainted with "the Queen," and that she knew "the Commissioner."

She was very childish in her manners, and her attention was attracted by the same simple means as that of children. She, however, showed none of the vivacity of a child. She did not attend to her personal appearance, and seemed to have absolutely no sense of shame or feelings of modesty.

Physically there were many signs of interest. The muscular power all over the body was greatly impaired, in no region, however, amounting to paralysis. The grasp of her hands was fairly equal, but extremely feeble, and she was very awkward in any movement she attempted. She was unable to dress herself. The muscles were flabby, but not markedly atrophied. The muscular power of her lower limbs was also diminished, and she was a very feeble, slovenly, and slow walker. There were no ataxic signs in her walking, but she shuffled her feet along the ground. She was able to stand quite steady with her eyes shut, but owing to her feebleness she cannot stand on one leg. There was a want of tone and expression in her face, and a general want of energy.

Patient's speech had more of the childish characteristics than those of general paralysis. She spoke in a soft, high-pitched voice, and in a sing-song manner. Tremulousness was seldom observed, but there was a marked slurring and indistinct utterance of many words. When she spoke there was often a quivering and trembling of some of the facial muscles, and sometimes a marked tremor of her eyelids.

The tongue was markedly tremulous, and both the coarser waves and the finer fibrillary twitches were present.

The hands and arms also were awkward and shaky in the coarser manipulations, and tremulous in the finer movements.

So far as sensation can be tested there seemed to be a distinct diminution of the common sensibility in the hands and feet.

Regarding the reflexes, the plantar reflexes in both limbs were found to be markedly diminished, and on some occasions could not be elicited. The epigastric reflex was, however, active.

Of the deep reflexes, the knee-jerks were found greatly and equally exaggerated in both limbs. There could also be obtained a spurious ankle clonus.

The pupils were both very much dilated, and they were unequal, the right being the larger of the two. The shape of both was not

circular, and the outline was very irregular. With the brightest light there was no reaction, and the consensual reflex was also absent. There seemed to be a slight reaction to accommodation. The ophthalmoscope revealed no signs of disease.

About three weeks after admission, patient slowly fell into a condition of melancholic stupor, with fixed unpleasant delusions. She gradually became more and more passive and motionless, and seemingly indifferent to her surroundings. She, however, was liable to break out suddenly into screaming fits of great violence, which would last for a quarter of an hour. She also began to refuse her food, and she stated that she could not swallow; she also said that her father had flung a jug down her throat, and that it was still sticking there. She had eventually to be fed artificially. She would be taken into a side-room in a most passive state, as if quite uninterested, but whenever the nose-tube was passed, one of her dreadful screaming fits would take place. This state of stupor lasted for a month, and then gradually passed away, and left her quite jolly. She became good natured and happy, but never developed any life or activity. She laughed and smiled when one spoke to her, and, as a rule, she sat in the sewing-room, appearing to observe everything that was going on around.

Patient has now been here eight months, and there has been a steady progression of the disease in all its symptoms, mental and motor. She has become more weak-minded, and cannot read or write, or even say the alphabet. Her speech has become more affected, she speaks less distinctly and runs her words together more, but she seldom speaks, except with great coaxing. She is in a facile, happy condition, and gives no further trouble than what is needed in dressing and feeding and keeping her clean. Her delusions seem to have gone, and she is never violent and excited. She has not got the sense or the power to attend to her wants. The eye symptoms remain the same, but the muscular weakness and the tremors have increased. Her bodily appearance has improved, and she has put on flesh. She, however, is very subject to chilblains on her fingers and toes. She has the same vasomotor disturbances of the hands and feet as the next case of A. K. had, and in spite of warm coverings her extremities are always cold.

A. K., a female patient, was admitted into the Royal Edinburgh Asylum, Morningside, in July 1890.

On admission she was nineteen years of age, and was undersized and childish in appearance, although in fairly good bodily condition. Her height was 4 feet 8 $\frac{1}{4}$ inches, and her weight was 8 stone 2 lbs. with her clothes on. She had rather a pale and pasty-looking complexion, with a placid and contented expression of face. The impression of weak-mindedness was distinctly suggested by the expression of her eyes and by the perpetual *simper* that played round the angles of her mouth. Her physiognomy was not at all unpleasant. She had grey eyes, and an average amount of light brown hair, and the outer canthi of the eyes were inclined upwards and outwards. Her figure was distinctly stunted, and her attitude was very ungainly. Her neck was short, her shoulders were stooping and rounded, her head fell forward, and her hands and arms were held awkwardly away from the sides of her body. Her breasts were poorly developed, and she had never menstruated.

As regards the family history, she inherited neuroses from both the father's and the mother's side. Her mother's paternal cousin was insane and had become demented, and her paternal uncle had died in an asylum of "softening of the brain," after an illness of three years' duration, at about the age of thirty, a description which strongly suggests general paralysis. Her mother was a strong and healthy-looking woman, of good size, aged forty-six, whose moral character was rather loose, and who was a very unfeeling mother to some of her children. Her father, a peculiar and unintelligent looking man, above the medium height, was forty-nine years of age, but had already at that age begun to look broken-down. He was pale, shrivelled, and gray-haired, and was unable to work on account of a callous ulcer on his leg, which had existed for fifteen years. He confessed to having had some venereal affection, which almost certainly was syphilis. He also complained of a delicate chest, and stated that consumption existed in his family.

Patient was the fifth child of a family of nine, and, in addition, her mother had three miscarriages, one immediately before, and two immediately after, patient's birth. Two of this family are dead; the third child died of hydrocephalus during infancy, and

the ninth child of meningitis at the age of eight. The eighth child is deaf, dumb, and epileptic, and is said to be hydrocephalic. The rest of the family are said to be healthy, the eldest son being twenty-seven years of age, and there are three girls alive and well.

Patient was a very weakly infant, but grew stronger as she got older, and she passed through the period of the first dentition without convulsions. During her childhood she suffered from measles, scarlet fever, and whooping-cough. At about the age of six years, she was attacked by curious "fits," which were supposed to be epileptic in their character; she would suddenly become pale, she would often bite her tongue, and she foamed at the mouth. These attacks happened during two or three years, but only three or four occurred each year. Nothing further of medical importance is known till the commencement of the present attack, excepting, perhaps, the non-appearance of menstruation.

Till her present illness, patient was always considered a healthy, intelligent girl, a little inclined to be shy and quiet, but there was no mental peculiarity or defect observed in her. She went to school at the age of five, and left school between the age of twelve and thirteen, after having passed the fourth standard. At school she is said to have been sharp and clever, and got on well. After leaving school, she was apprenticed as a book-folder, and served out her time of three years, but before the completion of that time the first symptoms of her illness had commenced, and since then she has done practically no work.

The exact origin of the patient's illness is very difficult to fix, but her mother states that about four or five years ago, when she would be about fourteen or fifteen, she had a sudden "faint," accompanied by unconsciousness, lasting over half an hour. This was not accompanied by convulsions, but she was much weakened, and she was confined to bed for two days. Subsequent to this she had two other of these "fainting fits," and on one of these occasions she called out, before becoming unconscious, "Oh! mother." It is improbable that these were due to cardiac syncope, as she had a quite healthy heart. These "fits" occurred about the time, or shortly before the first symptoms were noticed.

The first symptoms of the present illness that were noted were of a mental nature. The patient was noticed to have undergone a gradual change in her disposition. From being bright and active she gradually became dull and heavy, and it was found that she could not do work that required any intelligence. She made mistakes in messages of the simplest character, and the work she did was performed in the most mechanical way. She gradually lost the interest in things she had taken formerly, and seemed stupid and sleepy, becoming "lazy" and disinclined to do anything. The deterioration in intelligence was a slow and gradual process, and was misinterpreted by her mother, who thrashed her soundly for being a good-for-nothing, indolent girl, till at last it was obvious that her intellect was impaired. It was next noticed that she did not speak so fluently or readily as formerly, that she stammered slightly, and was very slow in expressing her thoughts, and at times stopped speaking altogether, and seemed to be unable to find words.

It was next seen that she did not walk as fast or as freely as she used to do; she was easily tired, and had the greatest difficulty in walking up a hill. The neighbours also referred to her ungainly attitude; her back was bowed, and she seemed huddled up. Walking became increasingly more difficult for her, and it was then observed that her hands and arms were shaky, and she was often seen to spill her tea when trying to drink it. Her speech was also observed to be more affected; it began to "quiver and tremble."

A year ago the patient was evidently in a fairly advanced condition of paresis. She was so weak that she had the greatest difficulty in walking about the house; she fumbled with her hands and fingers when attempting simple operations; her speech was greatly impaired, and she suffered, in the words of her father, from "great softness of the mind."

In February 1890 she was taken to Dr Affleck's Ward in the Royal Infirmary, and after being treated there for two months, left much improved in her general condition. Dr Affleck has kindly given me full notes of her case taken when in his ward, and I have been greatly indebted to them.

After returning home patient very soon relapsed into her pre-

vious condition, and was certified and sent here by the parochial authorities as an insane person.

The following facts were mentioned in her certificates of insanity :—“(1.) She has a stupid and idiotic expression ; she is childish, and it is only with difficulty that she can be made to speak.” “(2.) She has a peculiar imbecile look and laugh ; she behaves in a childish and idiotic manner when spoken to, and she does not know the day, month, or year.” The father, moreover, informed the physicians who certified her, that she had been affected for about five years, having been previously quite well ; that she was gradually getting sillier, and that she was now unfit to work ; that she could not go messages for anything, as she would bring back the wrong article ; and that latterly, if she happened to go out of the house, she wandered away and got lost ; and that on some days she was so “sulky” that she would not speak to any one.

Her mental state on admission was as follows :—Emotionally, her condition when at rest was one of calm contentment, no signs of trouble or pain ever ruffled her brow ; but, on the other hand, the slightest remark made to her, or the simplest attention, caused her to beam and to laugh all over her face. Every little circumstance that she observed seemed to be a fund of amusement to her, and the mere passing of the doctor through the ward would cause her to laugh and chuckle to herself long after he had left. When suffering from pain and fever, this happy disposition did not leave her, but even seemed intensified. Intellectually, there was very marked mental weakness. She was unable to comprehend any but the most simple statements. Complicated sentences, or any abstract ideas, seemed to have no meaning to her, and her only response was a fatuous smile. The simplest statements, indeed, were not comprehended readily. They had to be spoken distinctly and loudly, and repeated before there was any response which showed she understood their meaning. The reaction time of this response was always excessively delayed. The interest she took in her surroundings was very slight, and showed marked impairment of mental vigour. When taken into the room to be medically examined, she neither looked to the right nor to the left, and nothing attracted her attention ; she sat stolid, motionless,

and uninterested, showing no traces of resistance or modesty when partially undressed. From this lack of interest her attention suffered greatly ; it was impossible to get it fixed, and to get her to continue doing anything for beyond a few moments. It was impossible, for example, to get her to fix her eyes for an ophthalmoscopic examination. Her memory was no doubt distinctly impaired, yet she gave one the impression of remembering simple recent facts. She spoke very little, and then only when one asked her questions. With sufficient time and with sufficient perseverance exercised by the inquirer, one could elicit replies to most of the simple questions. She would answer that her occupation was "a bookfolder," that she lived in "the Canongate," and so on ; but she could not give an account of a bookfolder's work, or describe her surroundings in the Canongate. If one continued questioning her on this subject, she would answer, "I don't know ;" and if one still longer continued asking her, she would begin to laugh, and no more information could be obtained. She never expressed any delusions. So defective was her power of attention and observation, that during her residence here she never picked up the names of any of the nurses. She was very quiet and manageable, and never showed the least signs of restlessness or disobedience. She never attempted to do any work, for which, indeed, she was quite unable.

Comparing the patient's condition on admission with her condition five years ago, when she was described as a bright intelligent girl, who passed her examinations well, the contrast was very striking. She had evidently fallen into a condition of dementia, and was quite unable to attend to herself.

The physical signs of the case were even more important than the mental state. As regards the motor functions, it was noticed, in the first place, that her speech was greatly impaired, and accompanying this there was slight paresis of the lingual and facial muscles, with fibrillary twitchings of both. There was considerable hesitation in protruding the tongue, and it was seen to have both coarse inco-ordination and fine fibrillary movements. The facial muscles gave the face rather a stolid and wooden expression, on account of their immobility, and when she laughed distinct twitchings were noticed, especially round the angles of the mouth and the *alæ nasi*. Speech was very slow and hesitating,

and she enunciated all her syllables separately. The voice was rather high in pitch and monotonous, and as the syllables were slowly pronounced and sustained, the voice had a singing character. When she attempted to speak there was often a very marked fibrillary twitching playing all round her mouth for some time before a word was uttered, and then the syllable was suddenly pronounced with a slight stammer, as in the word "k—kick." The fine wavy tremor in the long-sustained vowels, which is so very characteristic of general paralysis, was seldom noticeable in her speech, but rather the coarser interruptions, more resembling stammering, as is seen in the following word—"A—alex—a—andr—ri—na—a." The hands and the arms of both sides were very much enfeebled, and she was unable to do any action which required either strength or delicate co-ordination. She was unable to hold a heavy jug in her hand or to pick up a pin, and when she wrote her letters were very badly formed, and the strokes were shaky. The grasping power of the two hands was extremely feeble. When patient moved her hands and arms, there were irregular jerky choreiform movements owing to inco-ordination, and fibrillary twitches might also be seen sometimes. There was some atrophy of the muscles of the forearm, and very marked atrophy of the muscles of the thenar and hypothenar eminences. Dr Affleck states that there was no reaction of degeneration. The myotatic irritability was very marked.

The muscular power of the lower limbs was greatly enfeebled, and she walked very slowly. There was no marked ataxia, and she was able to stand with her eyes shut. She was, however, very unsteady and tottering, and so weak were her legs that if put on the ground she could not usually get up again without assistance. On rare occasions she would rise, as cases of pseudo-hypertrophic paralysis do. The muscles of the lower limbs were of good bulk, and did not seem atrophied.

Patient's awkward gait has already been mentioned, and the stooping of the back.

The plantar reflexes were exaggerated, and the knee-jerks were completely absent. The rectal and the vesical reflexes were completely beyond the control of the patient when she was in Dr Affleck's wards, but she had improved considerably in this respect, and rarely during the day lost power over them.

The eye symptoms were as follows:—The pupils were both dilated and were unequal, the left being larger than the right. They reacted to accommodation, and very sluggishly and slightly to light. There was slight nystagmus on effort. Ophthalmoscopically there was found by Dr Argyll Robertson a few spots of disseminated choroiditis round the periphery of the field, a condition which, he stated, was often found accompanying hereditary syphilis. The sensory functions, so far as could be tested, seemed to be in a fairly normal condition.

The other systems were found to be normal, and the only other pathological signs noticed were a coldness and blueness of the hands, and the peculiar notched and pegged teeth, which corresponded exactly with Hutchinson's figures of the teeth in hereditary syphilis.

Patient remained six months in the Asylum before she died, and during her residence here the mental enfeeblement and muscular weakness slowly but steadily progressed. She became more and more fatuous and stupid, and seemed to comprehend very little indeed. She had no will and expressed no desires, and had to be clothed, fed, and attended to as if she were an infant. The expression of her face became blunted and wooden, and the twitchings much coarser and more marked. She very seldom spoke, but would always smile readily. She grew so weak in course of time that she had to be carried from place to place, as she could hardly stand, and she could do nothing for herself with her hands. There was no attempt at personal cleanliness on her part. At a late stage, too, she acquired the dirty and greasy look of the face so common in general paralytics.

Gangrene of the lower extremities finally caused her death. As has been noted, she was subject to coldness and blueness of the extremities, and although this was not the fully developed and marked type of Reynaud's disease, it was to all appearance one of the lesser modifications of it. On one day the extremities would be blue, on another mottled blue, pink, and white, and on another red, and then, perhaps, fairly normal. Sometimes the different extremities were in different conditions. She wore woollen gloves and stockings day and night, and the temperature of her room was kept above 60°, but in spite of this spots of

gangrene appeared at a time when the weather was very cold, those being trophic symptoms of her disease.

On December 26th erysipelas attacked the left foot, evidently originating from a gangrenous spot on the third toe. The temperature was $103^{\circ}8$ in the morning, and 101° in the evening. Poulticing and perchloride of iron were ordered.

On the morning of December 27th the temperature was 99° . Mentally she became brighter, but the speech defect was much more marked. She had almost never spoken for some weeks, and now, under the increase of temperature, her speech was found to have all the recognised characters of general paralysis. The erysipelatous appearance was greatly diminished on the left foot, but there was now a gangrenous blister on the dorsum. On the right foot there were gangrenous looking spots on the outer malleolus and on the third and fourth toes, which were dressed with iodoform and salicylic wool.

On the 30th the temperature was normal. The left foot seemed to be in a state of moist gangrene, which was advancing; the right foot of dry gangrene, which had not changed much. Gangrene had also appeared on the left hip. Mentally she was mildly hilarious, and sang to herself. She spoke louder and more distinctly, and laughed even more readily than formerly.

On January 3rd, 1891, the temperature rose to $102^{\circ}6$, and it was found that there was a profuse discharge of pus from the left foot. For the next week the foot steadily improved, and began to look well, and the temperature fell to the normal on the 6th. Diarrhœa now attacked the patient, and in spite of stimulating treatment she died of exhaustion on the 12th January 1891. During the last week she fell into a collapsed and semi-conscious state mentally.

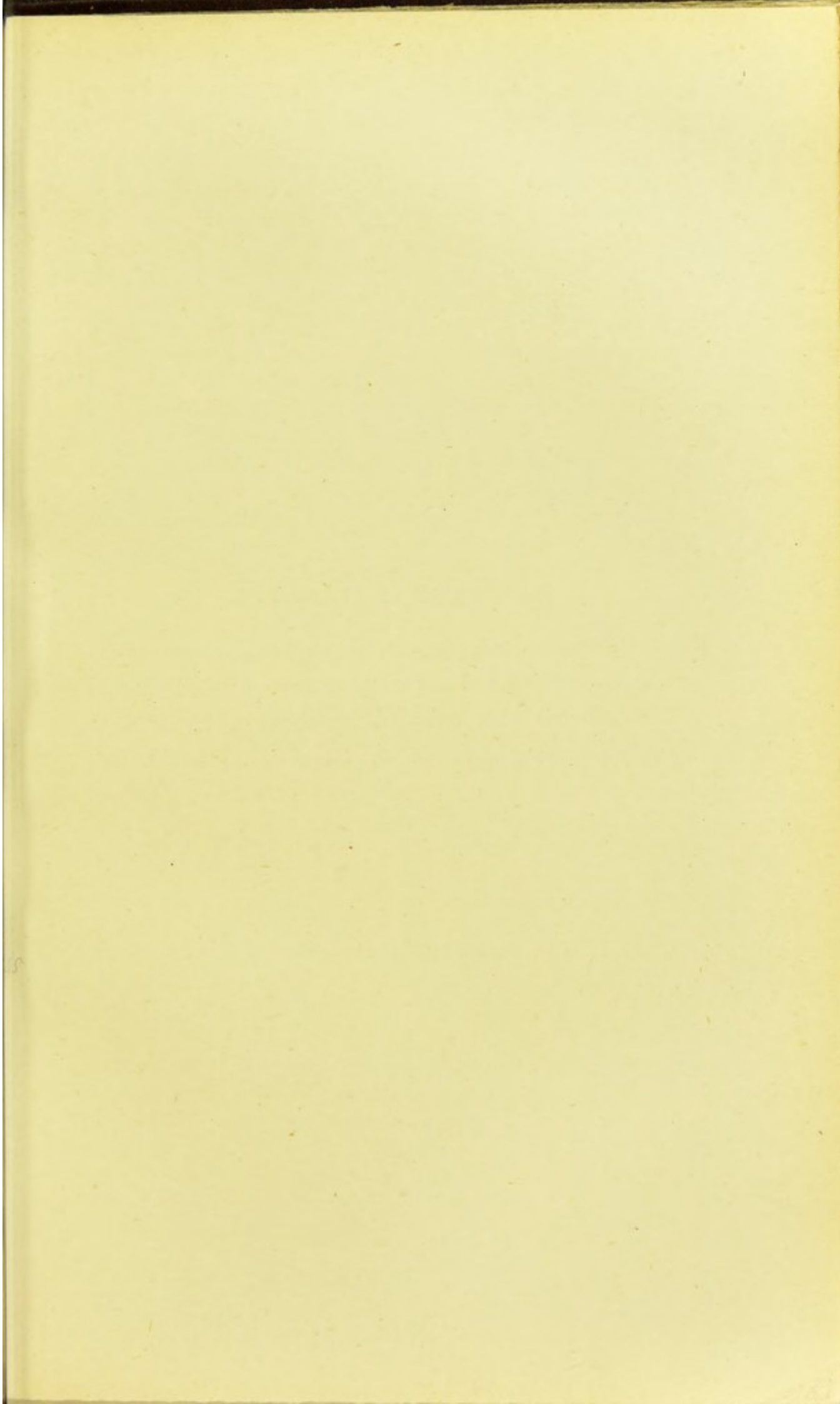
The pathological appearances in this case, as regards the nervous system, were as follows:—

In removing the skull-cap there was slight adhesion of the dura mater to it along the coronal suture. On reflecting the dura mater, there were numerous fine threads of adhesion between it and the arachnoid along the line of the pial veins, especially between the falx and the arachnoid. The arachnoid was milky and the pia mater tough and thickened. On removing the brain, it was found to weigh $34\frac{1}{2}$ oz. Of this there were $4\frac{1}{2}$ oz.

of fluid, and the cerebellum, pons, and medulla weighed $5\frac{1}{2}$ oz. The convolutions were very well marked and numerous, and there was only slight atrophy anteriorly. The pia mater was adherent markedly over the convolutions on the under surface of the frontal lobe, slightly on the under surface of the temporo-sphenoidal, but nowhere else. The two hemispheres were firmly adherent anteriorly, and the nerves at the base bound down by thickened membrane. On section of the brain, the lateral ventricles were much dilated, the membrane lining them thickened, and a few granulations could be seen on its surface. The gray and white matters did not to the naked eye present any abnormality. Granulations on the surface of the fourth ventricle were exceedingly well marked. The cerebral vessels presented a normal appearance.

The membranes of the cord were considerably thickened, and the dura was adherent to the arachnoid at many points. The vessels were congested. On section there was no marked change visible. It appeared as if, in the cervical region, the right anterior cornu were smaller, and, in the lumbar region, as if the left posterior cornu were atrophied.

On microscopic examination of fresh sections of the brain, there was found to be very considerable thickening of the pia mater, with a close network of fine fibres in the layer just below (see Plate VIII., *a*). A little deeper there were seen a considerable number of spider-cells of various sizes (see Plate VIII., *b*), most of them stained deeply, and easily made out. In the deeper layers the nerve-cells proper were very much degenerated, the apical processes of many being absent or truncated (see Plate VIII., *c*), and most of the basal processes were also gone. The nucleus in many of the cells was not to be seen (see Plate VIII., *d*), whilst in others it was vacuolated (see Plate VIII., *e*). In the *spinal cord* the pia mater was very considerably thickened, and formed a layer of some thickness on the surface. The white matter was to all appearance normal, no trace of degeneration or sclerosis being visible. There were, however, very distinct changes in the large nerve cells of the anterior cornua. Nearly all of them, especially those of the postero-lateral group, were very much degenerated, the numerous processes had disappeared, and the nucleus was invisible, either because it had



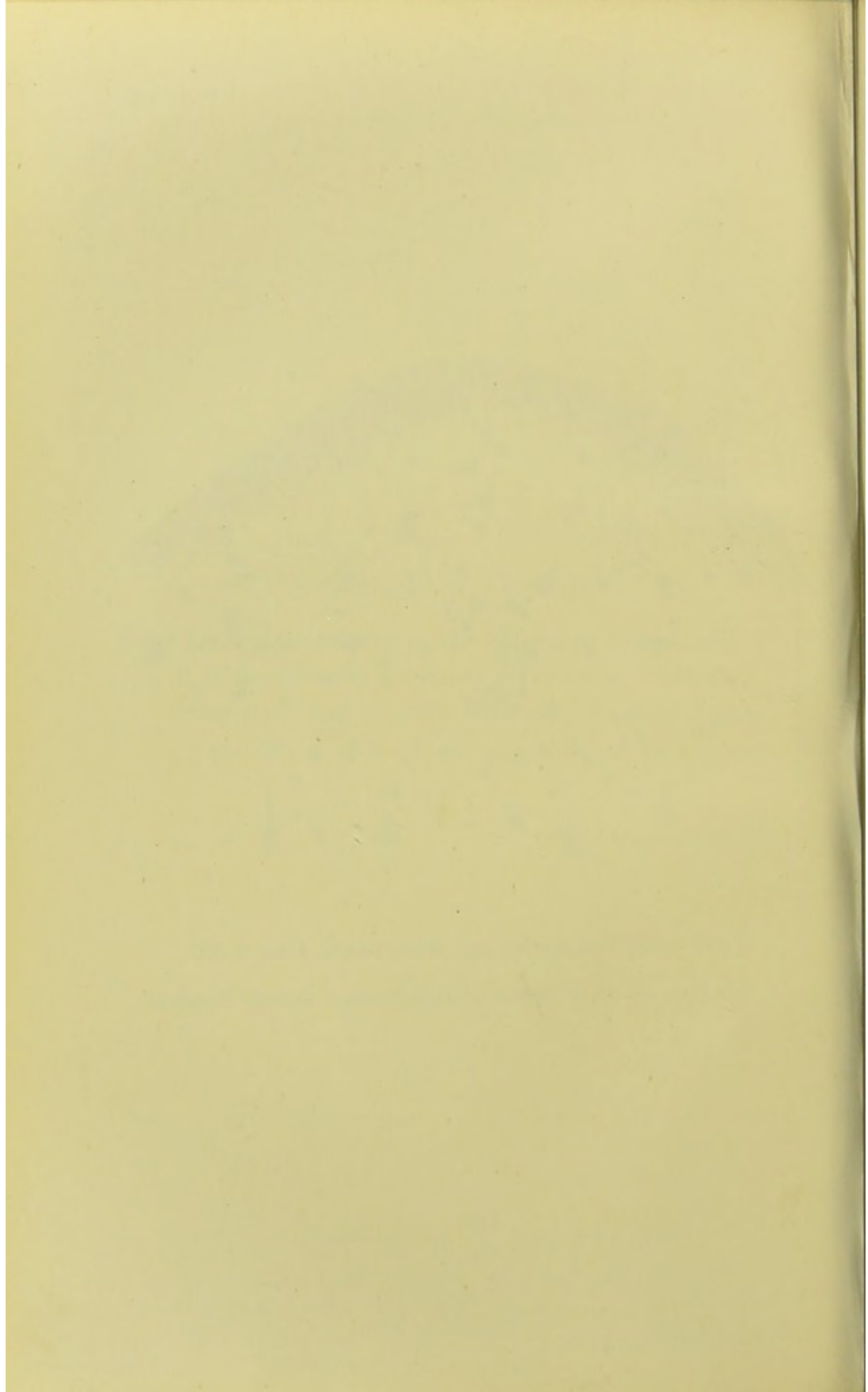
DESCRIPTION OF PLATE VIII.

Fresh section from anterior part of left frontal lobe of brain of
A. K. *a*, thickened and fibrous pia mater ; *b*, spider-cells ;
c, nerve-cells with truncated processes ; *d*, nerve-cell with-
out nucleus ; *e*, nerve-cell with vacuolated nucleus.



Fresh section from anterior part of left Frontal Lobe, $\times 300$

A. K.'s Case, aet. 19 , being one of Developmental General Paralysis



degenerated or was hidden by the large amount of pigment present in the cell. The epithelial cells lining the central canal were increased, the space being almost obliterated by their increase. A portion of the gastrocnemius muscle cut fresh and stained with picrocarmine showed considerable changes. Many of the fibres were narrower than normal, and the outlines were irregular. In them the transverse striæ were faint, the protoplasm had a granular appearance, and there were a few longitudinal striæ. Some of the fibres appeared normal. There was no excess of adipose tissue between the fibres, but the connective tissue cells showed signs of proliferation.

I have had those two cases described thus fully, because I think them both cases of general paralysis occurring during the developmental period at puberty, a period of onset which is exceedingly rare, and the full significance of which has not been hitherto recognised in the natural history of the disease. The case of A. K. had been seen by many distinguished physicians, who, though not coming to any definite diagnosis, formed different opinions regarding it. Disseminated cerebro-spinal sclerosis, pseudo-hypertrophic paralysis, locomotor ataxia, Friedreich's disease, and syphilitic meningitis, had all been inclined to by different observers in the course of the case. To those familiar with the usual course of general paralysis in the female, the symptoms and course of both cases are on the whole typical. There are certain facts of interest to be kept in mind in both cases:—1. None of the ordinary causes of general paralysis were present in either case, no sexual excess, no alcoholic excess, no overstrain, etc. 2. The disease began at fourteen or fifteen years of age in A. K.'s case, and at fifteen in J. F.'s case. 3. Menstruation never appeared in either case. 4. Both were in form and appearance girls, not young nubile women. 5. The disease in both began by a slow, gradual process of enfeeblement and mental "dissolution," the motor symptoms gradually following on. 6. Both were steadily progressive, as general paralysis progresses, in bodily and mental symptoms. 7. In both cases bodily development was arrested from the beginning of the disease. 8. Both had syphilitic teeth. 9. A. K. had syphilitic retinal symptoms. 10. The fathers of both had been syphilitic. 11. The mothers of both had one miscarriage before and two

miscarriages after the births of the patients, and A. K. had brothers and sisters with hydrocephalus, meningitis, deaf-dumbness, and epilepsy. 12. There was a marked heredity toward insanity on the maternal side in both cases, it being in J. F.'s case directly through her mother; while A. K. had also neuroses on the paternal side.

It is quite clear that no correct generalization can be arrived at on the subject from these two cases, but they point strongly to a form of general paralysis due to hereditary syphilis as the predisposing cause, and to puberty as the exciting cause, with a neurotic heredity as an extra-predisposing cause,—the disease having a distinct kinship hereditarily and developmentally to the other neuroses of this period of life. It seems as if in these cases the strains of development at puberty had the same effect as strains and undue outputs of energy in after life have in other cases in causing the disease. Dr Regis, in describing a case somewhat similar to those occurring at seventeen years¹ of age, refers to the prevalence of the arthritic diathesis in the ancestry, and discusses the possible influence of personal syphilis in the case, but does not refer to hereditary syphilis. He inclines to the theory that general paralysis is becoming more common at the earlier ages, a theory that Mickle also holds. But I am not sure that this is yet sufficiently proved by facts. I think we diagnose cases now as general paralysis that our predecessors would not have recognised as such, and they manifestly put down some cases of ramollissement and senile brain degeneration as general paralysis.

Tuberculosis in Relationship to the Developmental Neuroses, and especially to Insanity.

The relationship of tuberculosis, that scourge of humanity, to growth and development, to the neuroses hereditarily and personally, and to mental disease, is one of profound interest from both the physiological and pathological points of view. It is quite impossible in such a lecture as this to do more than suggest the salient points of the subject. I shall not, in this lecture, refer to any other forms of tuberculosis than to tubercu-

¹ *L'Encephale*, 1885.

lar meningitis, tabes mesenterica, strumous joint disease, and pulmonary phthisis. Dr James,¹ in his most masterly and philosophic treatise on Pulmonary Phthisis, has done far more than any previous writer to put many of the facts in a definite shape. His statistics show that tubercular infection chiefly takes place in the organs that are liable to it during the period of growth and development of the organism. Tubercular meningitis, the most acute and the most quickly fatal from the time of infection, killed 184 out of 234, or 79 per cent. of its victims before the age of seven and a half, that is during the period of greatest brain growth. Tabes mesenterica carried off 200, or 61 per cent. of its 295 victims, also under seven, the period of most vigorous action of the lymphatic glands. Out of 538 sufferers from strumous joint disease, 470, or 89 per cent., were under twenty-five years of age, that is while the bones are growing, and before their final ossification. In regard to that far more important and more fatal form of tubercle infection, pulmonary phthisis, James, taking the statistics of the Registrar General for Scotland, shows that the *greatest mortality* occurs at the twenty-fifth and thirtieth years, but then we must take a certain time off the age of death to get the period of infection. It is impossible to fix the exact number of years that should thus be taken off to give a true age of *greatest liability to infection*; but if five years are thus deducted, it would give under twenty-five as the most common age for consumption to begin, and this would agree with James's law, that "tubercular deposit tends to occur in the various tissues at periods when the excessive nutritive power required for growth is becoming or has become exhausted." Lung tubercle first shows itself in any great degree, in '14 per cent. of persons living near the beginning of reproductive power, viz., 15, it doubles its virulence by 20, reaching '34 per cent. then, and it gets to '38 per cent. at 25, and to '40 per cent. at 30, thus killing most of its victims during the developmental ages, and reaching its maximum just at the age of completed development. I had in 1863 shown the close connexion of lung tuberculosis and insanity, hereditarily and personally.² It is very common to find the two diseases in different members of

¹ *Pulmonary Phthisis*. By Alex. James, M.D.

² *Journal of Mental Science*, April 1863.

the same family, and there is every reason to suppose from the facts that a heredity towards phthisis may determine insanity, and *vice versa*. The percentage of deaths from tuberculosis is four times higher among the insane than among the general population at the same ages. I described a special form of mental disease which I called "phthisical insanity," and this begins in a large number of cases during the adolescent age, or just after maturity. Assuming, as I think we are entitled to assume, that the low nutritional condition of the body is the great predisposing cause for the tubercular infection, I contend that this innutrition is one form of trophic neurosis, and that the special pulmonary innutrition that admits of the tubercle bacillus finding a nidus in the lungs probably results from a trophic developmental failure in the epithelium of the alveoli of the lungs, in consequence of which the bacilli find free entrance and a suitable nidus there. Its connexion with insanity hereditarily shows the affinity of the trophic failure to the highest of all the neuroses. The coincidence of the maximum age of tubercular lung infection and of greatest liability to one of the most important of the acquired insanities, that of adolescence, is a very striking fact, and taken together with the facts as to heredity, seems to show that if tuberculosis cannot itself be called a neurosis, it is in most cases dependent for its existence on a trophic neurosis, or has the closest affinity to it.

There is one very striking fact about the developmental relationship of tubercular infection, and it is this, that idiots and congenital imbeciles are, during childhood and adolescence, far more liable to tubercular diseases than the sound, and that all their lives they seem to remain more subject to pulmonary phthisis than the sane are up to twenty-five, and this apparently because their development in any single tissue or organ is never fully completed. Dr Ireland¹ and other authorities state that "perhaps two-thirds or even more of all idiots are of the scrofulous constitution," "fully two-thirds of all idiots die of phthisis," and "the scrofulous diathesis seems to favour, or at least to accompany the production of idiocy. There is a larger proportion of scrofulous or weakly parents who have idiotic children than of healthy parents." Whatever is the kind of unresistiveness

¹ *On Idiocy and Imbecility*. By W. W. Ireland, M.D.

among certain sane adolescents that makes their pulmonary alveoli a fit nidus for the tubercle bacillus, that same bad quality is aggravated almost fourfold in the imbecile and idiotic class.

The following cases illustrate the connexion of pulmonary tuberculosis with mental symptoms in adolescents.

R. D. was admitted in January 1888, *æt.* twenty-five. He was suffering from delusional melancholia of four years' duration. He had a heredity predisposing him to the neuroses, including paralysis in an uncle and some form of mental derangement in his mother. During adolescence he had a fit of some kind, and several attacks of *petit mal* subsequently. He first suffered from a melancholic attack, treated at home, from which he recovered. Then, when aged twenty-one, he became reserved and listless, and gradually drifted into marked melancholia. On admission, he was much depressed and "very fragile," and seemed to be in the first stages of dementia. Earlier in the attack he had used violent language, and was sent to the Asylum because he was considered dangerous. Thirteen months after admission he died of *phthisis pulmonalis*, with *phthisis laryngea*.

P. C., *æt.* twenty-four, came of an ancestry which included two cases of insanity on the father's side. His mother and her brother suffered from sick headaches. There was *phthisis*, too, on the father's side. The patient and his brother have suffered from enlargement of the cervical glands, and a sister suffers from some form of chest-trouble. The patient's first attack of insanity occurred at the age of eighteen, when he laboured under adolescent melancholia; then when twenty-one he had an attack of acute mania; and now, since 5th December 1890, he manifests symptoms of simple mania, and makes but slow progress towards recovery. He is 5 feet 5 inches in height, and weighs only 7 st. 2 lbs. His chest at the nipple line measures 30 inches. His features are sharp; his complexion is fine, with a malar flush on each side; his palate is high; his chest expansion is poor; he has a persistent cough; the percussion-note is somewhat dull at both apices, especially the right; the breath sounds there are bronchial in character, and the vocal resonance is markedly increased.

He is in a state of restlessness and exaltation, giving expression to shifting delusions, many of them religious, and is always talkative. Underneath the exaltation, however, are some delusions of a more unpleasant character, such as that the charge attendant suspected him of seducing a girl, and struck him hundreds of times on the head and chest; and occasionally he bursts out in a suspicious tirade against the doctors and the whole management of the institution.

Acute Rheumatism.

I am not aware that the hereditary relations of acute rheumatism have been very exhaustively worked out, and especially I doubt whether we have any facts on which to prove any theory of a neurotic hereditary connexion. But if it is not proved to be a neurosis, the facts show it to have a striking relation to the development of the reproductive power. Of Macleod's 182 cases of acute rheumatism, 102, or 56 per cent., occurred before the age of twenty-five; and 94, or one-half, between fifteen and twenty-five; while 46 more occurred between twenty-five and thirty; while only 8 cases, or $4\frac{1}{2}$ per cent., occurred after the cessation of the most active reproductive nisus, at fifty. The same results come out in the conjoint investigation into the disease by a Committee of the British Medical Association.¹ Of the 655 cases there reported, 454, or 70 per cent., had their first attacks before thirty, only 30 of them being under ten, and an insignificant fraction over fifty-five. Some of the nervous accompaniments are then stated. These were chorea, neuralgic headaches, and neuralgia. The neurotic relations of acute rheumatism have yet to be worked out, but its frequent developmental character is fully established by statistics.

The following is a typical case showing a direct connexion between rheumatism and two serious neuroses, chorea and insanity, in an adolescent.

The case was that of E. M., a young woman, who during the physiological epoch of adolescence, at the age of twenty-one, developed acute rheumatism accompanied by pericarditis. The rheumatic poison also apparently attacked the motor part of the

¹ *British Medical Journal*, 1888.

nervous system, causing chorea, and latterly it involved the highest brain functions, producing mania, with delusions of suspicion and hallucinations of hearing and sight. The patient, who was a domestic servant, was admitted from Professor Greenfield's wards in the Royal Edinburgh Infirmary. No hereditary history of insanity was admitted, but a sister was certainly very peculiar and insanely suspicious. The patient was sent to the Infirmary on account of pericarditis, and when there developed chorea, and afterwards suspicions of an insane nature, necessitating her removal to the Asylum. On admission she was unhappy and discontented. She fancied that evil reports had been spread abroad about her; that the Infirmary doctor had chloroformed her and then abused her; that the nurses said she was immoral and had had a child; that poison had been given her; and that she was brought to the Asylum for some bad motive. She is said to have had hallucinations of sight and hearing when in the Infirmary, but they did not seem to be present on admission to the Asylum. Her memory was good, she was quite coherent in speech, and could answer questions. She was a very good-looking, short, square, rather anæmic young woman, with dark hair and dilated pupils. The chorea was not of a violent nature. It was general, but the facial muscles seemed more involved than those of the arms and legs, causing her to grin instead of smile. The tongue was protruded spasmodically and quickly withdrawn, and she jerked out her words when wishing to speak. She had pericarditis with effusion, and the temperature was 99° F.

Under treatment the chorea gradually left her, the last trace of it being noticed in the facial muscles; she got stout and rosy, and mentally there was a slow toning down of her suspicious frame of mind. For some time she believed the more reasonable of her insane suspicions, was inclined to disbelieve many statements made to her, and generally to be suspicious. Ultimately she was discharged recovered eight weeks after admission.

Such attacks of "rheumatic insanity" always show a neurotic tendency in the subjects of them. Commonly the acute choreic symptoms and the ordinary joint symptoms of the rheumatism alternate, just as one joint alternates with another in the swelling and pain. In E. M.'s case, the pericarditis no doubt kept up the

temperature longer than usual. I have elsewhere¹ described two similar cases of insanity with chorea occurring during acute rheumatism, both being adolescents,—the mother of the one having died of consumption, and the father of the other of tetanus, his mother being eccentric, and his maternal aunt eccentric. In my description of those patients and their bodily and mental symptoms, which latter I called “rheumatic insanity,” I altogether missed the significance of their developmental character.

¹ *Journal of Mental Science*, July 1870.

LECTURE III.

Developmental Epilepsy and Epileptic Insanity.

ALMOST all cases of true epilepsy first arise during the growth and development of the brain. This sweeping statement I shall be able to prove statistically. The disease is, therefore, of all the graver neuroses one of the most developmental. In general importance it ranks among the neuroses next to insanity, both as to frequency and seriousness. From the first appearance of nervous ganglia and nervous centres in the animal kingdom there are certain essential and basal qualities which these ganglia and centres exhibit, and without which their action would be ineffective, or even destructive to the life of the general organism. The first of these qualities is that which gives solidarity to the whole organism in its different organs and tissues—in fact, which makes organic differentiation reconcilable with organic unity in the higher animals. The second great quality is that which tends to active co-ordination for the general welfare of all the energizing processes. The third great quality is closely connected with the last. It is that which exercises control and inhibition to a greater or less extent over every vital process. The trophic nerves control and regulate the molecular motions that accompany the chemico-vital changes of the secondary digestion, metabolism, and katabolism, of nutrition, secretion, excretion, etc. The motor ganglia need an inhibitory apparatus to regulate the amount of motor energy to be expended and to arrest motor stimulus when sufficient for the purpose served has been exerted, just as much as they require a liberating apparatus to send the motor current to the muscles.

We have already seen some examples of developmental diseases due to diseased action of the trophic apparatus, such as dwarfishness, asymmetry, tuberculosis, acne, etc. We have also seen some examples of diseased action in the co-ordinating and inhibitory apparatus in the lower brain centres, the second

and third "levels" of the nervous hierarchy, such as chorea, asthma, etc. Now we are to see examples of disturbance in the co-ordinating and inhibitory apparatus in the highest regions of the brain cortex that originate and control voluntary motion and volition itself. Hughlings Jackson did a great service to Physiology and to Medicine when he coined the expression "discharging lesion" of the motor cortex to express convulsive movements. To discharge motor energy is the function of great tracts of brain cortex. To have a "lesion" in this discharging function means that the essential quality of a motor apparatus is impaired. Force of any kind that cannot be restrained and regulated is necessarily destructive, whether it be the lightning, the runaway locomotive, or the motor centre in the brain cortex during an epileptic fit. It is one of the basal and essential qualities of that cortex which has then gone wrong. Therefore it is not surprising that we have to go back to a bad heredity for the origin of most cases of epilepsy; and when we find it in pathological affinity with almost all the other developmental neuroses, most notably of all with insanity, we realize that it is the type and acme of all the explosive disorders. The essence of the epileptic lesion is loss of power in the inhibitory motor cells; the essence of the lesion in typical insanity is loss of the inhibitory power in the mental areas. Motion precedes mind as a vital quality, and attains perfection sooner; therefore epilepsy arises at an earlier period of life than insanity, though, as we shall see, it is commonly in turn followed by idiocy and mental weakness when it arises early in life. There are the two forms of epilepsy now generally recognised as distinct from each other, viz., the "Jacksonian" form without primary abolition of consciousness, and the "real" or more common form in which consciousness is necessarily involved. I do not attach the same importance to this distinction as some authors do, especially from the standpoint of these lectures. I agree with Jackson that those two forms of epilepsy may be regarded as affecting different "levels" of the motor hierarchy he theoretically sets up, beginning with the lowest reflex circuit, and ending with the highest mental-motor acts of volition and power of attention. But the condition that makes both forms of epilepsy pathological modes of motor energizing is the same, viz., a lack of the normal

inhibitory quality in the evolution of the energy of the motor cells. In the Jacksonian epilepsy we commonly find a gross and evident local source of irritation in the nervous centres, but such lesions do not always and necessarily cause periodically recurring convulsions. This effect is due to an innate lack of motor inhibition in the brain that exhibits it.

No one who has really seen much of epilepsy, and traced the heredity and clinical history of his individual cases, as well as examined a large number of brains of epileptics post-mortem, can have any doubt whatever that the disease is in its essence the result of a morbid quality in the working of the motor centres of the brain, and is not really due to localizable or "exciting" causes in ninety-nine cases out of a hundred. It is the result of unregulated, undue explosiveness or liberation of energy. The gas-engine is a fit type of the normal working of the motor cortex. Through an infinite number of small and regulated explosive liberations of energy steady motion is obtained. This is done by the co-ordination of a delicate machinery. But if the reservoir of gas takes fire and explodes all at once, and all its potential energy is thereby thrown away, we have a good type of what takes place in the brain during an epileptic fit. Any brain cortex may in extraordinary circumstances, or when subjected to the stimulating influence of certain poisons, explode in all its motor centres at once, and so produce a general convulsion. But when a brain is found to have a habit of explosion at periodic times from no extraordinary stimulus whatever, then we must look for the origin of this in an innate pathological quality. And we will find that in 90 per cent. of the cases this diseased quality has first shown itself as epilepsy during growth and development before the period of completed organic maturity at twenty-five. Gowers, Hasse, and Reynolds put the commencement of 75 per cent. of all their cases of epilepsy under twenty. If we deduct the cases that arise after that time through traumatism, through gross brain disease accidentally localized in the motor centres, and through the effects of syphilis, we have very few uncomplicated cases left other than those due to a developmental neurosis.

But at what precise periods of growth and development does the disease arise? Taking the first great nutritive and forma-

tive period of brain growth, from birth up to seven, Gowers'¹ most valuable statistics of his 1450 cases enable us to give the best reply to this question. He found that 340 of them, or 23 per cent., arose during that period. And 77 cases, or over 5 per cent., arose during the first year of life. This is the largest number in any year up to puberty. In those 77 cases the motor instability was so great, that it practically was exhibited whenever extra-uterine life began. No doubt in most of these 77 cases there was a very strong neurotic heredity, and was associated with genitous idiocy or imbecility. The cortex was bad and undeveloped in all its great functions, and entirely deficient as regards motor inhibition.

The next great period when the disease arises is puberty and early adolescence, in this respect contrasting markedly with insanity, which, as we shall see, is rare at puberty and early adolescence, but becomes very frequent indeed in the end of adolescence. Taking the age of thirteen as a common one for puberty to begin, Gowers found that the six years from that to eighteen produced 444 cases, or about one-third of the whole. Those years of early adolescence are the most deadly of all therefore. Then came the last seven years of adolescence, from eighteen to twenty-five, which produced 195, or only 13 per cent. of all the cases.

It is clear from these figures that there are two great epileptogenic periods, the first during the period of fastest brain growth from birth up to seven, and the next during the last period of slow brain growth but rapid development in the early reproductive period from thirteen to eighteen.

But we must look still further back than periods or eras of life to see why a brain becomes irregularly explosive. The heredity of epilepsy is markedly neurotic. From 28 to 35 per cent. have been the percentages that different authors have ascertained, the heredity being that of epilepsy itself, that is motor explosiveness, in three-quarters (Gowers) of the hereditary cases. The evil quality seems to come from the mother to offspring of both sexes rather more frequently than from the father, in this not following the usual law of mental heredity, which is to cross the sexes, from mother to son, and from father to daughter.

¹ *Epilepsy*, by W. R. Gowers, M.D.

The stronger the heredity in epilepsy, the earlier does the disease appear, as is the case in all the neuroses.

Others of the neuroses abound in epileptic families. Rickets is put down by Gowers as "causing" 10 per cent. of the cases. Ordinary eclampsia during teething, chorea, infantile paralysis, asthma, somnambulism, as we have seen, morbid impulsiveness and temper, the "hyperkinesiaë" generally, emotional perversion, morbid religious exaltation, perversion of feeling and action, dipsomania, and, above all, mental disease, are some of the neuroses with which epilepsy has close personal and hereditary affinity. In some counties in the south of England nearly one-fourth of the insane in the County asylums are epileptic, but it is not nearly so common as this in Scotch asylums. In Edinburgh only 8 per cent. of our insane are epileptic, while 22 per cent. of the inmates of the Larbert Institution for the congenitally weak-minded are epileptic.

We may conclude, therefore, that the tendency to motor explosiveness is an innate hereditary quality in epileptics, which eventuated into regular epilepsy at various stages of brain growth and development as the brain substance and its qualities were evolved. Instead of looking on the very commonly assigned mental exciting causes of the disease, such as fright, anger, and shock, as being real causes, I look on them in most cases as only proving the innate instability of the quality of the mental cortex, as well as the motor cortex. Unscientific, like scientific human nature, is always searching for the causes of phenomena. A distressed mother finds a certain satisfaction, if not a comfort, in assigning her child's malady to the sort of fright or shock, to which, as we all well know, most children are subjected often enough with impunity, but we must look far beyond such casual exciting causes of the first fit. The regularly recurring periodicity of the disease, which is one essential characteristic, is not at all explained by such "causes."

Recently Bevan Lewis¹ has, in his chapters on the Pathology of Mental Diseases,—chapters that mark an era in brain pathology,—stated that he does not agree with the "widespread community of opinion, that the pathological anatomy of epilepsy,

¹ *Text-Book of Mental Diseases*, by W. Bevan Lewis.

whatever it be, is the expression of a grave nutritional disturbance of cell protoplasm, a nutritive disturbance which will not express itself in palpable morbid change even to the higher powers of the microscope. From this opinion we must dissent; for it appears to us that a morbid appearance of the cortical cell does exist of a highly characteristic nature, when the cortex is the subject of examination by the fresh methods of research."¹ When he comes to describe the actual pathological appearances in the brain tissues of epileptics, however, he does not point out any morbid change that is confined to epilepsy. The vacuolation of the cell nuclei, and afterwards of the cell which he describes, and was the first to describe, cannot be said to be peculiar to epilepsy. Dr Middlemass, the present pathologist to the Royal Edinburgh Asylum, working by Dr Lewis's fresh methods, finds this condition of vacuolation in many of the chronic forms of insanity, and, curiously enough, he had not found the condition very marked in any of the four epileptics whose brains he has examined here. It is to be kept in mind that the morbid appearances found in the cell protoplasm of an epileptic dement of twenty years' standing do in no wise explain how the original want of motor inhibition arose. Just before and during every epileptic fit there must necessarily occur, amongst other things, a sudden transformation of energy in the motor cell. No post-mortem gross change can explain this. As showing the extreme care needed for a scientific deduction on such a subject, I subjoin first a sentence from Lewis, who has of all living men, except perhaps Meynert, done the most and the best pathological work in this department, and then shortly relate two cases of epilepsy, with some of the appearances found in the brain of each after death. After describing the vacuolation and destruction of the cell nucleus he says—"It is interesting to observe the persistence shown by the nerve cell despite the degenerative changes in its nucleus, and it is only later in the stage of dissolution that the cell protoplasm betrays evidence of degeneration."

T. C. became epileptic sometime from fifteen to seventeen, and insane at eighteen. He showed the typical irritability and violence coming on in relation to the fits, which he took in large numbers together every few weeks. The use of the bromides

¹ *Text-Book of Mental Diseases*, by W. Bevan Lewis, p. 322.

diminished but did not stop them. As years went on his speech became slow and indistinct. It was a typical paretic, not an inco-ordinated nor a convulsive speech. During the last three years of his life he was very demented, very weak, and generally paretic, and took several bouts of fits, with prolongations of the *status epilepticus* so severe that his death seemed imminent. He died at last, after such a bout of fits. After death the following post-mortem appearances were found. The description and drawing (Plate IX.) are by Dr Middlemass.

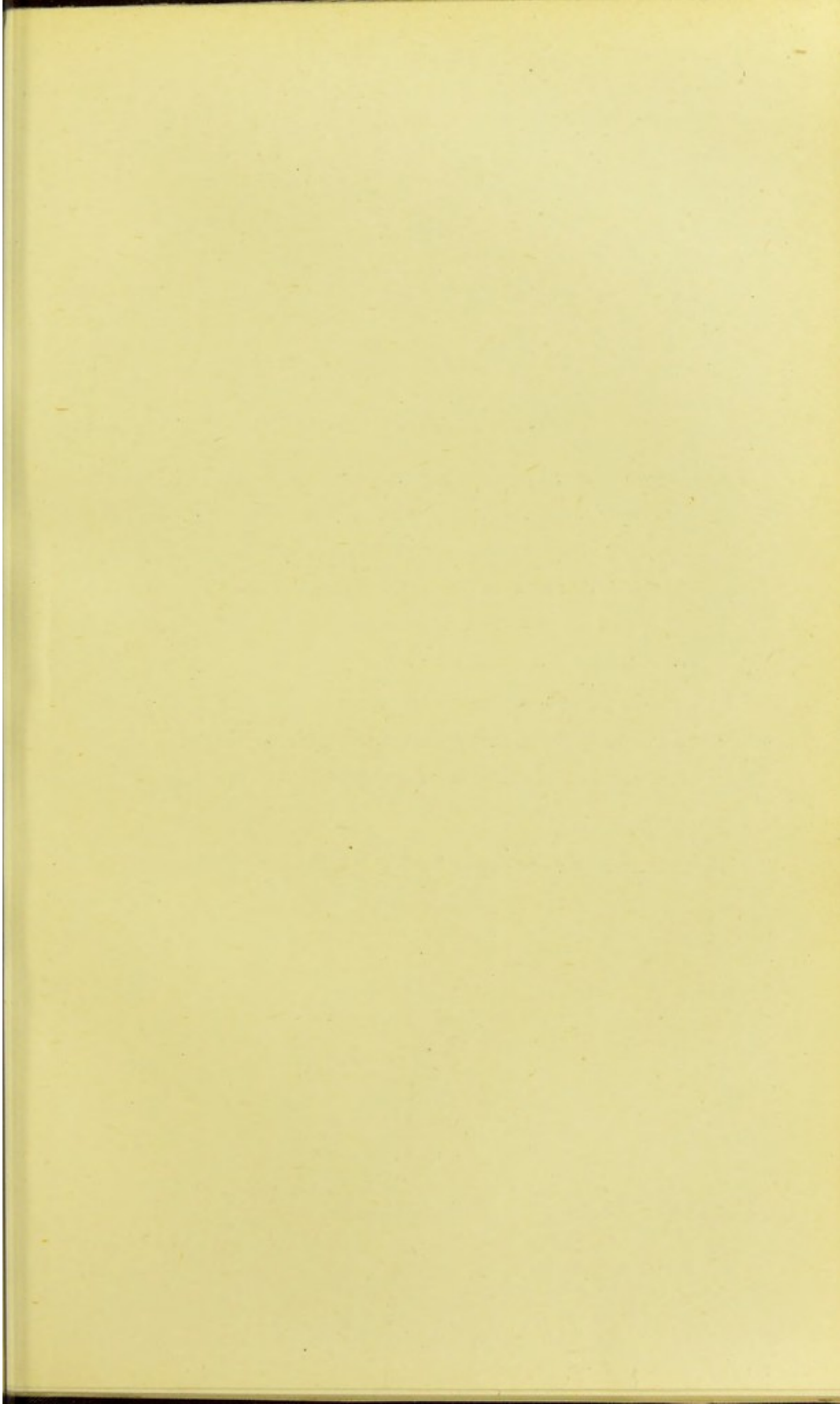
The pathological conditions found on examination of the brain of the above case of T. C. were very interesting. The skull-cap was slightly denser than normal, and just below the frontal eminences there were a few small rounded bony projections of the inner table. These were more marked on the right side than the left. The dura was slightly adherent to the skull over the frontal region, but otherwise presented a healthy appearance. The brain as a whole weighed $42\frac{1}{2}$ oz., of which the cerebellum weighed 3 oz., and the pons, medulla, and $\frac{1}{2}$ in. of cord 1 oz. The two hemispheres were slightly adherent anteriorly, but the pia did not appear thickened, and was not adherent to the gray matter of the cortex. The convolutions were well formed, and did not present to the naked eye any appearance of atrophy. On section nothing of a morbid character was seen.

Fresh sections were made from Broca's convolution, and from the inferior frontal convolution, according to Bevan Lewis's method, and stained with aniline blue-black. On microscopic examination there was found to be a slight thickening of the deeper layer of the pia mater, forming a network of very delicate fibres. In the outer layer of the gray matter there was a considerable number of spider cells, the nuclei being deeply stained, but the protoplasm very faintly so. Similar spider cells were also found in the deepest layer of the cortex, and in the adjacent white matter. The most interesting change, however, was found in the nerve cells of the second and third layers. On first examination the most prominent objects were the rounded or oval nuclei, which had taken on the stain very deeply. Under a low power these seemed to be all that represented the nerve cells proper, but with the high power there could be seen a small quantity of

protoplasm round each darkly-stained nucleus. It had taken up the stain only to a very slight extent, and hence was not readily visible. The appearance they presented is intended to be represented in the accompanying Plate (see Plate IX.), which is a drawing of a section from the left inferior frontal convolution. What was left of the cell protoplasm (Fig. 1 *a*, and Fig. 2) appeared to be composed of numerous minute rounded refractile colourless granules, some of the cells in addition containing a number of pigment granules at one or other side of the nucleus. The protoplasmic processes of the cells were completely gone, the truncated apex process (Fig. 1, *b*) in some being all that was left to indicate their previous existence. There could also be seen one or two masses of protoplasm without a nucleus (Fig. 1, *c*), and some nuclei destitute of cell protoplasm (Fig. 1, *d*). The nucleus, as already stated, was very deeply stained, rounded or oval in shape. Under a very high power the staining was seen not to be quite uniform, several small rounded or crescentic portions being slightly less deeply stained (Fig. 2) than the rest. This did not in the least resemble the appearances presented by vacuolation of the nucleus. Indeed, this condition of vacuolation of nuclei was present in only one or two cells out of several sections. The above changes affected only the cells of the second and third layers, those of the deeper layers being in different, but not advanced, stages of granular or pigmentary degeneration. The nuclei of the neuroglia cells were not increased in number, and presented a healthy appearance (Fig. 1, *e*). As regards the vessels, there was a slight increase of the nuclei of the adventitial sheath, and here and there a small quantity of pigment in the perivascular sheath.

In transverse sections of the upper end of the medulla, the large nerve cells showed very distinct evidences of pigmentary degeneration, but none of them presented the peculiar appearances of the nerve cells of the cortex.

Thus in this typical developmental epileptic we had a pathological condition precisely opposite to that described by Lewis as characteristic of epileptic insanity. The nuclei were large and showed no marked change, with no signs of vacuolation in any of them, and the cell itself had degenerated, and was largely disappearing, while there were present the spider cells, the



DESCRIPTION OF PLATE IX.

Fig. 1.—*a.* Nerve-cell showing well-stained nucleus, with small amount of protoplasm round it. *b.* Nerve-cell showing remains of apex-process and granules of pigment in protoplasm. *c.* Mass of cell-protoplasm without nucleus. *d.* Nucleus of nerve-cell, apparently destitute of protoplasm. *e.* Nucleus of neuroglia-cell. $\times 300$.

Fig. 2.—A nerve-cell showing granular condition of protoplasm, collections of pigment granules, irregular staining of nucleus, and atrophy of protoplasm and processes. $\times 650$.

These Drawings were made by Dr Middlemass, Pathologist to the Royal Edinburgh Asylum.

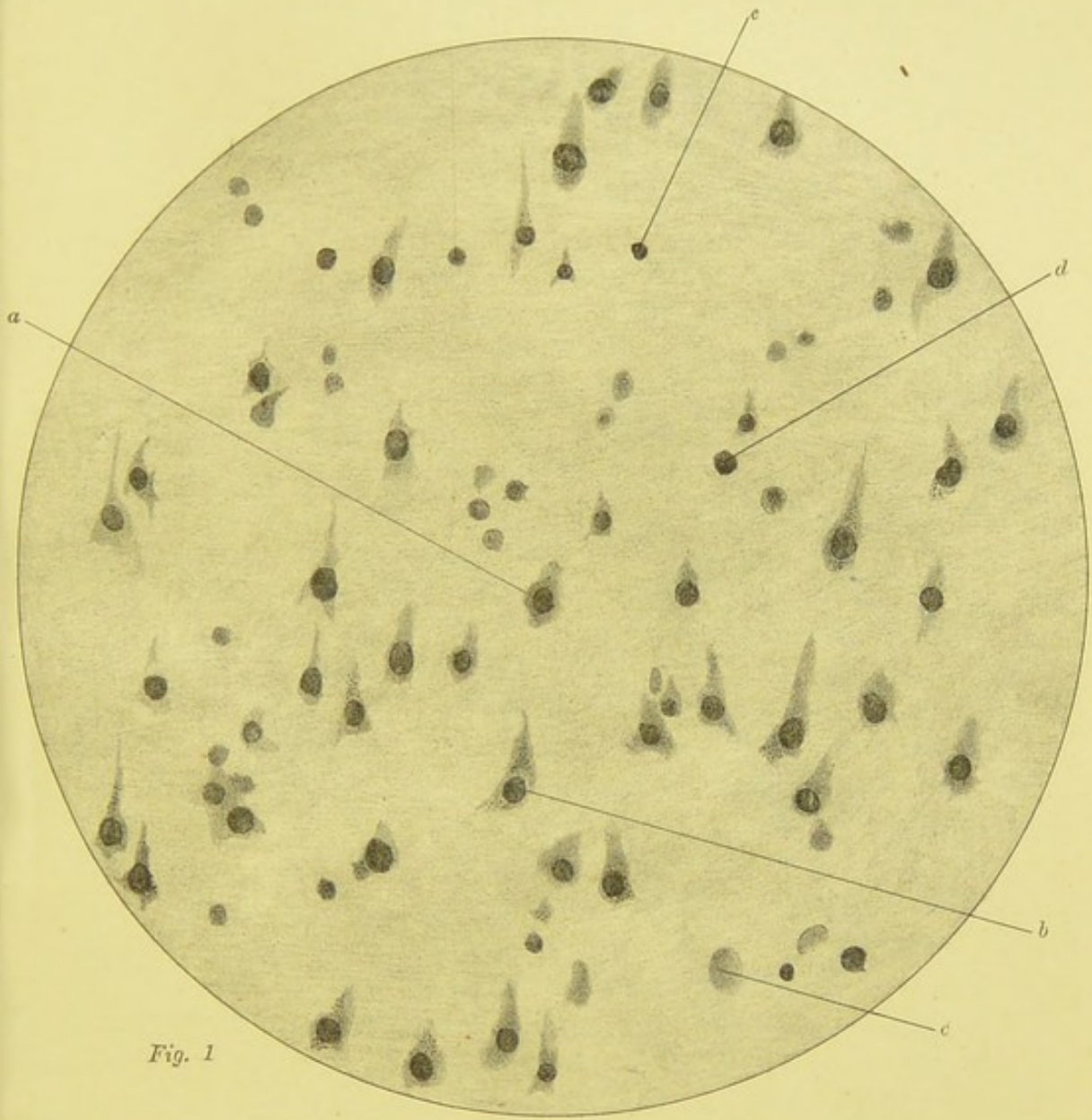


Fig. 1

× 300

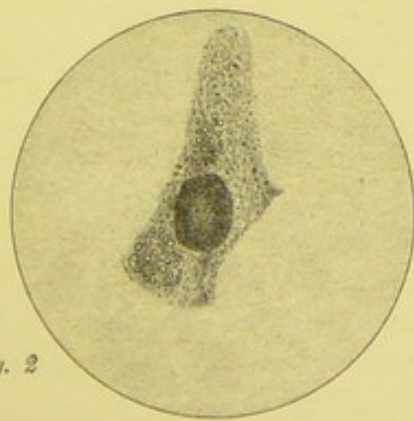
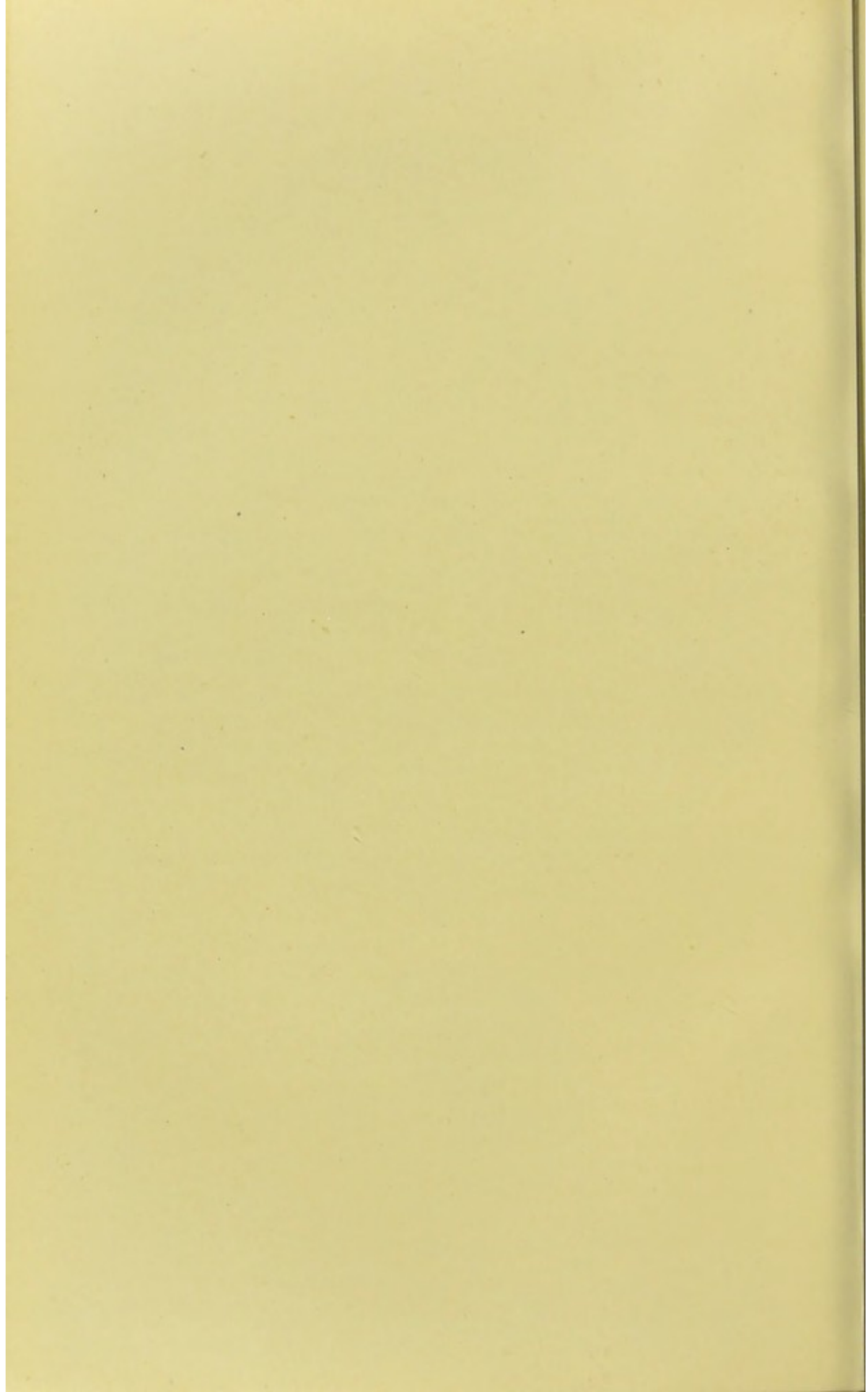


Fig. 2

× 650



absence of which, Lewis says, is so marked a feature of most of his cases of epilepsy, and which separated them so distinctly from the cases of general paralysis and alcoholism. The appearance of the cells in T. C.'s case rather resembled those of an epileptic idiot described by Lewis in *Brain* for 1879 (p. 371).

The next case was that of J. M., who became epileptic at thirteen, and took the fits more and more frequently, his mental powers going steadily downhill, until for about three years before death he could scarcely be said to exhibit any higher mental power at all. He had no wants, no desires, no affections; he could not reason, he had no power of attention, and no memory, and he never spoke. I used to show him to my students as the most perfect and the most extreme example of the complete dissolution of mind and speech through epilepsy I had ever seen. His speech had not disappeared through paresis or any want of articulating power, as in T. C.'s case, but apparently through the disappearance of mind, so that there were no ideas, and no wants to express, as in extremest dementia. He simply sat all day taking no notice of anything. At last, at the age of thirty, he died of sheer exhaustion. There was considerable general brain atrophy, and on microscopic examination of the convolutions there was seen much pigmentary and granular degeneration of the large motor cells, but not to an extreme degree, nor by any means universal, and we could find only one cell with a small vacuolation in its nucleus. In fact, considering his very frequent fits, total dementia and speechlessness, the result of the microscopic examination was utterly unsatisfactory as an explanation of the symptoms during life. I have seen many cases of chronic melancholia not much demented, of mild senile insanity, and many active-minded chronic maniacs, whose brains showed much more cell degeneration after death.

As a very typical case of developmental epilepsy, in its heredity, in its relation to other neuroses, and in the course of its mental and bodily symptoms, I relate the following:—

Y. Z.—Paternal grandfather drunken and then insane. Paternal grandmother violent in temper, eccentric, and became epileptic at seventy-one. Of the paternal granduncles two were insane. A maternal uncle of father epileptic at forty, and a

paternal uncle was dishonest and untruthful. The father during infancy suffered from nightmare, night visions, and convulsions at teething, but grew up strong and healthy in mind and body. The mother had a brother who was drunken and dishonest, and the mother herself was drunken. Almost every form of deficient mental and moral inhibition was thus found in the ancestry.

The patient was kindly, dishonest, untidy, untruthful, wanting in power of attention, and quarrelsome. He had no fits at teething, or any severe children's disorders. But lack of mental controlling qualities was very evident. At fourteen he took his first fit after a violent quarrel with a relation, and he has taken fits regularly ever since every few weeks, being often impulsive, violent, delusional, and maniacal after them, and he is now, at eighteen, gradually getting childish and demented, and has not developed in body, being still boyish looking.

Hysteria.

I bring in hysteria between epilepsy and adolescent insanity, because I attach far more importance to the mental element in this disease than most authors seem to do. I must not be understood as meaning technical insanity when I refer to the "mental element." As every physician knows, mental symptoms occur in innumerable diseases apart from insanity, and it is a great pity these symptoms of cortical disturbance are not more carefully observed and more accurately described as an ordinary part of clinical recording.

In any study of hysteria one is met at the threshold by the difficulty of determining what symptoms, nervous and mental, together or separately, are to be reckoned true examples of the disease. Are we to go on Charcot's lines and look out for local anæsthesia and irregular motor symptoms chiefly; or are we to take perverted conduct and character, diminished control over the expression of the emotions, abnormal "feeling" of all kinds—sexual, reproductive, and uterine mental reflections,—in fact, the indeterminate and the abnormal in the nervous and mental life of a young woman, as most medical authors would do? I lately saw a young woman of twenty, with a direct heredity towards insanity (maternal grandfather),

who had been delicate and anæmic since twelve, who had had slight hæmoptysis at eighteen, and who for six months had presented a train of symptoms of which the following were a part:—She had become whimsical, very much addicted to enlarging on her own feelings, changed in her affective nature, insensitive to the lesser moral obligations of duty in small things, such as obedience to her parents' wishes and a reasonable industry. She had developed absurd religious ideas of a subjective sort, such as that having "joined the church without giving her heart to God had destroyed her nerves," and so altered her appearance that every one looking at her could see this. She would not eat at times for a day or two, and could assign no reason for this. She would not micturate for more than a whole day, and not go to stool for several days, this being due to a perverted volitional effort. She would absolutely refuse to go to church one Sunday, and the next insist on going in the middle of the service. She would absolutely refuse to take the medicine ordered her because it was "hurting her nerves," while she would insist on having a former "bottle" because it "supported" her, both bottles containing the same substances differently coloured. She would at times refuse to go and see a doctor, and had to be put into the cab by force. When interviewed she would at first sit still, with her hands folded on her lap, and with her eyes looking down—a picture of modesty—and when pressed to speak, would say, "Let every one leave the room but the doctor," and then begin by asking if she might "confide" in him, and if he would keep "secret" what she was going to tell him. Then in a mock shamefaced way, with her eyes on the floor, she would say, "I'm sorry to say it has been all my own fault. I have brought it all on myself by my conduct. I've been very wicked." Expecting a confession of masturbation, from her mock modest manner, the doctor says, "But what is it you have done?" and finds that it is the not having "given her heart to God" when she joined the church that she means, or says she means. She describes many and wonderful nervous feelings, "jumpings" all over her body, "cracklings" in her nerves over her stomach, womb, and heart, and "emptinesses" in many places. Yet she declared she was not depressed, "not a bit," and spoke coherently. Her memory was good, and her control good continuously. She was unde-

veloped in body, very thin, pale, cold, and the colour of her skin of a leaden hue. There were no anæsthetic spots. Her menstruation was pretty regular, though scanty, and all the symptoms were aggravated just before the periods.

Now, here was an insane heredity, a threatening of pulmonary phthisis just before full feminine development of body; then, still before such development, a series of true mental symptoms which most physicians would have pronounced "hysterical" in their character. I had to admit that it was not a common type of mental disease, though there were abundant morbid mental symptoms present, and the girl was totally changed from her former and normal self. There was, in fact, a mixture of hysteria and insanity in the case, though most mothers would have been infinitely better pleased to have had it called hysteria simply. In regard to age the case was typical, being an adolescent in the latter stage of that period. There is none of the neuroses of development that appear so late as hysteria except adolescent insanity. In this respect the two diseases show their essential kinship; and this is, to my mind, one strong argument for considering hysteria as being in its essence a cortical disorder, probably taking its special form from functional disturbances in those mental cortical centres where the reproductive impressions are received from their organs, and where those impressions are brought into relationship with the innumerable emotions, desires, and volitional efforts that relate to reproduction or arise out of it. The higher mental cortex, as a whole, is the last of all the nervous centres to arrive at such perfection as the individual through heredity, education, and experience is capable of, and hence hysteria and insanity are the last of the developmental neuroses to appear. In the female sex reproduction is a much more dominant function of the organism than in the male, and has far larger, if not more intense relationships to feeling, judgment, and volition; hence when the heredity is towards the neuroses, and full and adequate development into the perfect type is handicapped thereby, the female becomes liable to this scourge of those of her sex who live in cities—hysteria—just when she should have emerged into perfect womanhood. The developmental power failed just when those extraordinarily subtle and complex relationships between organic reproductive necessities

and the highest emotional and social qualities should have been harmonized in the cerebral cortex to form the ideal woman. The combined capacities for intense affection, for great self-denial, for the worship of an ideal hero, and for the true and perfect modesty of the ideal woman, fail to be attained at the right time or become contorted, so that we have the perverted affectiveness, the useless self-tortures, the grotesque ideals, and the mock modesty of the hysterical adolescent of twenty.

The careful study of the mock modesty of the hysterical young woman reveals on what a complicated basis of bodily and mental function stands the most delightful, attractive, and necessary of all woman's graces, viz., feminine modesty. The social needs and restraints of modern civilized life in our more educated classes unite with subtle hereditary nervous defects to make hysteria so common as it is, and they will probably make it more common still, until we devise such conditions of life and such a mode of education for our young women during their development as will be antagonistic to both these sources of hysteria and insanity. To counteract neurotic heredity will be undoubtedly one of the great problems of the preventive medicine of the future.

Out of 781 cases of hysteria referred to by Landowzy and Briquet, 612, or 78 per cent., occurred before twenty-five years of age. Two hundred and sixteen cases occurred before fifteen, and only 169 cases after twenty-five.¹ It is, therefore, to a very large extent a disease incidental to the period of development, though it is not confined to that period of life. The most typical cases of this multiform disease are undoubtedly found in this period of life, and they arise in patients of the neurotic type. Though many of the motor and sensory symptoms of hysteria can best be explained by considering them due to disordered function in the basal ganglia, especially the corpora striata and optic thalamus, yet its mental symptoms must be referred to disordered working of the cortex. The psychological relations of hysteria have not at all received the attention they merit. There are some cases of hysteria that are neither more nor less than mental cases in nine-tenths of their symptoms. The relationship of hysteria to the other neuroses of development is very constant hereditarily and in the same person at different times of life. Certainly, its

¹ *Dictionnaire Encyclop. des Sciences Méd.*, art. "Hystérie."

connexion with adolescent insanity is very common, for in half the cases of this disease in young women I find there are "hysterical" symptoms present at some stage of the disease or preceding it. My experience must be that of many physicians in finding that most cases of insanity in the young women of the richer classes of society are in their earlier stages called "hysteria." I fancy many of our profession in good practice must have many qualms of conscience in thus yielding to a natural maternal prejudice in their nomenclature of disease. Hysteria is also very commonly mixed up with epilepsy and with chorea. It has in 77 per cent. of the cases a neurotic heredity, that being in by far the greater number of cases a direct heredity of hysteria in the parents. But in the ancestry of the 351 hereditary cases there had occurred insanity, epilepsy, convulsive maladies, and many other neuroses. I do not know of any of the neuroses so hereditary as hysteria, and none more mixed with other neuroses in the same families. The so-called hystero-epilepsy of Charcot I look on as a convolitional disease fully as much psychological as motor in its character. This is not the place to enter on the vexed question, but I have had many adolescents, partly insane, partly hysterical, and all most liable to "suggestion," whom I am convinced I could in a short time have made into about as good subjects of hystero-epilepsy as any of the Salpêtrière cases by a few cliniques before students. I always adopted the plan of treatment by studied neglect, by muscular work, by fresh air, by tonic moral treatment, and by unstimulating diet, and my cases mostly got quite well in a few months, except a few that became maniacal and ultimately passed into the secondary dementia of adolescence.

Adolescent Insanity and its Secondary Dementia.

The mental functions of the brain are liable to many kinds and to various degrees of disturbance and defect during its periods of growth and development. As we have seen, it can, from hereditary and traumatic causes, and from variously-caused arrested development, be left in the condition of idiocy or imbecility. I have already endeavoured to sketch the various motor and sensory neuroses in which psychological symptoms may

occur. The lesser mental diseases of development are delirium at low temperatures, *pavor nocturnus*, and somnambulism, of which I have already treated, and the short attacks of mania and melancholia that occur very rarely indeed in a few children of the most neurotic type. Besides these, there is the really grave and most important, as well as very frequent, mental disease, which in 1873 I first described and named the *Hereditary Insanity of Adolescence*, but which I now call simply *Adolescent Insanity*. The statistics and clinical facts I have published in regard to this form of mental disease¹ are sufficient to prove its existence and its importance, and Dr Bevan Lewis has confirmed and strengthened my conclusions by the statistics of his Asylum and his own independent investigations.²

In the upward course of evolution the mental part of man's brain has been the highest point hitherto reached. It has been the goal towards which all else has apparently tended. It is the superstructure without which all the other results of evolution would have had no meaning. Though it has probably taken hundreds of thousands of years of the evolutionary process to attain this high result, yet we must never forget that it only takes about five and twenty years and nine months to develop this organic miracle in an individual from the sperm cell and the germ cell up to the grandeur of function, the immeasurable complexity and the inexhaustible capacity that is possessed by the brain of a man of genius. Instead of one brain cortex in a thousand going wrong in this developmental process, or failing to reach a fair working capacity of function, the wonder is that in almost any case it ever attains this. It is receptive and reactive to impressions from almost every substance, every energy, and every influence in Nature outside it, as well as to much of its own energizing—in some cases most acutely reactive. It must provide for its own nutrition and repair. It must be stable, and yet not too stable, in its molecular condition, and in its energy production, for a too stable nerve-cell would not be properly reactive. It may be that the secondary dementia of adolescence that I am to describe—that state of mental death while the body lives on—is in its essence a mental cortex too morbidly "stable," and, therefore,

¹ *Edinburgh Medical Journal*, July 1879–July 1886. *Clinical Lectures on Mental Diseases*, 2nd edition, p. 531.

² *Text-Book of Mental Diseases*.

unproductive of mental energy, being irresponsive to appropriate stimuli. Certainly some chronic demented can be roused by extraordinary stimuli. The brain holds within itself its own vasomotor centres, and probably has an enormous number of such centres, each regulating a small but distinct area, with higher centres regulating combined and functionally associated areas. Even the change from a slightly acid to a slightly alkaline reaction round its cells would, after first unduly stimulating, soon destroy all higher brain and mental action in the cortex.¹ The laboratories that regulate the production of its appropriate chemical fluids, on which so much depends, must be kept in working order. The latest researches into its histology² show that each individual cell has its own apparatus of capillary vessel for nutrient supply, and lymphatic space and cell for drainage, on the healthy working of each of which the normal cell action must depend. All who have studied the pathology of insanity know that in juxtaposition we often find a diseased or degenerated and a normal cell. This necessarily implies that each cell has a certain individual trophic independence; and there are millions of such cells! No human imagination can conceive the complication of this cerebral mechanism, any more than the keenest thinkers as yet have been able to imagine anything of possible connexion or "thinkable" co-relation between this mechanism and the states of consciousness which are its end.

Looking to the gradual development of mind up to puberty, and the enormous and rather sudden leap that is then taken towards the higher mental life of the adult, we must assume an almost completed apparatus lying ready to be brought into use, just as the centres of respiration are ready for their functions at birth. And considering that the very highest mental and moral qualities of all, with the subtle differentiation between the male and female mental types, are only fully seen between eighteen and twenty-five in the average human being, we must look still to the apparatus through which all this is brought about in the brain cortex. In its organization and qualities alone is to be found the explanation of why in the male sex the mental development at that age is in the direction of action, of cognition,

¹ Roy and Sherrington, *Journal of Physiology*, 1890.

² Bevan Lewis, *Text-Book of Mental Diseases*.

of duty, and of the higher imagination, while in the female sex it takes the direction of emotion, of protective instinct, of a craving for admiration and worship, and of the creation of an ideal "hero" to be loved and worshipped in return. It is no wonder, these highest functions being the last to be developed in the organism, that derangements and diseases affecting the higher mental functions and their cerebral apparatus come last of all in the order of the developmental neuroses. They are incomparably the most important, too. In degree they present the greatest variety, from slight mental and moral distortions, mere "peculiarities," "eccentricities," and "idiosyncrasies," up to the complete temporary mental dissolution of delirious adolescent mania, and the permanent mental death of its secondary and terminal dementia.

A very few words are all that is necessary for my present purpose about the mania and melancholia of children before puberty. I have never met with any such case that has not been the child of very neurotic or insane parents or grandparents, and whose own diathesis was not intensely neurotic. The attacks are short and apt to be relapsing, and in most of those which I have seen I had some reasons for thinking that signs of an abnormally early reproductive period accompanied the mental symptoms. The earliest case I ever saw was a small melancholic child of six, who wept and wailed, and was sad about imaginary things, such as going to hell, and having taken a drink of water when it was wrong to do so. I have known two cases of a suicidal melancholia from seven to ten years of age. Child-mania is usually acute or even delirious in character, and seldom lasts more than a day or two at a time, except where there are convulsions or organic disease. Such brains are constituted in an intensely unstable way. They mean that a pathologically premature development of the emotional brain centres has taken place, the energizing that results therefrom in feeling being without the proper organic stability in the cortical cells that so energize. I never met with such a case without there being various other developmental neuroses in brothers or sisters.

The statistics of the Royal Edinburgh Asylum show the following facts in regard to the incidence of insanity during the age of adolescence:—Of 1796 total cases admitted in the course

of five years, 320, or 18 per cent., were between fourteen and twenty-five years of age. Of this number the disease was either congenital or due to very special exciting causes in 90, leaving 230, or 13 per cent. of the whole, in whom the influence of development was the chief predisposing cause of the disease. The first two years, the 14th and 15th, which are essentially those of puberty, only produced two of the 230 cases. This at once sets aside the first onset of reproduction as being a most insignificant factor in the production of mental disease. This contrasts markedly with epilepsy, as we have seen. The next five years, the 16th, 17th, 18th, 19th, and 20th, only produced 16 cases each, showing that their psychopathic tendency was low. But the next five years of adolescence, from the 21st to the 25th inclusive, showed a very marked increase, for they produced 31 in each year, or 68 per cent. of the whole. In fact, those five years produced more *uncomplicated* cases of insanity than any other five years of life. Dr Bevan Lewis does not give the exact numbers that occurred each year of life, but he found three-fourths of all his adolescent cases to occur between eighteen and twenty-one years of age.

If these are the facts in regard to the occurrence of insanity, what is its relationship to the normal mental developments of the brain at that period? How does it stand in regard to hereditary neurotic taint? What are its neurotic affinities? What special forms does it assume? How does it usually end?

There cannot be the least doubt, I think, as to its relationship to the special mental characteristics of the period of life in which it occurs. It is the period of intense mental development in the female sex, tintured at every point by her reproductive instincts, which are then acquiring solid form and physical potentiality. With reproduction comes, like a flood, the real knowledge and realization of all the possibilities and all the mysteries of life. In the male sex all the combined ambitions and altruistic emotions of life then burst forth to consciousness. Up till then in both sexes sufficient had been the day for its pleasures and for its evils. A mild egoism had bounded the desires. No real intensity in life had appeared to carry everything before it. The philosophic meaning of the change is that

the race is greater than the individual. We know that all this new mental life, all those intense emotions, all those overmastering ambitions, all those vague but profound longings, are represented, nay, that they arise out of brain energizing. Not only do they do so, but also the ideal and the poetic faculties of the period, and the very moral and volitional life are dependent on brain working as much as the movements of the fingers. The undeveloped brain shows no overmastering intensities of feeling or volition, and has no impregnable moral resistances. When development proceeds normally, every feeling and every mental capacity are expressed in a physical characteristic of expression, of form, or of motion. The beauty of woman and the strength and manliness of man are the bodily equivalents and counterparts of the mental ideals proper to the sexes.

As it is during this period, from twenty to twenty-five, that the mental "character" and the bodily "constitution" are fully formed and settled, it is no wonder that there are then risks to the mental functions of the brain to which hereditary weaknesses have been transmitted. If those weaknesses are mental, the result is apt to be adolescent insanity, or one of that most varied group of mental and moral twists or lacks which may be described as adolescent torpor and stupidity and aimlessness; or adolescent perversion of the moral sense or power of control exhibited in incompatibility of temper, irritability, impulsiveness, dipsomania, immodesty, vice, shamelessness; or general lack of morality; or in changed emotion, such as utter selfishness, aversion to relatives, asocialness, and unnatural attachments. The bodily equivalents of such mental misdevelopments are menstrual irregularities, chlorosis, hysteria, neuralgia, unattractiveness of person, irregular or deficient growth of mammæ or beard, awkward body movements and bad "expressions" of face.

The special symptoms of adolescent insanity are that it is maniacal rather than melancholic, 78 per cent. of all the cases taking the form of mania, with a considerable number of cases of stupor—melancholia not being absent, however. It is unquestionably adolescence which determines the fact that the ages at which most cases of mania occur are from twenty to twenty-five, while for melancholia they are from thirty-five to forty, and for general paralysis from forty to forty-five. The mania is in

the male sex restless,¹ boisterous, full of mock-heroic pseudo-manliness, obtrusive pugnaciousness, with often a morbid sentimentality; while in the female sex we find also restlessness, with lack of self-control, intolerance of control by others, impulsiveness, hysterical obtrusiveness, and emotional perversion. In both sexes we naturally find strong and perverted sexual ideas and practices. In adolescent insanity periodicity and remission prevail to a larger extent than in any other form except *folie circulaire*, which often originates then. This periodicity is an accurate pathological reflection of the normal periodicity of all nervous energizing, and especially of the reproductive capacity and *nisus*. This form of insanity has the closest relation to the function of reproduction.

It is the most hereditary of all insanities. Taking all our cases we only get a hereditary history of insanity in ancestry or collaterally in 23 per cent., though this is far below the real facts if we could ascertain them. In adolescent insanity we got a hereditary history of insanity in 65 per cent. of the cases. If I confined my attention to only these cases in which I had a really sufficient opportunity of ascertaining the hereditary history, I have found either insanity, or some nervous disease, or a distinct nervous constitution in both parents in almost every case. It is especially allied to and mixed up with epilepsy, chorea, deaf-dumbness, and idiocy.

Looking to its ending, we find that there are two opposite conditions in which by far the most of the cases terminate. These are recovery, mental life, and capacity in from 50 to 60 per cent. of the cases; and secondary dementia, mental and civil death, in about 30 per cent. The gulf between these two terminations is that between life and death. I believe that the majority of the cases who do not recover and become demented were doomed to this ending from the first by their original hereditary defect, just as much as the evolution of idiocy was inevitable in most cases of that defect from the time the sperm cell met the germ cell *in utero*, on account of the hereditary defect in one or both cells. Yet up to eighteen the young man or woman who is to die a secondary dement has often been sane and strong, with no bodily or mental defect that we can

¹ *Clinical Lectures on Mental Diseases*, by the Author, 2nd ed., p. 205.

certainly detect. This I believe to be owing to our present want of knowledge of development and its minute characteristics. I shall presently point out some of the morphological and other signs that sometimes uncertainly presage adolescent insanity in certain cases.

The secondary dementia that results in 30 per cent. of adolescent cases is of all acquired dementias by far the most complete. It is a pure degradation in function of the mind tissue, without in some cases many motor, or sensory, or trophic nervous accompaniments. Many of the patients will live in health, under favourable conditions, long lives. The change that takes place in the mind cortex in this developmental dementia is unique in organic nature. No other tissue undergoes a change in function like it, without showing manifest signs of alteration of structure, discoverable by naked eye or microscopic examination. The difference in functional quality between the cortical cell before the dementia and after it is the difference between effective human mind and mind often far below that of a dog. Yet we cannot as yet in early dementia by microscopic examination see any difference between the two cells. That more than anything else shows us how far we are yet from being able to examine a brain cell thoroughly. Of late years Dr Bevan Lewis has devised a method of cutting sections of brain, by which we can detect differences in old-standing cases of dementia.¹ A typical secondary dement after an attack of adolescent insanity does not think, does not feel, does not will, does not imagine, and does not remember in any proper sense. "Place fifty of them in a rich country, and they will neither sow nor reap, and will die off at once. If any other single organ in the body were in the same state as regards its function in which the mind organ in the brain is as regards its function in dementia, the body would die."²

There is, to my mind, a striking analogy between idiocy and dementia. With certain points of difference the great mental deficiencies are the same. The idiot has usually far more bodily defects, but that was because in idiocy the bad heredity was stronger and earlier shown during the formation and growth stages

¹ *Text-Book of Mental Diseases.* Bevan Lewis.

² "Secondary Dementia," by the Author, *Journal of Mental Science*, October 1888.

of life. I have already related cases where from traumatism, fevers, hydrocephalus, loss of the senses, or hereditary syphilis, children of from seven to twelve were arrested in their brain and mental development—put back, as it were, and left in states that could not be distinguished from congenital imbecility. There are a few cases of secondary dementia, resulting from attacks of adolescent mania, usually in the early years of adolescence, that become so complete as to resemble idiocy. Looking at the whole question of mental enfeeblement from birth up to twenty-five from the point of view of brain development, I am inclined to the conclusion that the secondary dementia of adolescent insanity is pathologically allied to genitous idiocy, as it certainly is etiologically through heredity. Much secondary dementia I look on as postponed idiocy. There are links that connect the one form of mental enfeeblement with the other which may occur in every year of life, from birth up to adolescence. Every form of enfeeblement, congenital or adolescent, may have maniacal attacks superadded to it. We have seen how the percentage of deformed palates is nearly the same in idiocy and adolescent insanity, this frequently indicating, where it exists, a certain bad quality and non-development of brain.

To my mind the change in the brain cortex, through which cells that had, when normal, been the vehicle of high thought, keen emotion, vivid imagination, accurate memory, and powerful volition, become, when pathological, unfit to manifest any one of these qualities, without any perceptible microscopic change, is the most remarkable and mysterious change in Nature next to that from life to death, and of itself marks out adolescent mania as the greatest and most important of all the developmental neuroses.

Adolescent insanity has also this peculiarity, it occurs just before maturity. It is the last cortical developmental disease. Just when the organism is about to take on itself the burden of full reproductive capacity in addition to that of organic and mental life, it breaks down at the very highest point. Nature's law of the barrenness of a bad stock is thereby carried out, for demented, though not necessarily asexual or barren, are in any organised society non-reproductive.

Recovery from adolescent insanity is usually marked by the

development of full reproductive characteristics. The beard grows, the voice changes, the form assumes the full masculine type in the man, while the breasts develop, the form rounds off, and menstruation becomes normal in the female.

The following is an example of the insanity of puberty who made a good recovery :—

R. B., æt. 17½. Third attack. Maternal aunt and paternal second cousin were insane. Was a healthy, clever girl till she was fifteen, when at the onset of the first menstrual period she got dull and depressed. Next month, instead of menstruating she became very dull and melancholy, and was sent to the country. At the third month she became quite stuporose and was sent here. She was a typical example of melancholic stupor. By the aid of fattening food, "building up" medicine, and hospital treatment, she recovered in three months. In another three months she became acutely maniacal, and was sent here again. From being a quiet girl she became a great tom-boy. She jumped on and off tram cars without paying; she ruled her younger brothers and sisters with a rod of iron; she was "cheeky" to her elders; she obeyed no one. She was always in great spirits. In four months she was fit to go home. It was noted that she became excited every month, though she did not menstruate. She was very precocious; was a great flirt in the ball-room, and as vain as a peacock. Eight months after, at the end of last year, she again had a very acute attack, and was admitted. For three months she was in a great state of hilarious excitement, then for another three in a state of profound stupor. Then she slowly recovered, till she has now reached a normal condition; she is stout and womanly looking, instead of being girlish as when she became ill. She has now menstruated three times, after an interval of two years since the first time. She is stouter, and is more womanly than she has ever been. The close connexion between her uterine functions and her mental condition was noticed by all during the last two years.

The following is an example of the more common form of adolescent insanity occurring during the latter five years of the period :—M. A. G., aged twenty on admission; a steady, cheerful, industrious girl who had exhibited no marked mental peculiarity until her present illness. An aunt had chorea, and her father

was markedly neurotic, though not insane. She had been overworked in an indoor occupation and became anæmic, then she suffered from bad headaches, then from insomnia, then showed "hysterical" symptoms, then exhibited slight melancholia of a religious type, and finally became maniacal. This train of symptoms took about three months to reach that stage of mania at which she had to be placed in the Asylum. When admitted she was erotic, restless, and had exalted ideas, *e.g.*, that she was the Princess of Wales. She gradually got worse, and was so acutely maniacal that for several days she had to be secluded in the padded room. The excitement abated in about a month, and then she had a relapse not quite so severe as the first attack. This occurred three times. Between each attack she picked up and gained in weight, so that when the relapse occurred she was heavier than on admission. Finally, she got rid of the tendency to become excited, grew fat, gaining nearly two stone in weight. She settled down into a sedate, modest, sensible girl. She began to menstruate regularly about five months after admission. At first there had been dysmenorrhœa and then amenorrhœa for three months. She is now perfectly well, and I see no reason, from my experience of similar cases, why she should not so remain all her life. During the attack of insanity she manifestly developed from an immature girl into a woman in looks and shape. The attack marked a physiological crisis in her bodily and mental development, and having got over that, she passed into normal womanhood.

The next three cases were members of the same family, J. P. and M. P. being brothers, and M. P. A. being a sister. Their mother had been repeatedly insane, and in the Asylum four times, suffering from attacks both of mania and of melancholia, from which she made good recoveries. Two of the attacks were puerperal. She suffered from bad neuralgia, too, at times. Her mother had a cousin an imbecile, and she—*i.e.*, the patients' maternal grandmother—died of consumption. The patients' father was a drunkard, had a squint, had suffered severely from cephalalgia at adolescence, and died of cerebral apoplexy. The father and mother were sixth cousins. The following is briefly the history of the children:—Eldest: a son, a drunkard; a thief, sent to prison; left handed; talked much in his sleep. Second:

a daughter, normal. Third: a daughter, had epileptic fits as a child; did not get proper control of her bladder till she was twelve or fourteen; had two illegitimate children, and "thought nothing more of this than of having her tea." Fourth and fifth: girls, died of convulsions at six and five months respectively. Sixth: M. P. A., a girl who never was honest and truthful, but pleasant mannered; got married at twenty, and took to drink when pregnant—becoming a dipsomaniac with slight morbid elevation, so that she was sent to the Asylum on three occasions. Seventh came J. P., who became insane and maniacal at nineteen, recovered in a few months, then had another similar attack at twenty-two, and after various relapses passed into complete terminal dementia at twenty-four, just when his beard grew fully, and he lives on, healthy in body, but devoid of all the higher mental attributes. The eighth was a girl, who is as yet a pleasant looking healthy young woman now twenty-four. Lastly came M. P., a boy who became insane and melancholic at $11\frac{1}{2}$; recovered after a few months; then had another attack, and was maniacal a year; and then another, again one of mania, when he was sixteen, which has passed into complete secondary dementia.

It is interesting to notice here that the eldest boy and the two girls who suffered from neuroses were epileptic or lacking in mental control like the father, and the two youngest boys were insane, but in them the disease was developmental, and became dementia in adolescence, their graver psychoses being derived from the mother. The convulsions in the cases in which they occurred appeared during early childhood: the insanity was also developmental, but appeared later. The neuroses became accentuated and deeper in character in the youngest children born after the mother had been insane, as well as appearing earlier in life, until in the youngest Nature seemed only to have had normal developmental energy enough to carry him sound-brained up to eleven years of age.

I had a case of two neurotic, but otherwise healthy parents, whose two eldest children had hip-joint disease at seventeen and recovered, but one of them afterwards died at twenty-five of phthisis; and the youngest son, after being an adolescent dipsomaniac and "fool" generally as to his morals, but clever intellectually, took an attack of mania at twenty-two, which

ended in mild secondary dementia—the two children between the two eldest and youngest being healthy. All the children but one were highly neurotic and slightly peculiar mentally—that one attaining marked distinction in his profession.

I have had in the Asylum something like twelve members of one family—brothers and sisters or cousins—epileptics, melancholics, cases of mania, imbeciles, and idiots: many of them having been phthisical. I have had members of four generations of that family, and in four-fifths of them those various neuroses appeared first during adolescence, especially in the younger generations.

In some cases we find neuroses of other kinds arising during early development, and ending in insanity at a later period of life; in some such cases full bodily and mental development being postponed, or never being reached at all.

The following case illustrates the connexion of acute rheumatism, asthma, chorea, over-sensitiveness, and over-shyness of disposition, amenorrhœa, hysteria, melancholia, stupor, and secondary dementia :—

A. B.—Heredity: father and his two brothers intemperate, and one of the latter, an uncle of the patient, had alcoholic insanity. "Whole family nervous and rheumatic," two brothers having had acute rheumatism. Father died at seventy-seven of "brain softening," his memory and mental power having failed for a year or two before death. Mother healthy. No further history. Patient had an attack of acute rheumatism at six, and heart was damaged (mitral incompetence). She became asthmatic at thirteen, and could never undergo much muscular exertion. She was in disposition and character sensitive, very shy, fanciful, wanting in courage, and not very social, but intelligent. Could not be kept at school, because the work produced amenorrhœa and anæmia. Her appetite was capricious. She was always cold in her extremities, and she was thin, and her mammæ and full womanly form were never developed. She often suffered from dropsy. At thirty-four she began to suffer from headache; then that passed off, and she became hysterical. Supervening on the hysteria, and mixed up with it, she suffered from chorea for a year. At thirty-seven she became melancholic, with delusions as to her being very wicked. She had not been specially religious before. When the melancholia came on the asthma ceased; the dropsy

disappeared, as well as the chorea and the hysteria. The melancholia was of the excited variety, and after a year passed into stupor, which in another year passed into dementia, not complete, with a good deal of motor excitement.

Comment on this instructive case is almost superfluous. I have no doubt whatever that there was much more neurotic heredity than the father's brain break-down at seventy-seven. There was, as an element of lowering of energy, a damaged heart from six years of age. The rheumatic tendency must have been strong to break out so early. The neurotic tendency was so shown, and also in the asthma, the impaired body development, the chorea, and the hysteria. By the way, she had a neurotic, not an abnormal palate, but a rabbit-shaped arch of lower jaw, and irregular teeth. Then when the neurotic disturbance reached the highest mental centres, it left the lower centres altogether—the headache preceding the melancholia, and disappearing when the mental pain came on. Thus the brain centres were affected from below upwards, the pneumogastric centres which caused the asthma, the basal ganglia which resulted in the chorea and hysteria, the special sense centres which caused the cephalalgia, and at last the mental centres which resulted in the melancholia. When their innate energizing power was exhausted came the dementia or mental death. I look on this case as an example of those not uncommon where development is not completed at the proper time, and is never quite completed in fact, and decay comes on early.

The Lesser Mental and Moral Morbid Changes of Adolescence.

There are a series of lesser mental and moral changes and perversities that are liable to occur in adolescents of both sexes with hereditary weakness, short of mania or melancholia or technical insanity generally, that are frequently much more difficult to treat and often almost as distressing as the insanities, and that I believe to be due to the same hereditary and pathological causes, and to be of the same essential nature as insanity. They consist in some cases of stupidity and lethargy, so that the girl or lad ceases to care for or to show intelligent curiosity in anything. Or they consist in an asocial development at this normally one

of the most social of all ages. The youth ceases to mix with his friends, to play games, or to find pleasure in meeting his fellows. He shuts himself up, and his social instincts seem for the time paralyzed. Or they take the form of a causeless aversion to father, mother, sister, or brother, intolerance of control by them, and utter disregard of their feelings. All this time he gets on well with strangers, who see nothing wrong. Or they take the form of general "incompatibility" of temper, so that the person gets on with no one, and is cantankerous and suspicious all round, losing situations, quarrelling with friends, and making enemies everywhere. Or they take the form of impracticability, with visionary scheming and want of common sense, of mild paranoia. Or a frothy sentimental religionism develops itself, changing churches without reason, and taking always to new and striking modes of expressing their religious instincts. Or we have sudden immoralities contrary to the tenor of the former life. Or perverted sexual and reproductive trains of thought dominate the mind and affect the conduct. All these, being liable to occur as adolescent psychoses in hereditarily neurotic families, should certainly be looked on and treated from the medico-psychological rather than from the moral and disciplinary standpoints. Heredity and brain alone explain such divergencies from the normal social and mental types. They cause enormous misery in families, and their real nature and origin are commonly misunderstood, their kinship to mental disease being seldom thought of.

The morbid mental change, when it takes the form of simple diminution of the volitional power, so that irresolution, fickleness, want of power to follow any kind of continuous work, "morbid laziness," and lack of energy all round, are the chief characteristics, is particularly apt to be misunderstood. I was once consulted about a young man, P. Q., aged twenty-five, whose history was the following:—His mother was a "nervous" woman, and his father came of a strong and able stock. The family history of his mother could not be got. He had received a very good education, was above the average ability in some respects, and entered a commercial life about twenty. At first he got on well, and did his work well. Then he began to be troubled with seminal emissions with a loss of real sexual power.

He did not masturbate, and had not led a bad life. Then he would leave his work for days without any reason, except that he felt that he could not possibly go on with it. This feeling soon got so strong that he could not be got to work at all. He simply stayed in bed half the day, and did little or nothing the other half. Such laziness had not been his characteristic in health, and came on periodically. He was not consciously depressed or unhappy. He could talk quite rationally on all sort of things—in fact, under the stimulus of other minds he brightened up in conversation into a charming and lively youth. But in regard to his ordinary daily life no motives, moral or otherwise, had any effect on his conduct,—fear, loss of prospects, duty, alike failed to rouse him. Outward pressure when continued beyond a certain point produced irritability. His memory was good. He was thin and flabby in his flesh. He was sent a voyage, and seemed to get back to his normal condition. He resumed work, but after a few months he fell back into his morbid mental condition, but still more exaggerated. He would not get up any day till the middle of the day. He would take two hours to his bath and dressing. He could sit down to no meal regularly. He would at times stop in the middle of dressing and stand stock still in the cold with no clothes on. He could seldom write a letter or read anything continuously. He would be got out for a walk, and once started he would sometimes walk on without much aim for ten miles till he was quite exhausted. He always ate very well, but was thin and bad coloured. His bowels were costive. At times he suffered from headaches, and was apt to be specially costive at these times. He always could talk rationally on any subject. Mental and social stimulus he seemed to enjoy and respond to, but he initiated no subject of conversation. He always felt better in the fresh air. His facial expression was intelligent, but indicated the neurotic diathesis. He was perfectly aware of his volitional paralysis, and deplored it greatly, and hoped he would get over it. He was willing and anxious to carry out every means for his restoration. He was not a "reproductive hypochondriac" whose mind dwelt on his impotency and seminal discharges, which in my opinion were not the cause but one accompaniment and symptom of his adol-

escent neurosis. The irregular periodicity in his symptoms connected his complaint with the other functional developmental neuroses.

I have seen many such cases, and they are not apt to recover if they continue for over a year. What can one do in such a case? I don't know anything better than what I recommended for this lad, viz., to board with a gentleman farmer in the country and "learn farming"—being really under control, and subjected to the daily stimulus of a sound vigorous will, and the influence of a physiological routine of life—as an object in life, to live in the fresh air, to have generous diet with some claret or bitter beer by day, to wear warm clothing, and to have a mentor almost always present to give volitional stimulus *ab extra*, to take strychnine, the phosphates, the mineral acids, quinine and phosphorus, and to have gymnastics, games, sea-bathing, and skin friction in moderation, and to wait patiently to see if Nature would, under these favourable conditions, restore the brain to its normal volitional power at the time of fully completed development.

I lately saw a somewhat similar case. A young man who had been a student for nine years, had often been slightly melancholic, was always most irresolute, was at times hypochondriacal, and would at these times declare he could only walk at a snail's pace, "something having come on him that prevented his using his muscles freely." One morning he said he found he could not reach his mouth with the spoon he was supping his porridge with, the next spoonful was worse, and the next worse still—a good example of the effect of auto-suggestion gradually weakening the volitional power. He was not strong minded, and had a poorly developed head, was narrow between the eyes, and a deformed V-shaped palate, though finely developed in his muscles. Every such case has its own features, just as every human face has its own expression.

As illustrating the frequent hereditary character of immoral qualities, and their frequent appearance suddenly, just as a disease appears often at adolescence, I quote the following from the *American Medico-Legal Journal* for 1890:—"A brilliant lawyer in a Southern State married a lady of most excellent family—beautiful, cultured, and wealthy—her father a most distinguished

judge of the Kentucky bar, contemporary with Henry Clay, and charged with important public functions. For a long time he succeeded in concealing his alcoholic habits from the public, but at last fell a victim to his appetite. He had three children, one daughter and two sons. One son died of convulsions in infancy, the other at the age of nineteen had to be sent to an asylum for the insane. The daughter referred to developed a fondness for drink after her marriage, and died from disease induced from chronic alcoholism, leaving six children, two sons and four daughters, all seemingly healthy. One son, a lawyer, committed suicide at forty-two years of age. The second son, a physician of passionate and misanthropic temper, married and had two children, then broke off all relations with his family. One sister suffers from nervous disorders which take the form of hysteria; two younger daughters remain unmarried, very intelligent, but are considered 'queer.' The eldest sister, a very handsome woman, a specimen of perfect physical development, and who seemed entirely free from peculiarities, was happily married to a man of opposite temperament and appearance. Every outward circumstance and condition was favourably indicated for happiness in this union. Six daughters and one son were born to them, and we vainly had hoped that the curse on the house had been removed; but the third daughter was feeble minded, had to be cared for as an infant, and was finally burned to death by her clothes taking fire. Another daughter, very intelligent, but of nervous temperament, and subject to intermittent attacks of insanity. The only son, a successful physician, but has developed an appetite for drink; while the youngest daughter committed suicide by throwing herself from a third story window."

I was once consulted about the case of a lady, who up to fourteen or fifteen had been as ordinary children, but who since that age had been the despair of her teachers and the skeleton in the closet at home. While clever intellectually, and not given to gross immorality of any sort, she had exhausted all the arts by which disobedience, lying, perversities of every kind, and outrageous unconventionalities of dress and conduct, could break her parents' hearts. She seemed to be without affection except towards animals, tramps, and

oddities generally. She always professed sympathy with the bad, the low, and the unfortunate. Respectability was an unpardonable offence to her. She was amazingly ingenious in her ways of "shocking" her parents and their friends by word and action; yet she was well read; she would pass muster among strangers for a month at a time as a clever, interesting, and original girl. She was about to marry a robust but respectable clodhopper when I was consulted about her. She did so, and had one or two children, and became apparently a careful mother and a frugal farmer's wife; but she was always eccentric and asocial, and never professed any affection for her parents.

There are many such cases where the moral and mental "twist" seems to follow a "love affair" or disappointment, but in whom the "love affair," the disappointment, and the succeeding mental changes are, I believe, mere sequences in an adolescent mental neurosis.

I am quite convinced that losses of mental inhibition and morbid impulsiveness of all sorts, without intellectual defects, occur in neurotic adolescents as really pathological mental phenomena. I have elsewhere described adolescent dipsomania,¹ and congenital absence of conscience and impulses towards crime. I think a recent criminal case in Scotland, that of the "Arran murderer," was an example of this. A weak, vain youth, with a notoriously bad heredity as regards mental taint, committed a murder under most extraordinary circumstances, without any real motive, and behaved in an insane manner afterwards, was convicted, but his sentence was afterwards respited as a result of a careful medical examination into his mental condition. I happen to know that he has had relatives who became subject to attacks of ordinary insanity during adolescence.

It would need much time to enter into the question of those most interesting phases of depression and transitory deep feeling that have been so common in the adolescent period of the lives of many men of genius. Literature owes much to them, and poetry too. What physician can read the lives and writings of Goethe, Carlyle, Cowper, or Thackeray without seeing that the world would never have had *Werther*, *Sartor Resartus*, or

¹ "Diseased Cravings and Paralyzed Control," by the Author, *Edin. Med. Jour.*, Dec. 1889, p. 517.

Pendennis, except their authors had passed through melancholic phases of existence at the time the reproductive nisus was rising into dominant strength over all the life, and thoughts, and feelings. Suicide was contemplated at the very time when those men were fullest of life. It did not then need disappointed love nor thwarted ambitions to make them "tired of life." Nor do we find such adolescent depression confined to men of poetic temperament. We know that men afterwards of calmest or most sceptical minds—political economists and philosophers like Stuart Mill and Hume—passed through melancholic periods from twenty to twenty-five, and both these men then seriously contemplated suicide. Any attempt to explain or to understand such "Stygian darkness, spectre haunted," without taking into account the teachings of heredity and of the physiological psychology and pathology of development, would be entirely futile and misleading. Without going the length of Tolstoi, one could wish that biographers and writers of serious fiction more fully took into account the facts and the laws of physiology and heredity in doing their work.

The Morphology and Premonitions of Adolescent Insanity.

If we could find any bodily or mental signs that would enable us to say in regard to any individual at twelve or thirteen, or earlier, "He will by-and-by be liable to adolescent insanity or other adolescent neuroses," it might lead us to devise such measures and conditions of life as might be prophylactic. As yet we are not able so to read his future definitely. The deformed palate that I have pointed out occurs in 55 per cent. of the adolescent insane:¹ it is a new, and, to my thinking, a very important, though not a sure danger signal. Commonly also the form and facial expression are neurotic, and the development is retarded for the age. Frequently there are menstrual derangements, though I do not agree with Dr Bevan Lewis, that those are so common as he says. They are in my experience more common as symptoms after the mental disease has begun. Sensory neuroses in the head are very common. I lately admitted a girl of twenty-three who had suffered from megrim from fourteen up to twenty, which then ceased and

¹ See Plate III., p. 42, and Plate V., p. 48.

mental symptoms began. Headaches, feelings of confusion and heaviness in the head, and vertigo are common. Explosiveness and undue impulsiveness, with lack of self-control, are frequent. Undue seriousness and thoughtfulness, want of the mirthfulness and physiological unreason proper to the age, are sometimes followed during adolescence by attacks of mania, to the utter astonishment of relatives and friends, who all say that the victim was "the very last in the family" they would have expected to become insane. The lesser neuroses and mental peculiarities in a hereditarily-predisposed family should make us look to the possibility of the greater.

All sorts of postponements of developmental processes, all forms of asymmetry about the head and face, should be danger signals taken along with a neurotic heredity, though I have observed that certain members of neurotic families seem to have "taken their share" of nervous taint in stable trophic changes, such as squint, wry-neck, or some asymmetry of the face or form, some ugliness or awkwardness, and seem to have become in consequence exempt from any of the functional neuroses.

We are yet sadly deficient, however, in regard to exact facts or moderately reliable generalizations through which we might read a man's neurotic horoscope. The chief thing that we can do is to observe and put on record facts clinical and hereditary.

The Relationship of the Neuroses, and the Laws of their Hereditary Transmission and Interchangeability.

No doubt the neuroses are almost all interchangeable hereditarily more or less, but when a certain departure from normal brain working or structure has become differentiated in an individual or a family, we know that that same departure is by far most apt to appear again in descendants. Harelip follows harelip; convulsive diseases follow convulsive diseases; asthma, hysteria, and megrim breed asthma, hysteria, and megrim; epilepsy and insanity follow each other.

There are two very general laws or tendencies that prevail in different families as to the neuroses. In one case, Nature tends to revert back to the normal and healthy type, and disease gets less in intensity in different generations, till it disappears. In

others it gets accentuated in each successive generation—nervous instability, or neuralgia, or headaches in parents becoming hysteria, and chorea, and asthma in the children, epilepsy in the grandchildren, melancholia in the great-grandchildren, and adolescent insanity with its dementia or idiocy, and extinction in the next generation. As yet we cannot lay down rules by which the extinction of diseases could be fostered, and disease accentuation avoided. And if we could lay down such rules, they would certainly need for their carrying out the practice of mating on scientific principles. How far we are from that every man and woman who has married for love well knows.

When the very principles of heredity are still in dispute, and the highest authorities differ as to whether acquired peculiarities are transmissible, we cannot be expected to have much formulated knowledge as to the laws of the hereditary transmission of nervous diseases. If acquired peculiarities are not transmissible, how did any disease ever become hereditary? The possible factors in the heredity of the neuroses are so complex and multiform that it must be one of the last branches of medicine to be fully elucidated. Those physicians who see much of nervous diseases sometimes come across facts that are absolutely staggering in their complexity. For instance, I lately ascertained, in regard to one of my patients, that there were several other cousins and second cousins all of the same generation insane. The families came from a secluded district, and I had the help of a very intelligent and interested relative in expiscating the facts as to the family history. I found that for three previous generations there was an absolutely clean bill of health as regards the graver neuroses—all but one slightly eccentric, weak-minded granduncle who did not marry. But in the great-great-grandfather's family there had been several cases of suicidal melancholia, which was the disease my patient suffered from. Here was a stream which had been replenished by four new streams by marriage, yet from it had she received, in an apparently direct way, a special cortical disease which had lain dormant as a mere potentiality, but yet had been transmitted by three generations of nervously sound people. Now the transmission of a mere tendency, a potentiality, is a common fact that the imagination fails to grasp in any definite way.

Nothing very unusual had happened to my patient to "bring out" the latent taint, except, perhaps, that she had been in easier circumstances than her ancestry, not having to work so hard, and had come to a large city to live, and had no children. But these altered circumstances had not happened to her cousins, who also became insane. I lately heard of another case in which two ladies of the same name became insane about the same age, and they were both melancholic, and both expressed in a precisely similar way their mental depression by a wringing of the hands, as if they were always washing their hands. No relationship between them was at first known, but being Highlanders, their family histories were ascertainable, and it was found they were fifth cousins. A common ancestor five generations back had apparently transmitted to each a tendency towards melancholia, and with it an excitation of a small cortical area in the motor centres of the brain, and all the subsequent intermixtures of blood, and all the varied conditions of life of these four intermediate generations, had not eradicated or changed this localized morbid tendency. Such cases give us an idea of the possible exactitude of the laws of heredity, but we cannot as yet grasp the precise conditions of this most complicated and obscure problem.

As another illustration of the complication and difficulty of the heredity of nervous disease, let us look at the following family history:—

I. Generation.—Patient's paternal grandfather was left-handed, had a violent temper, and was very eccentric and hypochondriacal for many years. Her paternal grandmother was a martyr to "rheumatic gout." They had eleven children.

II. Generation.—Of the eleven, eight died young,—one of consumption at the age of sixteen, another of fits after eating poisonous berries, and six in infancy from unknown causes. The patient's uncle was very irritable, like his father, and also very hypochondriacal and even delusional. He was a talented professional man. A paternal aunt, who suffered from heart disease, was very nervous and very energetic; she became slightly deranged in mind once under puerperal fever, and again in senility. Both attacks were very temporary. The patient's father was very sensitive and very delicate; he had heart disease, and died during an attack of angina pectoris; he was

subject to annual attacks of "influenza." He married a lady who died of chest trouble, "one of the lungs was affected." She had a sister—maternal aunt of the patient—who was an idiot, and a brother had softening of the brain; another brother became a famous professional man, but was peculiar. An uncle (I. Generation) had an organizing genius, and was a notable commercial man.

III. Generation.—In the patient's generation, a cousin attained the first rank in his profession, and was distinctly a man of genius. A brother of the patient died, æt. twenty-two, of epilepsy, which began when he was nine years old. The patient herself was very spirited and nervous. When aged fifteen she became ill and "depressed" mentally, and had leeches applied to her head; she used to fancy herself dying, and to picture her coffin on the hall table. She married when twenty-one years old, and had fourteen children in fifteen years. When aged forty-one she became depressed after the birth of twins, but recovered. When aged fifty-four (six years ago) she became melancholic, and has never recovered, being now an example of irregular *folie circulaire*. Her husband died of consumption. Of her brothers, one died young of consumption, another of tubercular peritonitis, a third had epilepsy, and a fourth had an abdominal tumour.

The following are the important facts in the history of the patient's fourteen children:—

IV. Generation.—14 children.

1. Son.—Handsome, clever, "peculiar."

2. Daughter.—Had "sunstroke" when aged nine. During adolescence she suffered from severe "sick-headaches," accompanied by impairment of vision and some impairment of speech. She now, at the age of thirty-five, suffers from severe chronic rheumatism.

3. Daughter.—Delicate. Subject to sudden swelling of the abdomen and extremities, accompanied by hysteroid symptoms.

4. Son.—Had "white swelling" in the knee when aged four; at the age of five deformity of the spine began, and he remained a cripple all his life; pulmonary phthisis began at eleven, and he died aged twenty-one.

5. Son.—Died when eighteen months old of fits after "suppressed whooping-cough."

6. Daughter.—In early adolescence suffered from spinal weakness, for which she wore a jacket, and in later adolescence had severe neuralgia.

7 and 8. Twin boy and girl.—(Twin births have been very numerous in the family.) The girl is delicate.

9. Son.—When aged sixteen he had epileptic fits following severe epistaxis, but they only lasted one day, and have not recurred. He is now aged twenty-six, is remarkably clever, and "takes after" his distinguished uncle in appearance and character.

10. Girl.—Died in infancy.

11 and 12. Twins.—Died in infancy.

13. Girl.—Healthy.

14. Girl.—Excitable, delicate, pretty. She suffered from a transitory mental derangement (two days' duration) before puberty.

I believe this would be found to be a very common type of family history in many of our noteworthy families. What a tangled skein of eccentricity and talent, of insanity and consumption, of convulsions and brain softening, of idiocy and genius! What a mixture of the good and the bad in the brain cortices of those four generations of men and women! The most desirable and the least desirable nervous and mental qualities came out, we cannot doubt, in strict obedience to hereditary law, which as yet one cannot formulate and can scarcely imagine. It will be observed how many of the neuroses were developmental.

A few General Considerations in regard to the Prevention of the Neuroses of Development.

Heredity is no doubt the real predisposing cause of them all, and the sole cause of many, some of them being in certain cases inevitable during growth and development. But heredity is a question of degree and intensity in each case, and it fortunately needs in many cases an exciting cause to develop the diseases that are its outcome. That opens up to us a large field of preventive measures against the adolescent neuroses. One or two general principles we are safe in following as making for preven-

tion. Build up the bone and fat and muscle, especially the fat, by any means known to us during the periods of growth and development. Make fresh air the breath of life to the young. Develop lower centres rather than higher ones, when there is bad heredity. Don't give too much flesh and nitrogenous food during growth and adolescence, as being special stimulants to the higher cortex, and to the too early development and dominance of the reproductive functions and the sexual nisus. Avoid alcohol and nervine stimulants absolutely, if possible. Do not cultivate, rather restrain, the imaginative and artistic faculties and sensitivenesses and the idealisms generally, in the cases where such tend to appear too early and too keenly. They will be rooted on a better brain and body basis if they come later. Cultivate and insist on orderliness and method in all things. The weakly neurotics are always disorderly, unbusinesslike, and unsystematic. Fatness, self-control, orderliness, are the three most important qualities for them to aim at.

But in spite of all we can devise and do, the developmental neuroses will appear in many cases. The hereditary fate of those who suffer from them was sealed generations ago. The whole subject is a great study worthy of the best minds of the future, and the facts I have brought forward, even if casual and inconsistent, may be suggestive and stimulating to future workers in this field.

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