THE FEEBLE-MINDED

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THE FEEBLE-MINDED

A Guide to Study and Practice

BY

E. B. SHERLOCK, M.D., B.Sc. LOND., D.P.H.

Barrister-at-Law, formerly Superintendent of the Belmont Asylum for Idiots, and Lecturer on Biology in the Westminster Hospital Medical School

WITH AN INTRODUCTORY NOTE BY

SIR H. B. DONKIN, M.D. OXON., F.R.C.P. LOND.

Medical Adviser to the Prison Commissioners, Member of the Prisons Board, Consulting Physician to Westminster Hospital, late Member of the Royal Commission on the Care and Control of the Feeble-Minded

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TO

H. W. W.

AS A TOKEN OF ESTEEM

PREFACE

One meets in the world with many human beings who do not appear to have attained to the average intellectual level of their social class. For the condition of such persons no very satisfactory designation is available, the terms actually employed being all open to objection either because they are indefinite or because, being definite, they are inaccurate. "Degeneracy" implies the falling from a higher estate, whereas it is the failure to reach the normal one which is the more obvious characteristic. "Amentia" errs in the other direction. It suggests that the defect observed is entirely due to laggard development; a suggestion which, as will be seen later, is not particularly well founded. Moreover, the term "Amentia" is widely used to denote states of confusional insanity. "Mental Deficiency" is too comprehensive, while "Idiocy" and "Imbecility" are too restricted in their application. One might, perhaps, speak of a "Psychical Hypotrophy" or utilise the Greek word "μωρία," which, whatever it may have meant originally, has now so few associa-

tions that any desired signification might be attached to it. On the whole, however, it seems best to follow the lead of a recent Royal Commission and employ the term "Feeble-Mindedness." Without attempting a too rigid definition, then, it may be said that for the purposes of this book, "The Feeble-Minded" are the persons with whose "care and control" the Royal Commission just mentioned concerned itself.

Between feeble-mindedness and sanity there is no clear line of demarcation. To say, as a recent writer does, that "the two conditions do not merge into one another and between the lowest normal and the highest ament a great and impassable gulf is fixed" is, to say the least of it, misleading. A more accurate statement of the position is that in the report of the Departmental Committee on Defective and Epileptic Children, 1898, which runs:—

"From the normal child down to the lowest idiot there are all degrees of deficiency of mental power: and it is only a difference of degree which distinguishes the feeble-minded children referred to in our enquiry on the one side from the backward children who are found in every ordinary school and on the other side from the children who are too deficient to receive proper benefit from any teaching which the school authorities can give."

This book does not profess to be more than an

introduction to the subject with which it deals. Its original aim was more ambitious, but the clearer perception of the magnitude and complexity of the problems presented by the feeble-minded which has resulted from its preparation has engendered in the author a more modest estimate of its utility.

The earlier chapters are concerned with psychology and with the anatomical and physiological facts which are believed to be correlated with psychological happenings. Such facts as belong more particularly to those special departments of biology which are known as pathology, etiology and taxonomy are then dealt with, and finally the subject is considered in its legal, medical and educational bearings. Taken as a whole the treatment may be best described as sociological.

Since it has proved to be impossible to discuss fully, within the limits of a small book, the numerous debatable topics to which reference has had to be made, the author has contented himself with drawing what appear to him to be the practically important conclusions legitimately deducible from the evidence before him. He confidently anticipates that his efforts will have resulted in his giving cause for dissatisfaction to numerous worthy people. Thus the psychological scheme adopted will doubtless be regarded by professed psychologists as unconventional. The author hopes, however, that it may at

least prove intelligible, and therefore free from a defect which has vitiated a good deal of psychological teaching in the past. Take, again, the views on heredity which are propounded. So far as these are capable of being allocated to any particular school, they have something in common with the hypotheses of Nägeli and Weismann, but to associate anybody's name with them more definitely than this would probably give rise on the one hand to indignant repudiations and on the other to protests as to disregarded claims. To disciples of Weismann the teaching here given will appear contaminated with the pestilent neo-Lamarckian heresy, while the Mutationists, the Mendelians, and the Biometricians will doubtless be prepared to sink their differences in order to join in a chorus of condemnation. The lore of heredity is open to the reader, and he may well study it for himself. One may, perhaps, be allowed to throw out the suggestion that he will find the memorial volume *Darwin and Modern Science* of the greatest service, and that he should not overlook the recent works of Dr. G. Archdall Reid and Mr. Charles E. Walker.

As will be gathered from the bibliographical references, the literature of the subject has been freely consulted, and it is hoped that adequate acknowledgment has been made in all cases. Some portion of the notes on the admission of cases of

feeble-mindedness to workhouses and asylums has appeared in the *Lancet*, and is reproduced by the kind permission of the editor of that journal. Some of the photographs of brains are taken from a thesis submitted to the University of London, and have been used to illustrate a paper on "The Pathology of Epileptic Idiocy," which is to be found in the Annual Report of the Metropolitan Asylums Board for 1907.

The author is under a special obligation to Sir H. B. Donkin, who, besides contributing an Introductory Note, has offered many helpful criticisms. He desires also to place on record his indebtedness to the Medical Superintendents of the Leavesden, Darenth, and Caterham Asylums; to Dr. J. F. Powell; and to Dr. A. K. Maclachlan for help in the preparation of the indexes.

CONTENTS

LIST OF ILLUSTRATIONS

INTRODUCTORY NOTE

In justification of this response to a request for some words of introduction to Dr. Sherlock's book I claim only my great interest in the subject matter, to which I have given thought during many years; my long work as a member of the recent Royal Commission on the Care and Control of the Feeble-Minded; and my special and personal experience of the considerable number of mentally defective persons who are found in our prisons.

Both the plan and execution of this book give evidence that the author has attacked his subject after laborious study and thought and with a rich equipment of practical knowledge. He has produced a work which, in my judgment, is by far the most scientific and useful of all that have as yet appeared on the confessedly important matter which is now creating so wide an interest. The book, as a whole, is marked by a rare absence of prejudice, and a wholesome refusal to accept without adequate proof any doctrine, however seemingly favourable it might be to conclusions to which the author might incline. A study of the first five chapters will, I think, fully bear out these remarks, and justify the author's view that a scientific consideration of the nature of mind in general is a

necessary preliminary to any useful discussion of the subject of mental defect.

It may possibly be deemed by some that the author might have struck a somewhat more certain note when dealing with the still-vexed question of the inheritance of mental defect. But in a book of this scope, with an eminently practical bearing on the question of the best methods of controlling the large body of mentally defective persons, both children and adults, who are now a source of fruitless expense and many dangers to the community, a final pronouncement on the exact nature and causation of feeble-mindedness is not necessary, even if it were possible. The positive harm which is demonstrably caused now by many "mental defectives" whom the existing laws cannot control, and the certain prospect of large numbers of mentally defective children being permanently unable to shift for themselves and very liable to take to a life of misery to themselves and multiform evil to others, are sufficient reasons in themselves for legislative enactments on the lines recommended by the Royal Commission and worked out in some detail by Dr. Sherlock in the final chapter of this book. Proper control of the feeble-minded, which is so necessary for these reasons alone, will go far towards satisfying the requirements of all such persons as may hold that the primary necessity and justification for the means proposed is to be found in the hereditary nature and consequent propagation of mental defect.

In this context a few words must be said on the very luminous Chapter in this book which treats of the "Varieties of Feeble-Minded Persons." Dr. Sherlock here comments trenchantly on many existing

classifications. He justly points out where they fail, both for scientific and practical purposes ; while at the same time he admits the almost insuperable difficulty of establishing a system of classification which would effectively compass both of these objects. He states his opinion that the best classification on practical lines is that suggested by the Royal College of Physicians of London, and adopted for confessed purposes of utility by the Royal Commission ; while he shows quite clearly that were it intended to be a scientific or clinical classification, it would be open to similar charges of defect.

In proposing a really excellent combination of classificatory systems which, as he says, "appears to give the most generally useful arrangement" he enumerates nine sub-divisions, eight of which are marked, clinically, by saliently different characteristics ; while the ninth, and far largest, sub-division of all, he terms "Residual." He further shows that each of these sub-divisions will supply instances of the three grades of mental defect which may be called, respectively, "Idiocy," "Imbecility," and "Weak-Mindedness."

In this "residual" group which constitutes much the largest proportion of the total number of the "feeble-minded," and a much larger proportion of those who are the subjects of the slighter forms of defect, are included most of those who cannot now be legally controlled, and who form, essentially, the class of persons whom it is sought to control on account of the harm they do and the evils from which they suffer. Among these are the children who in large numbers become paupers, criminals, and prostitutes, and are constantly a source of wasteful public expenditure.

Members of this group, says Dr. Sherlock, may show "all kinds of physical abnormalities," but these are not of a nature to help in the differentiation of distinct types of disease. "For sociological purposes," he adds, "it does not seem necessary to attempt any more elaborate classification than that into cases of 'idiocy,' 'imbecility,' and 'weak-mindedness' already utilised."

It will thus be seen that for the practical purpose of deciding as to the proper forms of control and treatment needed in most cases, Dr. Sherlock is in accord with the description given in the Report of the Royal Commission. The merely verbal difference of nomenclature which is shown in his use of the word "weak-minded" instead of "feeble-minded" in this context is, of course, of no special consequence. In common with many, especially American, writers the author uses the word "feeble-minded" generically, to include all grades of so-called "congenital" mental defect; while the Commissioners used this word in the sense, more prevalent in England, of a less marked grade of defect than is commonly described by the terms "idiotic" or "imbecile." Hence the word "weak-minded" in this book represents the word "feeble-minded" as technically employed by the Commission.

H. B. Donkin.

THE FEEBLE-MINDED

CHAPTER I

THE NATURE OF MIND

To speak of "feeble-mindedness" is to imply, in the first place, that such a thing as "Mind" exists and, in the second, that mind is capable of existing in other than a normal condition. As a necessary preliminary to arriving at a conception of what normal and abnormal minds consist in one must therefore endeavour to envisage "Mind" as it is in itself.

There is perhaps no other branch of science which a student approaches with the same misgivings as preoccupy him in the case of psychology. The matters towards which his thoughts are directed are here intangible, vague and elusive facts of an unaccustomed order and his difficulties are increased by the apparently irreconcilable diversities in the descriptions of the facts, which confuse him as he turns from one source of instruction to another. Momentarily re-assured by sight of the comparatively solid ground of reaction-time experiments, plethysmographic records of emotional expression, and the

other data of the practical psychologist, he soon finds these are but slippery rocks from which he is again plunged more deeply than before into the sea of metaphysical speculation. In such an emergency a chart, even of the most imperfect kind, which may serve as a guide to smoother waters, will be of value and in the following pages an attempt is made to supply one.

"Observation of the mind," says Huxley,[1] "makes us acquainted with nothing but certain events, facts, or phenomena (whichever name be preferred) which pass over the inward field of view in rapid and, as it may appear on careless inspection, in disorderly succession like the shifting patterns of a kaleidoscope." These events, facts, or phenomena we call mental processes and we classify them under various headings as thoughts, sensations, ideas, feelings and so on; mind at any given instant being the sum total of the mental operations proceeding at that instant. For all practical purposes Consciousness is the same thing as Mind.

Contemplation of the number and complexity of the mental processes with which we are familiar can hardly fail to inspire in us a hope that on analysis they may be reduced to simpler elements and this is to a great extent the case.

Certain of our mental processes show a direct relation to the conditions of our environment: they constitute, indeed, our sole source of knowledge of that environment. Apart from them the environment has, *for us*, no existence. This, of course, is quite other than saying that the universe has no

[1] T. H. Huxley, Hume and Berkeley, Collected Works, Vol. 6.

existence outside our consciousness. The fact that we do not see a thing or do not see it clearly is no proof that it does not exist.

Such knowledge as we have acquired about the world outside ourselves has been obtained through the instrumentality of our sense organs and it resolves itself into mental presentations arising in consequence of the application of stimuli to those sense organs.

We are familiar in nature with a capacity, on the part of both inanimate and animate bodies, for responding to stimulation. The study of explosives introduces us to bodies in which chemical reactions of great magnitude can be initiated by apparently trivial stimuli : a mere touch, for example, will cause such a body as iodide of nitrogen to explode. A mere touch similarly, may cause a reaction in a living creature. The resemblance between the results obtained in the two cases has not unnaturally suggested a chemical basis for both, but too much stress must not be laid on this analogy.

In the particular case where the organisms concerned are our own bodies we observe that the reaction is accompanied by an effect on consciousness, *i.e.* not only do we respond to stimulation but we *know* that we are so responding. We do not credit the inanimate body which reacts with this capacity for knowledge and we are uncertain as to the exact stage in the evolution of living beings at which it appears.

So far then we have three factors to consider : (1) the application of a stimulus, giving rise to (2) a reaction, which is accompanied by (3) a mental

process corresponding to that reaction. Departing somewhat from conventional terminology we will call the reaction a "Sensation" and the associated mental process a "Presentation," thus establishing a convenient distinction between the physical fact, stimulation: the physiological fact, sensation: and the psychological fact, presentation.[1]

Sensations may have their origin in the parts of the nervous system associated with the organs of special sense or in other parts which are not so obviously specialised, *e.g.* the terminations of the nerves connected with the bones, muscles, joints, and viscera. To this second group of sensations the designation "organic" is sometimes applied.

The list of physiological reactions is a fairly long one: it includes—

(1) Cutaneous sensations, of two kinds, the "protopathic" and the "epicritic." These systems were differentiated by Messrs. H. Head, W. H. R. Rivers, and J. Sherren[2] and are described in their

[1] The distinction between physical and physiological is an arbitrary one, but between the physical and the physiological on the one hand and the psychological on the other there is a gulf which cannot be bridged over in the way so often attempted; that is to say, by a loose employment of the term Sensation. According to the *Dictionary of Philosophy and Psychology*, Sensation is "that mode of consciousness which can only be accounted for by the present operation of an external stimulus upon the nervous system, or some equivalent condition." Here it is proposed to define a mental process by the help of physical criteria which are not commensurate with it. The use of the term "Sensation" in a purely psychological sense as denoting a unit of experience would be quite legitimate, but since it leaves us without a convenient word to express the physiological conditions of a mental presentation and is superfluous as a synonym for such a presentation, it seems preferable to employ the term in the sense adopted in the text.

[2] H. Head, W. H. R. Rivers and J. Sherren, *The Afferent Nervous System from a New Aspect*, *Brain*, Nov. 1905, p. 111.

paper, which appeared in *Brain* for November, 1905. The protopathic system is "capable of responding to painful cutaneous stimuli, and to the extremes of heat and cold. This is the great reflex system, producing a rapid widely diffused response unaccompanied by any definite appreciation of the locality of the spot stimulated." By means of the epicritic system we "gain the power of cutaneous localisation, of the discrimination of two points, and of the finer grades of temperature, called cool and warm."

(2) Visceral sensations.

(3) Auditory sensations.

(4) Labyrinthine and motor sensations. These are concerned in the maintenance of muscular tone and in the co-ordination of movements. The motor sensations are those known as "kinæsthetic," but the labyrinthine are also, in a sense, kinæsthetic.

(5) Visual sensations.

(6) Gustatory sensations. These are of four kinds corresponding to the qualities "sweet," "bitter," "salt," and "sour."

(7) Olfactory sensations. The varieties of these have not been determined with certainty. Zwaardemaker's classification runs thus ;—

(*a*) Ethereal. (*b*) Aromatic. (*c*) Balsamic. (*d*) Amber-musk. (*e*) Allyl-cacodyl. (*f*) Burning. (*g*) Caprylic. (*h*) Repulsive. (*i*) Nauseating.

On examining a presentation more closely we discover in it certain features or qualities which call for description.

(*a*) In the first place we notice that a presentation which has been called up by a sensation is not

henceforth a constant part of consciousness. With removal of the stimulus the presentation fades away. But experience shows us that it may re-appear in consciousness without the repetition of the stimulus: there may, in fact, be a re-presentation. This species of spontaneous reproduction is called "perseverance." The particular mental process which is involved in the re-appearance of a presentation is called Memory, and as it seems impossible to resolve it into any simpler constituents, we must accept it as a further "element of mind." What becomes of the presentations until they are re-presented we can only surmise. If it is any help to the student, he may suppose, with Binet,[1] that they "prolong their existence while they are not being thought in the same way and for the same motive that material bodies continue theirs while they are not being perceived."

(*b*) Another characteristic which we may observe a presentation to exhibit is that of being pleasant or unpleasant; of being, in the language of the psychologists, "affected." There are, according to Professor E. B. Titchener,[2] "three possible views of elementary affective process. The affection may be an attribute of sensation—an 'affective tone' of sensation.[3] Or the affection may be a mental element distinct from, and co-ordinate with, sensation. Or lastly the affection may be itself a sensation, a sensation of a special kind like a visual or the

[1] A. Binet, *The Mind and the Brain*, 1907, p. 126.

[2] E. B. Titchener, *Lectures on the Elementary Psychology of Feeling and Attention*, 1908.

[3] "Sensation" is here used in the sense of "presentation."

kinæsthetic." As he dismisses somewhat contemptuously the first view and devotes a considerable amount of space to demolishing the third, we may regard the second as the one which meets with his approval. The only objection to this view is that it hardly lays sufficient stress on the dependence of affection on the idea, for without presentations or re-presentations affection is non-existent, although the converse statement, *viz.*, that without affection ideas are non-existent, does not appear to be true. We may note that a more elaborate scheme of subdivision of the affective process than the one here adopted is employed by some psychologists, *e.g.* by Wundt, who recognises three pairs of antithetical affective qualities, pleasantness — unpleasantness; excitement—tranquillisation; tension—relaxation.

Representations differ from presentations in no important respects save that of being later in time, and we may conveniently include the two classes under the denomination "Ideas." The appearance and re-appearance of Ideas in consciousness we may call "Ideation." Our mental outfit, then, so far as we have got, consists of Ideas, Memory, and Affection, and we must now proceed to enquire what are the possibilities in the way of mental architecture which this outfit furnishes us with.

Although for the purposes of elucidation we regarded Ideas as isolated events in consciousness, a survey of our minds shows them to be woven into innumerable and ever-varying combinations of different grades of complexity. As I write, my organs of sight and hearing are being assailed by stimuli emanating from an object lying within my

field of view. My consciousness contains ideas corresponding to the colours black, white, and yellow, and to a noise of short duration. The ideas are simply there and have no connecting link beyond their simultaneous presence. But connecting links can be added by memory. The ideas of colour and noise, if previously experienced in connection with other ideas, will recall those other ideas. I remember, for instance, that the object has other sides than the one I see, that it is tangible, that it is made up of many parts, and so on, and my mind consequently becomes occupied by a group of ideas which are not only present together now, but which, in my experience, have been present together many times previously, and which therefore I have learned to regard as having some firmer bond of union than mere simultaneity. I am, that is to say, not only aware of the presence of sensations, but I *perceive* that they are referable to a particular object to which I have been taught to attach the name "watch." A group of ideas which can be thus referred is a Percept.

It has been usual for psychologists to apply the term percept only to the special case of grouping which I have taken as an example, *i.e.* the case in which both presentations and re-presentations are concerned. There seems, however, to be no sufficient ground for this distinction, and the term will be used in this work as equally applicable to a group of re-presentations only when these are referable to a particular *species*, as opposed to a *genus*, of natural phenomena.

For the purpose of arriving at the definition of a

percept, we have considered ideas apart from the special quality of affection. If we now include within our purview this aspect of ideas also, we are able to take a further step. An idea or percept which is appreciably affected, or, if another way of putting it is preferred, the idea or percept with which an affection is associated, is called a Feeling.

But we are able to observe in our minds affected processes which seem to be much more complex than Feelings. These are what we call Emotions. The term connotes a "moving out" or "expression" as distinct from the "impression" which we have so far considered, and we must now deal with the new factor which appears to be introduced.

It constantly happens that the effects of stimulation, instead of being confined to the development of a sensation, become evident as action, and action will have its equivalent in consciousness in so far as it provides a stimulus to the sense organs. Such equivalents are called Kinæsthetic Ideas. Now emotion involves action, and it would appear to be the ideas arising from this activity which, added to a Feeling, convert it into an Emotion. The Emotion will thus comprise what may be described as primary and secondary groups of ideas. Emotions are numerous and diverse, but for our present purpose we need not proceed further with the classification of them than to indicate that they can all be referred to two, still more easily to six, categories of affection, the more detailed differences between them being dependent on their ideational rather than their affective content. It is generally taught that "organic" sensations are mainly responsible

for the affected ideas which are comprised in emotion.

A prolonged emotion of no great intensity we call a Mood, while we speak of one which is brief but intense as a Passion.

For a long time there has been in progress between psychologists a discussion as to the relation subsisting between an emotion and its expression. At first sight it certainly appears that the sequence of events is that we feel an emotion and then proceed to its expression; but Lange, James, and others, take up the position that we feel an emotion because we are expressing it, not that we express an emotion because we are feeling it. Appeal is made for confirmation of this view to the experience of persons whose business or amusement it is to express emotions, and actors are quoted as having testified that when they are representing emotions effectively, they actually experience them in their own consciousness. That emotion may be generated by an effort of the will is borne out by the interesting experiments alluded to by Sir Francis Galton,[1] in which he succeeded in developing in his mind a fear of espionage and a reverence for the figure of Punch by allowing himself to dwell upon those topics. On the other side of the account we may, however, set the evidence of no less distinguished an actor than the late M. Coquelin ainé, who, in an interview reported in the *Daily Graphic* for Jan. 28th, 1909, said, "I go to a theatre for a first performance entirely without emotion, knowing exactly what I am going to do and exactly how I mean to do it.

[1] F. Galton, *Memories of My Life.*

Everything that the actor does on the stage should be an act of his volition and not the result of a blind impulse of emotion." The apparent discrepancy is perhaps to be explained by supposing that in some cases the primary and in others the secondary group of ideas is the one more strongly affected.

It will be seen that the definitions of emotion and its modifications which have been given imply more than the mere existence of ideas, affected or unaffected. If we search our consciousness, we discover that we are aware of something more about ideas than that they simply *are*; we observe that they have certain relations to each other. The ingredients of natural phenomena can be distributed among at least four categories—those of matter, force, time, and space. Perhaps the first two may be taken together and expressed simply by the term motion. As to the existence of these categories outside the limits of human experience we know nothing: they exist for us because we think that they do; they are the projections of our consciousness against the background of the universe. Force and matter (or motion) have, as we conceive of them, a quality of substantiality which is lacking from time and space. Now ideas are the psychological equivalents of motion, but since we are aware also of the existence of time and space, these must also have some equivalents in consciousness. The essence of our conception of time and space is an awareness of succession—of the occupying, by motion, of successive positions in time and space. Our psychological equivalent of succession

is something different from an idea in that it is not directly referable to any sensation.

Introspection will tell us that our minds contain products of ideation which are much more complex than, though probably derived from, percepts. Psychologists have been accustomed to describe four modes of combination of ideas. These may be arranged in pairs according to whether the association is determined by (*a*) the co-existence or the succession of the ideas; or (*b*) the similarity or dissimilarity of the ideas.

The presentations and re-presentations in a percept form a natural group of ideas between which there is the relation of simultaneous association. When for any reason one of the ideas in the group is revived, the rest tend to be revived also. The groups of ideas in consciousness are ever changing, but before those in one group have passed away others may have entered consciousness and so become associated with the original group. One of these new ideas may serve to revive the original group and we have then a case of successive association or association by contiguity. An entirely new group of ideas may contain one which had already occurred in the previous group. This idea, when presented in the new grouping, may reproduce the former grouping. Association by similarity occurs in this way: it is thus, as Semon[1] has pointed out, only a special case of *simultaneous* association. Contrast association also may be accounted for on a basis of simultaneous association if we remember how we are trained in childhood

[1] R. Semon, *Die mnemischen Empfindungen*, 1909, Chap. X.

to think of contrasted objects or qualities together. Yet another form of association to which no special name is applied, but which may also be brought into the class of simultaneous association, is recognised. Thus we find that if the ideas x and z have each been separately associated with the idea y, although neither x nor z alone may suffice to reproduce y, a combination of x and z may be effective.

Our processes of analysing and synthesising groups of ideas may have also a more specific character, dependent on the circumstance that when ideas are like each other we can become aware of the fact. The act of comparing ideas with a view to learning whether they are alike or not is called a Judgment.

We are now well within sight of the morass in which generations of metaphysicians have floundered. What is it which enables us to observe relations of succession and similarity and to associate ideas according to those relations? Is it some "mental element" or "process" additional to those already enumerated, but essentially of the same general character, or does it, perhaps, belong to a higher order of mentation? Frankly, we do not know, and if we have the scientific spirit we admit as much. Let us, therefore, accept provisionally the existence of a something which, in accordance with precedent, we will call the Ego and proceed with our examination of ideas.

We have seen that ideas may be "affected"; that they may be grouped together in various ways; and that they have certain relations to each other. They have yet a further characteristic: they are not all

equally prominent in consciousness at any one instant and any one of them or any group of them is not prominent in consciousness to the same extent at all times. An idea which is prominent in consciousness is said to be "attended to," and the condition of its prominence is called Attention. Ideas may be prominent in consciousness either because they have a natural or intrinsic importance, or because the Ego lends them that importance. Any sufficiently strong and sudden stimulation of a sense organ will give rise to a dominating idea in consciousness. A loud sound or a bright light or a strong smell standing out from the background of ordinary sounds, sights, or smells will attract notice: it will be involuntarily attended to. On the other hand, we may select some particular idea or group of ideas for notice by a process of voluntary attention. The faculty of voluntarily attending is appropriately entitled Volition, and it is because we have this faculty that Reasoning is possible, for Volition enables us to abstract from groups of ideas such ideas as we wish, and we can then bring these abstracted ideas together in order to compare them and so establish between them a relation of similarity or of dissimilarity. Such a comparison of ideas is, as we have already seen, called a Judgment. The comparison of judgments with the same end in view, *i.e.* in order to ascertain whether they are like or unlike, is called Reasoning.

One of the simplest results of Reasoning is the discovery that different groups of ideas may have a sub-group common to all of them: thus we are familiar with numerous objects which differ from one another, but yet have so much in common that we

perceive them all to be watches. The sub-group of ideas which is thus common to several percepts constitutes a Concept. It is unfortunate that we should have to indicate this generic idea-group by the same term, viz. "watch" as was applied to the specific idea-groups or percepts from which it was derived. For this the defective analytical faculties of the minds in which our language was evolved must be held responsible.

But the faculty of attention does not merely supply us with judgments. We have seen that ideas tend to call back to consciousness the ideas with which they have previously been associated. By attending to an idea we may, therefore, enrich our minds with new ideas which in turn may lead us on to yet others. This is Recollection, a special case of that capacity for re-presentation which we have admitted to the status of a "mental element" under the designation Memory. If it were not for the fact of association it is inconceivable that we could remember anything by an effort of will since no amount of attention to other ideas could bring to consciousness one not there. Having obtained our recollections, however, there is nothing to prevent our associating them together in novel combinations and the process of doing this we call Imagination.

Some of the ideas present in our minds are, we have seen, "affected." A judgment dealing with affected ideas is a Sentiment and, like the emotions, the sentiments can be, ultimately, referred to two main classes according as the affection of pleasure or pain predominates.

A further sub-division of the sentiments often

employed is that based on the interests to which they refer. We have thus four groups of sentiments—the intellectual, the æsthetic, the religious, and the social, and it is the last of these which is of the most importance from the psychiatrical standpoint.

As with so many other psychological terms, the word "sentiment" is used by different writers with different meanings. Since a certain prominence has lately been given to his views, mention should be made of Mr. A. F. Shand's conception of a sentiment as "an organised system of emotional dispositions centred about the idea of some object."[1]

The notion of mental constitution which we have now attained to is that of a collection of ideas which may be attended to by an Ego, and the attributes of that Ego may be sketched in the words which Lloyd Morgan applies to volition, which is, in effect, the Ego in operation. It is "an activity, selective and synthetic, which is neither energy nor consciousness, which has not been evolved, but through the action of which evolution has been rendered possible: which is neither subject nor object, but underlies and is common to both."

It would be wearisome to enter at length into the dispute which has raged as regards the necessity for accepting the Ego as an entity transcending consciousness, but since we have, for the sake of convenience, so accepted it, we must in fairness point out that the necessity is not so urgent as may appear. We recognise that, apart from our volition, ideas can return to consciousness after leaving it. This return, further, seems to depend on laws of

[1] W. McDougall, *An Introduction to Social Psychology*, p. 466.

association which are also quite independent of volition. Again, the prominence of the ideas in consciousness, as in the case of involuntary attention, may not be determined by volition. It is at least conceivable that all the conditions are in some way referable to alterations in the environment. What we observe in consciousness is simply that ideas are there, our assumption of an Ego is merely an attempt to explain their presence in a special case, and since in other cases we do not require metaphysical explanations, there does not appear to be any very sound reason why we should do so in this.

The exercise of volition is accompanied by what has been called a "sense of effort" or "Conation" and it is essentially this feature which marks off voluntary from involuntary mental activity. But this "awareness" of what is toward does not appear to differ from an idea, and that fact in itself suggests that the difference between involuntary and voluntary processes is simply that the latter have, as compared with the former, a greater ideational content.

There is about volition an apparent independence of circumstances which is regarded as elevating it to a higher plane than that occupied by the mental elements so far discussed. This is what is meant by Free Will. But the assumption that the Ego acts irrespectively of the subject's state of consciousness at the time of the action is not well established. If we consider our activities we find them to be conditioned in some measure by the degree of affection characterising the ideas which give rise to them. As Mercier[1] puts it "Volition depends upon

[1] C. A. Mercier, *Psychology, Normal and Morbid*, p. 466.

affection. When affection is neutral there is no Volition. Pleasurable affection determines Volition to continue the existing state of action or passion. Painful affection determines Volition to change the existing state of action or passion."[1] Our "motives" then are simply strongly affected ideas.

It is held by some psychologists that volition, that is to say, the faculty of voluntarily attending, is dependent only upon affection. If this be so, the hypothesis of an Ego is superfluous. It would seem, however, that the intensity of the affective colouring of an idea is not a measure of the prominence of the idea in consciousness: it is rather a measure of the utility of the idea as a factor in the adaptation of the individual to his environment. Nor is this the only consideration bearing upon the matter. In order to appreciate the position more accurately we must now turn to an important aspect of the working of the mind which was incidentally touched on when the formation of concepts was under review. It is the faculty which our minds display of taking short cuts. If we refer to our experience of the way in which we become cognisant of things, we find that our appreciation of a proposition does not require a detailed knowledge of all the trains of thought to which the proposition can give rise. When, in consequence of leaning against the edge of my writing table, I am reminded that I have a watch in my pocket, the mental picture of the watch is in the highest degree indistinct. In proportion to the

[1] Sollier makes a similar statement. "We may," he says, "regard attention as the result of an affective state, putting into play the motor power," while Ribot describes spontaneous attention as "caused by emotional states.

degree of attention which the circumstances require me to devote to the watch, it becomes more and more clearly defined in my consciousness. But for many purposes of life, the less distinct image will serve sufficiently well. Similarly, a passage in a book may be at once intelligible even though one does not pause to think out all that it involves. In imitation of an experience recorded by Professor James, I have just taken up a book near at hand and having opened it at random, have placed a finger on the page and have then read the words to which my attention has been thus directed. They are:—

"The total amount of carbonic acid exhaled would be about 12,000 grains."

The sentence presents no mystery, its purport is at once obvious; but if I proceed to analyse what has been conveyed to my mind by it, I find that the apprehension of it involves various series of facts in relation to chemistry, physiology and mathematics which were certainly not present as separate factors of consciousness when I read and "understood" the words. It seems then that in the processes of thinking we are able to utilise a complex idea by restricting our attention to some of its components.

But if this is true for the receptive side of our minds, it is no less so for the emissive side. The ideas corresponding to our activities exhibit the same tendency towards short-circuiting. The schoolgirl steadily plodding through her "five-finger exercises" will be only too unhappily conscious of which note follows which, while her teacher will rattle off the various sequences without a thought as to the movements of his hands, though probably he

began in the same laborious fashion as his pupil. This faculty of acting with only the merest shred of attention is called "Automatism," and when, proceeding a stage further, the activity of the organism has no obvious counterpart in consciousness capable of being attended to at all, we call the condition a "reflex" one. Reflex movements may, however, be attributable to an undeveloped, rather than to a specially modified mind, and those of the lowest living forms seem to be of this type.

According to the teaching of some psychologists the important series of activities which we call "instinctive," and which are characterised by inattention both to the end in view and the means of attaining that end, are essentially automatic, *i.e.* they were originally associated with clearly defined mental concomitants which have, in the course of transmission through many generations, gradually faded away. "Evidemment," says Th. Ribot,[1] "à l'origine, tout instinct, simple ou complexe, a été une forme quelconque de l'activité psychique ; mais, grâce à des répétitions perpétuelles chez l'individu et ses descendants, il s'est établi dans le système nerveux de l'animal des dispositions permanentes, des connexions stables entre divers éléments anatomiques : l'instinct s'est enregistré, organisé."

Professor Titchener[2] takes up a somewhat similar position. "I believe, with Cope," he says, "that even the automatic involuntary movements of the heart, intestines, reproductive systems, etc., were organised in successive states of consciousness."

[1] Th. Ribot, *L'Hérédité Psychologique*, 1902, p. 19.
[2] E. B. Titchener, *op. cit.* p. 300.

There is considerable difference of opinion among psychologists as to the part which instinct plays in human affairs, but there can be little doubt that inherited tendencies control our conduct to an extent which is not always sufficiently allowed for. McDougall, in particular, has laid stress on the importance of these innate dispositions. The analogy of volition would lead us to expect that instincts, as springs of action, should have a well-marked affective tone, and this experience shows to be the case. In his analysis of the subject, McDougall[1] correlates the principal instincts with what he regards as the primary emotions of man, as shown in the following scheme:

Instinct	*Emotion*
Flight	Fear
Repulsion	Disgust
Curiosity	Wonder
Pugnacity	Anger
Self-abasement	Subjection
Self-assertion	Elation
Protection of offspring	Tenderness

Other instincts with less well-defined emotional attributes are the reproductive, the gregarious, the acquisitive, and the constructive, while among the innate tendencies which are of too general a nature to be classed as instincts are what McDougall calls the "pseudo-instincts," suggestion, imitation, and sympathy.

We employ yet another device to facilitate the

[1] W. McDougall, *op. cit.*

working of our minds. It is the scheme of symbols which we call language. Let us consider, for example, the word "exhaled" in the passage quoted above. The actual presentations in consciousness which set my mind at work were simply ideas of some light and dark areas on a sheet of paper, and had no intrinsic relation to the physiology of respiration. That I should regard them as having such a relation is due to the fact that I have accepted a convention, subscribed by all English-speaking persons, which decrees that the particular arrangement of differently coloured surfaces which I have just been looking at shall signify a particular phase of a particular form of organic activity. In our mental processes, then, we utilise not only simple (and complex) ideas of things themselves, but ideas of symbols—words—which we have made to stand for those things. Very largely we think in words. In describing the working of his own mind, Professor William James [1] says: "I am sure that my own current thinking has words for its almost exclusive subjective material, words which are made intelligible by being referred to some reality that lies beyond the horizon of direct consciousness, and of which I am only aware as of a terminal *more* existing in a certain direction to which the words might lead, but do not lead yet."

The substitution of abbreviations and symbols for original ideas will involve among its consequences such an obscuring of the native affective colouring of those ideas, that the dependence of the activities referable to the ideas upon affection may no longer be obvious. We are thus supplied with a reason

[1] W. James, *The Meaning of Truth*, 1909, p. 31.

why motives, even if they were originally of a kind to compel attention, may have ceased to attain to prominence in consciousness.

Speech plays so large a part in mental development that, although the subject bristles with difficulties, its psychology must be studied by anyone who wishes to obtain more than a superficial knowledge of the nature of mind. There is no lack of material for the purpose, but since the greater part of it falls into the hands of biased or uncritical observers, its educative possibilities are rarely exploited to the full. In this field we are precluded from employing the introspective method except to a very limited extent. Even the most efficient memory is incapable of re-presenting to the mind those early stages of the struggle for expression which constituted the dominant interest of the first few years of life. Later we can examine the ways in which we acquire new words or lose old ones, the dependence of our mental capital of words on the physical peculiarities of our vocal organs, the unattended to association which makes us use the same word or root several times in a short passage, and kindred topics; but our acquaintance with the contents of the infant mind is purely objective, and so easy is it to misinterpret what we see that the utmost reserve must be employed in advancing any propositions relating to the subject. Just as the wondrous feats of intelligence attributed to cats and dogs can practically always be reduced to the simplest psychological elements, so the scintillæ of wisdom which emanate from the infant brain lose their brilliance at once when subjected to the cold

light of reason. The writer knows of a child which, at the age of six months, frequently enunciated distinctly the syllables "dad-da" and "dad-dy," but a very brief study of the case served to show that these excursions into phonetics had no relation to the presence of its male progenitor, or, indeed, to any distinguishable feature of the environment, but were merely an accidental result of that playful exercise which the mechanism of speech shares with the rest of the muscular apparatus. As Rzesniezek puts it, "the child amuses itself by the hour with its own private articulation-concert." That the "accidental result" should take a form so closely allied to voluntary speech is not without its significance from the standpoint of heredity. It certainly suggests that since the particular faculty of intelligible, even if not intelligent, expression thus exhibited had not been acquired by the individual, it had been inherited from the ancestors who acquired it.

The elements of speech are apparently derived from two sources, *i.e.* some of them are inherited and some acquired. By a process of evolution which can be observed during the first few months, the reflex cry of the period immediately following birth passes through phases of differentiation correlated with the incidence of such varying stimuli as pain, pleasure, hunger, repletion, or other bodily condition, until it becomes the rudimentary speech which has been spoken of above as "accidental." How far progress in this direction can occur is doubtful, but some indications are afforded by children who are deaf from their earliest infancy. Thus Ashby and

Wright [1] record the case of a child who at the usual time babbled such syllables as "mam," "dad," and "am," but eventually proved to be quite deaf. Too much stress must not be laid upon such an exceptional case as this, because one may suppose that in the absence of auditory stimuli the inherent capacity for articulation was not fully developed. It seems probable that quite a considerable amount of vocal "raw material" is accumulated before the child begins to imitate sounds spoken before him, and that this original material is of a kind differing from that acquired later. Children may employ speech sounds, *e.g.* clicks and gutturals, which adults do not—unless, indeed, they be adults belonging to certain savage tribes—give utterance to, and later in life they may apply to objects about them names which find no place in the conventional scheme of language, and which they seem to have evolved quite independently of, and perhaps in spite of, efforts at instruction by their elders. It has been noted too by Vierordt and others that children sometimes have a difficulty in voluntarily imitating sounds which they have spontaneously used, and Meumann endorses the observation of Schmiedel that a temporary dumbness sometimes marks the transition from the spontaneous lalling of infancy to the formal imitation of spoken speech. Even when there is not this abrupt break, a stage is passed through in which it is to be inferred from the child's behaviour that he responds to words addressed to him although he makes no attempt to use them. One must be

[1] H. Ashby and G. A. Wright, *The Diseases of Children*, 1905, p. 573.

careful not to fall into the error of exaggerating the significance of this response. It involves nothing more than an association of ideas of the most primitive kind. Take, for instance, such a case as this :— The child's attention has been directed to a certain object while, contemporaneously, the word "gee-gee" has been uttered. Subsequently, on again hearing the word, the child may, by looking towards the animal, indicate that there has been established in his mind an association between the auditory and the visual ideas. But there is something more. Since the idea complex has given rise to movement, we must suppose it not to have been indifferent but to have had an affective colouring. Whether that colouring is dependent on the idea of the word spoken, or on the idea of the object formerly seen, or on some ingredient contributed to the idea complex by inheritance, may be doubtful, and indeed it becomes henceforth increasingly difficult to distinguish instinctive and acquired activities, so that there is wide difference of opinion among psychologists as to the scope of the former.

For the activities involved in speech an affective prompting is, it would appear, just as necessary as for movement of other kinds. This seems to have been most clearly recognised by Meumann[1] whose well-marked critical faculty has prevented his adopting the *omne ignotum pro magnifico* attitude of so many other philologists, and whose teachings as to the ontogenetic evolution of language bear upon them the stamp of common sense. For him the active speech

[1] E. Meumann, *Die Entstehung der ersten Wortbedeutungen beim Kinde*, 1902.

of a child begins with a stage which he calls the "emotional-volitional," or stage of the expression of desire. To the child, he says, "the world of his wishes and desires, of his feelings and affections, and not that outer world accessible to the intellect, is his world." The words which a child first learns to speak are those connected with objects which appeal to him, and he employs a single word to indicate a variety of things, not because he has formed a concept under which those things can be subsumed, but because he wants them all or is dissatisfied with them all. Experience will shortly teach him the inexpediency of, for example, applying indiscriminately to things which are too hot or too cold the single term "'ot" as in the case described by Tracy, or of saying "nein" when he means "ja," as Preyer records, and thus will be initiated what Meumann calls the "intellectualisirung" of the hitherto emotional speech.

In the absence of any introspective method of investigation, the subsequent stages in the acquisition by the child of a vocabulary are likely to remain enveloped in mystery. We are confronted with the problem of deciding why, in the first place, the sounds of words should have any meaning at all, and, further, why they should have acquired the specific meaning actually attached to them. A review of the different theories dealing with the point is beyond the scope of this work, but allusion may be made to the chief ones. There is, to begin with, the imitative, or objective, or onomatopoetic, or "bow-wow" theory, which derives names for things or events from sounds which are associated with those things or events: there is the subjective or interjectional or

"pooh-pooh" theory, which refers our initial attempts at speech to the exclamatory outbursts which form part of the expression of the emotions; and there is the compromise between these explanations which is to be found in Noiré's modification of the onomatopoetic theory to which the name of the "yeo-he-ho" theory has been applied.

One thing is clear, though it is apt to be overlooked. A child does not necessarily understand or mean by any given word what is in the mind of the person who teaches it to him. Usually, it appears, his interpretation of it is originally much wider than that of his tutor. What, for the latter, is merely the name of a thing, may connote for the former innumerable predicates relating to that and other things which have in common no more than some interest which, though of the first importance to the child, is unintelligible to the observer. But while in one plane the dimensions of a child's thought are so wide, in another they are quite restricted. The literalness of children is, in its way, just as striking as the indefiniteness of their ideas. James recalls that at the age of eight he thought, in reading "Lord Ullin's Daughter," that "the staining of the heather by the blood was the evil chiefly dreaded, and that when the boatman said

> 'I'll row you o'er the ferry.
> It is not for your silver bright
> But for your winsome lady. . .'

he was to receive the lady for his pay." It was doubtless a child of a larger growth who regarded the words

> ". . . . . books in the running brooks
> Sermons in stones. .'

as a misprint which could be set right by interchanging the positions of the words "books" and "stones." How foolish to the schoolboy is Virgil's famous phrase "Sunt lachrimæ rerum," and how little does he appreciate, as he will in after life, the true inwardness of

"O Fortunati! quorum jam moenia surgunt."

At what stage in development the spoken word may be construed as symbolical of a judgment is a matter in regard to which much diversity of opinion exists. Sully[1] speaks of "rudimentary judgments" as occurring at the age of one year, and gives as an example the naming and pointing at an object, *e.g.* a dog. As expressed in speech, "judgments" (without qualification) are first noted in the second half of the second year. Even according to Sully's own definition: "We judge," he says, "whenever we go through any mental process which ends in an affirmation or negation of something"—such "rudimentary judgments" are hardly worthy of the name of judgments at all, and it seems preferable to regard them with Meumann as simple results of association involving no processes of analysis or synthesis. The first steps in reasoning are probably not taken for a considerable time after such a display of "intelligence" as this becomes possible. By learning new words and extending the meaning of the old ones, the child makes progress in knowledge but since the feeble minded are, *ex hypothesi* restrained from attempting the higher flights in this sphere of activity, we need not devote more space to

[1] J. Sully, *The Teacher's Handbook of Psychology*, 1909, p. 298.

the topic. The reader will find it treated of at length in Romanes' *Mental Evolution in Man* and kindred works.

Exception may perhaps be taken to the view of Mind and Consciousness expressed above. It is very generally held by psychologists that the term "Mind" embraces certain processes which appear to go on in a mysterious sub-personality, of which the Ego takes no account except on those occasions when for some not very obvious reason the sub-personality thrusts itself upon consciousness. Thus we meet with such cases as the following:

Glancing in a casual way over a sheet of an evening paper, my eye was arrested by a paragraph referring to the death of a certain Member of Parliament. The name was unfamiliar and the particulars given contained no allusion to the political views of the deceased gentleman, yet I found in my mind a clearly defined idea of the party to which he had belonged. I had no recollection of reading anything on this point and I therefore read the paragraph again only to find that, as I had supposed, it contained nothing bearing on the matter. Then I noticed that the article, of which I had only read a portion, was headed "Death of a Unionist M.P.," words which it is clear I must unwittingly have read before.

From such comparatively trivial instances of what has been called "unconscious memory" we may pass to the more complex questions of hypnotism and multiple personality. It is true that the hypothesis of a sub-conscious personality affords a

simple explanation of the phenomena observed. But it does not follow that such an hypothesis is valid. Professor H. Münsterberg,[1] for example, will have none of it. "The story of the sub-conscious mind," he says, "can be told in three words: there is none." He explains the current mistaken teachings thus.

"Facts are referred to the sub-conscious mind which do not belong to the mind at all, neither to a conscious nor to a sub-conscious one, but which are simply processes in the physical organism: and secondly facts are referred to the sub-conscious mind which go on in the conscious mind, but which are abnormally connected. Thus the sub-conscious mental facts are either not mental but physiological, or mental but not sub-conscious."

The case of "unconscious memory" given above belongs to the latter category: an idea corresponding to the word "Unionist" was present in consciousness, but was not being attended to. "Multiple personality" may be explained on either basis: there may be "co-conscious" groups of contents which appear to be independent since they have no common content, or when any particular personality is present to consciousness, a simultaneous manifestation of another personality may occur which has simply a physiological significance, *i.e.* is unattended by mental concomitants.

In his book just cited, Professor Münsterberg proceeds to an interesting analysis of consciousness, which he defines as "the presupposition for the

[1] H. Münsterberg, *Psychotherapy*, 1909, pp. 125 and 130.

existence of the psychical objects." It is the "subject of awareness" of the ideas which constitute mind, but since it has no existence apart from its content (which is the sum of those ideas) we seem justified in the proposition already advanced that consciousness and mind are, for all practical purposes, the same thing.

CHAPTER II

THE BASIS OF MIND

It may be noted that throughout the foregoing analysis of mind it has been tacitly taken for granted that the conclusions which a particular individual has come to about his own mind may be applied to the minds which he assumes other persons to possess. This proceeding is justified for any individual so long as nothing in his experience invalidates it. It is futile to raise the objection that we do not know that other minds are constituted like our own. This is to claim for knowledge a transcendental character which removes it from the sphere of utility. Absolute truth has no existence for us except as a maximum of probability, to which there are many degrees of approximation. Truth, according to Prof. W. James, means "that ideas (which themselves are but parts of our experience) become true just in so far as they help us to get into satisfactory relation with other parts of our experience." Or as he puts it in another place, "true ideas are those that we can assimilate, validate, corroborate, and verify."[1]

[1] W. James, *Pragmatism*, 1907, pp. 58 and 201.

We have regarded mental processes as facts, *i.e.* as phenomena which have so invariably been found on examination of the mind that it is incredible that they should not always reward introspection. The resemblance which we observe between ourselves and other persons makes it incredible that this statement should not apply to them also. If, for example, one invites a number of persons to write down the ideas suggested to their minds by a particular set of terms, it will be found that those ideas have been derived from associations of similarity or contiguity just in the same way as one's own are.

This capacity in ideas for being treated objectively as well as subjectively opens up a new field of investigation for the psychologist, for he is placed in a position to observe (what no amount of introspection would have told him) that ideas are not merely shadowy and elusive entities aimlessly floating through infinity, but that some, perhaps all, of them are linked by an indissoluble bond to material things; he perceives that in some obscure fashion mind is a function of matter. The particular kind of matter with which he learns to connect a manifestation of mind is that which is called nervous, and the existence of the bond between them is demonstrated to him by the constancy, in his experience, of their association. That brain is the organ of mind is to be gathered from the fact that, in a general way, the two things vary directly. Animals displaying more intelligence have relatively larger brains (though size of brain is not the only criterion of intelligence) than those displaying less. Removal of the brain eliminates mind, and any agency which puts out of

action part of the brain interferes to a corresponding extent with the development of mental processes.

It seems unnecessary to labour this point since the teaching of the dependence of mentation on the integrity of the brain is universally accepted. As to the nature of that dependence there is, however, by no means the same unanimity and it is perhaps worth while, in order to view the matter in its proper perspective, to summarise what has been said about it by the almost innumerable philosophers who have exercised their intellectual faculties upon it.

The speculations as to the relation of mind and body may be divided into two main groups according as attention is paid to the respective characteristics of mind and of body as such, or the causal relations of one to the other are considered. From the first standpoint we may, under the guidance of our predilection or our educational bias, see mind and body as totally distinct entities or as modes of existence of a common entity. In the former case we subscribe to the doctrines of Dualism, in the latter to those of Monism. As dualists we may conceive of mind as a "soul-substance" with or without limitations, *i.e.* as restricted to the sphere which is occupied also by material things, or as an infinite something which only comes within our ken at its points of contact with matter. As monists we may regard the common entity as of a purely physical nature, *e.g.*, as some form of motion capable of presenting itself to us under different disguises. This is materialism. On the other hand, we may conclude that since consciousness is the only entity

of which we have direct knowledge, nothing except consciousness exists. This is idealism.

But we may, from a second standpoint, see mind and body as not merely co-existent, but as interdependent, *i. e.* as having a causal relation to one another. "We may," says J. S. Mill, "define the cause of a phenomenon to be the antecedent or the concurrence of antecedents upon which it is invariably and unconditionally consequent."[1] There is between mind and body an "invariable and unconditional" association which suggests a causal relation, though whether mind or body is antecedent is a matter which we are not in a position to decide. Three possibilities may occur to us in this connection. We may suppose that body in some way produces mind, or, conversely, that mind produces body; or we may combine the two hypothetical processes and assume that, not only does the mind control the activities of the body, but that at the same time these activities influence the course of psychic events. Only the third of these possibilities seems to have been seriously regarded by metaphysicians, who have incorporated it in a theory of reciprocal interaction or, as the Germans call it, "psychophysischen Wechselwirkung."

Various objections can be urged against these different views. If mind and body are quite distinct entities, as the dualists teach, why should the relation between them be so intimate and so uniform? To take an old difficulty, which is pointed out by Eisler,[2] "from whom descends the soul of a child, from the

[1] J. S. Mill, *A System of Logic*, Book 3, Chap. 5.
[2] R. Eisler, *Leib und Seele*, 1906, p. 28.

father or from the mother or from both? and if the latter is the case how can two soul-substances beget a third when they do not even become intermingled?"

Materialists have now discarded the crude conception of mind as a "secretion" of the brain, which was suggested by Cabanis and by C. Vogt. Lotze's argument against such a view seems unanswerable. "If," he says, "mind is secreted by the brain, it must be in the brain in some form before that process takes place; if it is there in a psychic form it does not become psychic as the result of the brain's activity, and if it is there in a physical form we have no explanation as to how the facts of its being secreted can convert it into something psychic."[1] The notion that we have to deal rather with a special case of the conservation of energy, "physical" motion being converted into an equivalent amount of "psychical" motion, though plausible enough at first sight, is equally open to criticism. Our conception of physical energy involves also that of space in which, and from a determined region of which, it acts: physical energy again has the capacity of doing work, mechanical or chemical. An idea has no such properties. Which of us by taking thought can add one cubit unto his stature? The physical and the psychical are not commensurate: they cannot be expressed in the same terms.

For idealism no better case can be made out: its only legitimate development is into that apotheosis of vanity which is called "solipsism." It involves

[1] R. Eisler, *op. cit.*, p. 44.

the ignoring of physical as distinct from psychical realities, and the futility of attempting to act in this way has been abundantly demonstrated by the followers of what is called Christian Science. There is, however, about idealism, considered merely as an academic proposition, a specious plausibility, the refutation of which has taxed the ingenuity of many generations of philosophers. The difficulty was familiar, for example, to John Locke, and in his "Essay concerning Human Understanding" he deals with it at length, but without disposing of it altogether satisfactorily.

The case is stated very fairly by Professor E. Lugaro[1] who admits that "the existence of a reality outside consciousness is a pure hypothesis." He proceeds to point out, however, that the hypothesis is very firmly established since "there is no experience which does not support it. . . It therefore not only imposes itself on consciousness but its negation is inconceivable." Very pertinently he asks, "if consciousness is the only reality, what signification can the terms error and illusion possess when applied to the same data of consciousness?"

Some of the existing conflict of opinion as to the necessity of deriving our ideas from contact with a material universe is no doubt due to a misunderstanding of what, for psychologists, is meant by "Reality." Professor Münsterberg[2] states the position concisely when he says that "physical

[1] E. Lugaro, *Modern Problems in Psychiatry*, Trans. by D. Orr and R. G. Rows, 1909, pp. 48 and 40.

[2] H. Münsterberg, *Psychotherapy*, 1909, p. 133.

objects are those which are possible objects of awareness for every subject: psychical objects are those which are possible objects of awareness for one subject only."

Mr. R. B. Haldane[1] holds a similar view. "All men," he says, "must see and feel in such a fashion that the universals in which their descriptions are recorded are the same, if the impression is to be given the title of real." A little later he mentions what he calls a threefold test of what we mean by reality: Agreement furnished by (1) our own present senses of every kind; (2) our past sense experience; and (3) the sense experience of others. "These throw light upon what we mean by reality and unreality in human knowledge, or, for that matter, in human perception. It means the assignment of the phenomenon to its proper place in the context of experience."

Accepting "reality," we are in a position to accept also Professor W. Mitchell's ingenious explanation of the relations of mind and brain. "It is an error," he says, "to speak of mental and physical facts as co-ordinate. . . A mind and its experiences are realities that are presentable to sense as the brain and its action."[2]

Against the hypothesis of reciprocal interaction is advanced the difficulty of imagining how such an interaction could take place between entities which, according to our experience of them, have no attributes in common. Further, it is urged that the

[1] R. B. Haldane, *The Pathway to Reality*, 1903, Vol. I., pp. 71 and 77.

[2] W. Mitchell, *Structure and Growth of the Mind*, 1907, p. 23.

scheme of physical causation is complete in itself and leaves no gap at which psychical agencies can be introduced, and that, *mutatis mutandis*, the same is true for psychical causation. (Prinzip der Geschlossenheit der Kausalität.)

Philosophers have endeavoured to make good the defects in the various hypotheses above mentioned by the introduction of a *tertium quid*. To bring matter, with its properties of form, mobility, and extent, within the sphere of action of an entity lacking those attributes, seemed to Descartes and the school of the Occasionalists to require divine intervention. Leibniz assumed the existence of a "pre-established harmony." A host of writers from Spinoza to Wundt have adopted some modification of the "Identity Theory," a form of Monism which holds that mind and body are different aspects of some common Being, as mutually dependent on, and indispensable to, each other as the concavity and the convexity of an arc of a circle. The "Ding an sich" or "Noumenon" of Kant; the "Absolute" of Schelling; the "Wirklichkeit" of Paulsen and others; the "Unknowable" of Spencer, are examples of the hypothetical entities of which the existence has been postulated. These entities tend to fall into one or the other of two categories according as they are assumed to approximate to a material substance on the one hand, or to an idealistic abstraction on the other. Again the old difficulty crops up: how can we conceive of anything which can be endowed with such diverse attributes as mind and body, which attributes are not even of the same order of natural events? It is met, to some

extent, by supposing that the diversity exists rather in the observer's points of view than in the thing itself.

With some show of reason it has been doubted whether the association of mind and body is so universal as has been assumed. If mind is regarded as co-extensive with consciousness, it follows that all nervous tissue has not the same functions since it is possible to have nervous phenomena without consciousness. We might suppose that mind is a function of a special or ultra-nervous tissue, but there is no histological evidence of this. Again it has been seriously argued that it is impossible to assign to a physical basis of neuronic intercommunications the apparently endless variety of combinations of which our ideas are capable. Why, for instance, should it not be credible that a certain stock of ideas having been supplied by physiological means to our minds, those ideas may undergo an independent process of evolution ?

Fortunately we need not attempt to decide questions like these. None of the views above referred to is sufficiently well established to serve as a guide in the adjustment of our social relations. Whatever they may eventually lead to, the most abstruse speculations of the metaphysicians have as yet no more practical bearing on the right conduct of life than has, for example, master play at chess. For our present purpose we have only to record our experience that mind and body are intimately related, and we require no more elaborate doctrine than one of a psycho-physiological parallelism such as we assumed at the outset.

It is desirable now to study the range of this (psycho-physical) parallelism in order to define the province of mind more accurately. The extent to which consciousness is the concomitant of physiological processes is obscure, because in the case of our own processes we are not agreed as to what is meant by consciousness, and in the case of the processes we observe in others we have the further difficulty that, even if we were agreed as to what consciousness is, we could only infer that it accompanied physiological activity.

In what follows it will be assumed, as is now generally believed, that the physiological is only a special case of the physical, by which is meant that the group of phenomena which are called physiological can be expressed in terms of matter, of the forces which act upon matter, and of the changes which matter undergoes.

We can probably best obtain a clear conception of what the position actually is by applying the results of biological observation and speculation to the question of how the nervous system has reached its present stage of complexity. The capacity of responding to stimulation is not restricted to living things, but the kind of response which living things exhibit is different from that displayed by inanimate matter, the essential distinction being found in the fact that living substance has, in a high degree, the power of making good the losses of motion which are involved in its manifestations of activity, while that power is defective in non-living matter.

For our present purpose nothing is gained by harking back to a stage anterior to the appearance

in evolution of the material which we call bioplasm and which we postulate as the indispensable basis of vital characteristics. As to the nature of the most primitive form of bioplasm there are certain hypotheses. Ray Lankester[1] believes that its nutrition was effected rather on the lines of that of animals than in the fashion typical of plants. He thinks that "it very probably fed in the first few aeons of its existence on the masses of proteid-like material which, it may be supposed, were formed in no small quantity as antecedents to the final evolution of living matter." In its simplest form bioplasm may have been characterised by a condition of stable equilibrium, the amount of motion supplied to it by intrinsic and extrinsic sources of energy being exactly equivalent to the amount which it expended in the production of vital manifestations. But bioplasm of such a kind, in view of the destructive agencies to which it would always be subjected, would tend to diminish steadily in amount and to become eventually extinct. Bioplasm has, however, survived and this is apparently to be explained by assuming that the motion supplied to it has not been, and is not now, quantitatively or qualitatively, exactly equivalent to that which it has lost or is losing. The expression of this lack of correspondence in the processes of receiving and emitting motion is found in the cardinal attributes of bioplasm —its growth and variability—and it is on account of its possession of these attributes that bioplasm is able to perform its chief duty, which is to go on

[1] Ray Lankester, *A Treatise on Zoology*, Part I., 1st Fasc., 1909, p. xv.

living. The capacity for growth enables a reserve of bioplasm to be provided against the local catastrophes which would otherwise destroy the organism: while variability is the quality which makes adaptability possible and is therefore the *sine qua non* of evolution.

Why bioplasm should have undertaken the task of growing and adapting itself at all we have no sort of notion, unless we assume that "through the ages one increasing purpose runs," but as to how growth and adaptation take place we have, by general agreement, a choice between two views; according to one of which these manifestations of vitality are spontaneous, that is, of unknown origin, while according to the other they are a response to stimulation.

The mechanism by means of which stimulation may be supposed to produce its effects has been studied by many workers, particularly by the German biologist Richard Semon, whose main contentions may be indicated here. By "stimulation" Semon understands a change in what he calls the "energetische Situation" of an organism. A stimulus causes a corresponding change in the condition of the organism stimulated, and we observe, not the change, but the results of that change. These results he calls the "reaction." Stimuli may be exogenous or endogenous (enzymes); thus in Hering's theory of vision the sensation of "white" is exogenous, while that of "black" is endogenous. The principle of the conservation of energy does not appear to apply to the results of stimulation, owing to the number and complexity of the internal factors

which a stimulus calls into operation, and, moreover, those results may be manifested in all provinces of organic happenings—chemical, morphological, psychical. On the removal of a stimulus, the organism which has been stimulated may return to its former state as regards the obvious reaction, but its capacity for reacting has been permanently modified. To this modification he applies the term "Engramm" to express the idea that something has been, so to speak, "inscribed" or "written upon" the organism.

The capacity of the organism for being thus modified is the "Mneme," and nervous tissue is especially endowed with "Mneme." The existence of an engraphic change is demonstrated by the fact that the original reaction can now be produced by other than the original influences; for instance, after a dog has been hurt by a stone thrown at him, the sight of a raised hand holding a stone will suffice to revive in him an idea of the blow. Influences which act in this way are said to be "ekphoric." Semon develops an ingenious hypothesis to account for the occurrence of successive association by distinguishing between what he calls the "synchrone" and "akoluthe" phases of stimulation, and he explains the inheritance of mental characteristics by supposing that the reproductive cells, before separation, have shared the "Mneme" of the parents and have consequently received engraphic impressions which duly become evident when the appropriate ekphoric stimuli occur.[1]

[1] For an exposition of Semon's philosophy the reader is referred to his works, *Die Mneme*, 2nd edit., 1908; and *Die mnemischen Empfindungen*, 1909.

The simplest forms of bioplasm of which we have experience as constituting distinct individuals is, it would seem, of a higher grade of development than has so far been assumed, though the differences are morphological rather than functional and do not affect the considerations as to the effects of stimulation which have just been set forth. There may have been, at some stage of evolution, bioplasm of the non-nucleated primitive type for which E. van Beneden suggested the name "Plasson." But such a form of bioplasm appears no longer to exist. The group of lowly organisms which bears the name of Proteomyxa includes forms with no defined nucleus, but there are reasons for thinking that nuclear substance is nevertheless present. It is, indeed, a matter of the greatest difficulty to decide which of existing Protozoa must be regarded as showing the smallest amount of departure from the hypothetical primitive bioplasm, for adaptation does not of necessity involve increase in structural complexity. Thus the Gregarines, which Spencer took as illustrating the lowest level of development, are now regarded as having been degraded from a higher order through the adoption of a parasitic mode of life, and similar considerations apply to some of the simplest vegetable forms, *e.g.* Bacteria. Ray Lankester regards the group known as the Mastigophora as being the one from which the other classes of Protozoa and the earliest plants—Protophyta—have been derived, and the Mastigophora represent a considerable advance upon the "Plasson" stage.

Between the various unicellular animals, there is,

from the point of view of the psychologist, little to choose and we may, for the purpose of study, take one of the most familiar forms, such as Amœba, without regard to its taxonomic position. Amœba consists of bioplasm of which a portion retains characters comparable with those of "Plasson," while other portions are differentiated to form, respectively, a nucleus and an ectoderm. There is no obviously differentiated nervous system, and in the production of "nervous phenomena" the animal reacts as a whole. The vitality of Amœba is expressed in various ways. In the first place the animal has the power of responding to stimuli—it will, for instance, retract its pseudopodia and assume a more or less spherical shape when touched or shaken, and it can throw out pseudopodia in the direction of foreign bodies which chance to be in its vicinity. It does not, however, act in this way towards all foreign bodies. If the bodies are particles of food material the reaction takes place : if they are innutritious they are left alone. Considering the movements of Amœba as a whole, we observe that they are of such a character as to facilitate (1) its coming into contact with a more favourable environment or (2) its escape from an unfavourable one.

We find in the above facts an explanation of the genesis of the mental element which we have called "affection" and an indication of the way in which the activities of the organism are dependent on affection. In its incipient state, affection is thus not so much a matter of pleasure and pain in the usual connotation of those words, but of gains and losses—

of conditions promoting or opposing nutrition—of anabolic and katabolic phases of metabolism.[1]

Certain other members of the great group of the Protozoa present even more striking phenomena. According to the observations of E.G. Balbiani the organism known as *Didinium nasutum* distinguishes between two species of Paramœcium, attacking one but not the other: moreover, it distinguishes them at a distance and begins the attack by throwing trichocysts at its prey, so that it may be credited with powers of orientation.[2] Various species of Technitella, to take another example, exercise the nicest choice among the building materials available to them and form a "test" of quite distinctive character. Thus, according to Heron-Allen and Earland,[3] *Technitella melo* employs only sponge spicules, selecting those which are of the correct length for the position to be filled. *T. legumen* constructs from spicules and fine mud a two-layered shell, in the outer layer of which the spicules lie parallel to the long axis of the test, while in the inner "the spicular fragments are much shorter and

[1] This view is not universally accepted, thus H. R. Marshall has suggested that:—"Pleasure and Pain are determined by the relation between the energy given out and the energy received at any moment by the physical organs which determine the content of that moment; Pleasure resulting when the balance is on the side of the energy given out, and Pain when the balance is on the side of the energy received. Where the amounts received and given are equal, then we have the state of Indifference." (*Mind*, Vol. XVI., 1891, p. 470.)

One may note also that in a complicated organisation, such as that of the human mind, no simple relation between metabolism and affection may be discoverable: it is unpleasant to be bored by an oft-told tale, but not obviously injurious.

[2] A. Binet, *The Psychic Life of Micro-organisms*, 1903.

[3] E. Heron-Allen and A. Earland, *On a New Species of Technitella, &c., Journ. of the Quekett Microscopical Club*, April, 1909.

are laid at right angles to the outer layer." A new species, *T. thompsoni*, is even more remarkable, for it builds an extremely neat test of echinoderm plates only, although in the two regions where the creature has so far been found such plates "form an infinitesimal percentage of the material as dredged, and their presence would be almost unobserved unless especially searched for."

Here then we seem to have to do with something very like volition. But to speak of affection and volition as occurring among the Protozoa is to endow those creatures with minds. We have no desire to prejudice the issue in such a way. It is possible to regard mind either as a universal attribute of matter or as having no existence except in a misinterpretation of physiological facts. In this book the question is left open and no attempt is made to dispose of a problem which is as old as the mind itself, and apparently as far from solution as it was in the beginning.

"Some dim form of discrimination is the germ from which the spreading tree of mind shall develop," says Lloyd Morgan,[1] and on this view the Protozoa seem to be endowed with minds of a fairly advanced order. But the facts are explicable on the special physical lines which are called physiological. A simple response to stimulation may be a purely physical process: this we infer from the fact that it may take place in admittedly non-living substance. But, as shown more particularly by Prof. Bose,[2] response in the inanimate may exhibit a very

[1] C. Lloyd Morgan, *Animal Life and Intelligence.*

[2] J. C. Bose, *Response in the Living and Non-Living*, 1902.

high degree of complexity, so high indeed that, to quote Prof. Adami,[1] "In the nature of its responses to stimuli, living matter differs at most in degree, and not in kind, from non-living." Amœba's "discrimination" between nutritious and innutritious particles may therefore be regarded as merely two different responses to two different stimuli. The selective power of lowly organisms may be due, as Spencer[2] puts it, to "the setting up of an assimilative process when assimilable matter is brought in contact" with them. We have here, it would seem, the rudiment of the sense of taste. A greater elaboration of the capacity for selecting, such as is displayed by Didinium, seems to involve also a rudimentary sense of smell, but between taste and smell there is no essential difference, indeed, as Spencer points out, in aquatic creatures smell and taste can be but degrees of the same faculty corresponding to dilute and concentrated solutions of nutritive substance. In the case of Technitella the problem is more complicated since the matter is apparently not one of simple nutrition, but an explanation on physical lines can easily be supplied without exceeding the limits of legitimate speculation if we accept Spencer's dictum that "all forms of sensibility to external stimuli are, in their nascent shapes, nothing but the modifications which those stimuli produce in that duplex process of integration and disintegration which constitutes the primordial life, physiologically considered."[3] At some stage in evolution there

[1] J. G. Adami, *The Principles of Pathology*, 1909, p. 90.
[2] H. Spencer, *Principles of Psychology*, 1870, Vol. I, p. 308.
[3] H. Spencer, *op. cit.*, p. 312.

appeared organs susceptible to the influence of mechanical impacts. This may be regarded as the genesis of both tactile and auditory sensations, since, as Sherrington[1] puts it, the cochlea is essentially "a group of glorified 'touch spots.'" On similar lines a variation which gave rise to an organ capable of appreciating radiant energy would provide the germ of the apparatus for producing sensations of heat, cold, and light.

In Amœba the physical basis of affection would appear to be supplied by the whole of its bioplasm, but we may suppose, with Titchener,[2] that the evolution of higher types has been marked by the appearance of a special mechanism of affection comparable with that which we regard as the basis of presentation. He conceives of the affections as "mental processes of the same general kind as sensations," and suggests that "the 'peripheral organs' of feeling are the free afferent nerve-endings distributed to the various tissues of the body." If we accept Wundt's scheme of six affective conditions we must assume a greater specialisation in the afferent nerve-endings than if only two forms of affection are postulated, but otherwise the position is unchanged, since three pairs of aspects of nutritional phenomena can be pictured as readily as one pair.

Movement of a seemingly voluntary character also admits of being referred to a process of stimulation. As we have seen above, the existing parasitic Protozoa are probably not the least evolved

[1] C. S. Sherrington, *The Integrative Action of the Nervous System*, 1906, p. 324.

[2] E. B. Titchener, *Lectures on the Elementary Psychology of Feeling and Attention*, 1908.

members of the group, but their degraded state may perhaps be reversionary and we may therefore regard as still plausible Spencer's hypothesis as to the mode of origin of motility, which is as follows :— The earliest organisms evolved lived in constant contact with supplies of nutriment ; motility is an adaptation to existence in a medium (salt or fresh water) which, while it everywhere yields a sufficient supply of oxygen, has nutriment irregularly scattered so that search has to be made for it. On the lines of Semon's teaching, we may regard this adaptation as of the nature of an "engramm" impressed upon the bioplasm by the change in its "energische Situation" which occurred when its environment was changed.

The activities of a protozoon are not, therefore, necessarily those of a free agent, but may be directly referable to the stimuli brought to bear upon it. Even if the stimuli known to us seemed inadequate to account for the animal's varied movements, we should have to remember that there may be involved physical agencies not cognisable by us because of a kind outside the limited range of our sense-organs either temporarily or permanently. It appears, however, that we need not appeal to any unknown forces: the known influences of the environment are sufficient.

We have seen that, whatever may be the reason for such a condition of affairs, the first duty of bioplasm is to continue in existence, and to that end it displays powers of growth and of variation. But in so far as these powers are utilised, the organism is compelled to take upon itself new responsibilities.

Let us consider first how the mere increase in bulk affects the position. As pointed out by Spencer, an individual consisting of a fragment of bioplasm will, according to mathematical laws, necessarily display a certain ratio between its mass and its surface, and since on the extent of its surface depends its capacity for taking in food, any alteration of that ratio will affect its nutrition. Assuming that the organism does not undergo any change of form, the ratio of surface to mass will get steadily less as the mass increases, and consequently growth will lead to a diminution in the food supply and so be automatically checked.

There is probably also another factor for which allowance must be made. The unit of bioplasm which we meet with in practice is the cell, and this has reached a stage in evolution at which we can distinguish a more highly specialised portion of the bioplasm—the nucleus—from a less highly specialised portion—the cytoplasm. The cytoplasm provides an environment for the nucleus in the same way as the medium in which the cell is living constitutes its environment, and we may therefore suppose that growth is dependent, not only on the relationship between the medium and the cytoplasm but also on that between the cytoplasm and the nucleus.

The necessary adjustments can be made in various ways. By spreading itself into a sheet or a reticulum the organism maintains the ratio between mass and surface which is necessary to it. But to do this defeats to a great extent the main purpose of growth. A large mass of bioplasm is little better

protected against circumscribed disasters than is a small mass. A more satisfactory result will be obtained if the organism, on reaching the limit of growth under the prevailing conditions, divides into two (or more) daughter organisms of form like its own, or cuts off successive parts of its substance as fresh individuals. Complete separation of the daughter organisms may not, however, be necessary to meet the nutrition difficulty, and it would seem that the undiminished risk of total destruction that the organism runs is now more than counter-balanced by the increased capacity for variation which the multicellular state confers upon it. In the multicellular organism the capacity for variation shows itself morphologically as differentiation of the bioplasm into various tissues subserving different, but apparently equally essential, functions in the maintenance of the organism as a living thing. But one of these tissues, from the nature of its peculiar function, has a special relation to the rest of the tissues. The mechanisms which respectively seize upon food materials, convert them into an assimilable form, assimilate them, integrate them, and cast out the waste materials which result from them, could be of little service to the organism if their actions were not co-ordinated, and it is the business of "nervous tissue" to effect the necessary co-ordination. We find, as the above considerations would lead us to expect, that nervous tissue comes into intimate association with all other forms of tissue.

Neither phylogenetically, *i.e.* by study of the evolution of the human race, nor ontogenetically,

i.e. by study of the development of individual human beings, have we as yet arrived at a satisfactory explanation of the way in which this association is brought about. We do not know that any one of the various types of animals which now intervene between the Protozoa and Man closely resembles a stage which Man has actually passed through in the course of his evolution, and our histological data are insufficient to justify a confident statement on embryological grounds. There are two possibilities to be considered: the connection between nerve-cells and other cells may be due to the fact that the separation which results from cell division is incomplete, strands of bioplasm remaining to constitute permanent links between the daughter cells; or it may be brought about by the nerve cells having come into relation secondarily with the remaining cells. Which of these lines has actually been followed is, and has long been, a matter in regard to which physiologists differ. It would seem that in plants and in some invertebrate animals the connection between the nerve cells and between a nerve cell and the cell which it controls is effected by direct continuity of bioplasm. In the higher animals, even though, as the observations of Szily and Held suggest, such continuity occurs, it is difficult to explain the degree of complexity to which the nervous system attains without assuming that secondary relations are also established. If what is called the "neurone theory" is discredited the generally accepted teaching as to the mechanism of conduction of nervous impulses will require revision, for the existence of "synapses," or regions

where the terminations of nerve cell processes come into proximity merely, is essential to the stability of modern theories of nervous activity.

The earliest stage in the differentiation of nervous tissue is theoretically one in which all the rest of the cells making up the individual are connected with the special one which sub-serves the function of co-ordination. As the number of cells increased there would need to be a corresponding increase in the size of the co-ordinating cell, unless, by the introduction of some new device, the same object could be attained in another way. Except in rare instances, *e.g.* in the electric cat-fish, the nerve cells do not show any tendency to increase in bulk with the demands made upon them and it may be supposed that, as a result of natural selection, a better way of meeting the necessities of the case has been evolved. This better way is the provision of nerve cells of different orders, situated at different physiological "levels," and so arranged that nerve cells controlling each a small portion of the body are themselves brought into correlation by "higher" nerve cells, and these by still higher nerve cells. Thus the activity of the cells giving rise to the fibres constituting an anterior spinal nerve root will produce movement in a limited part of the body, but cells of several anterior cornua can be prompted to act in the production of an elaborate co-ordinated movement by means of cells in what is called the "motor area" of the cerebral hemispheres, and the functional activity of these cells, in turn, can be controlled by cells in the parts of the brain which Flechsig described as "association centres."

So much uncertainty attends the interpretation of the nervous phenomena of invertebrate animals that, until we reach the base of the vertebrate division, the appearances observed are not sufficiently like those in Man to be of any use in providing a key to the latter. Described in the most general terms, what seems to happen in the development of the central nervous system is this. A majority of the nerve cells come to occupy a position in the median plane which admits of the corresponding parts of the body being arranged symmetrically about them. They are collected in such a way as to form, with the tissue which serves to bind them together, a tube running along the greater part of the length of the body beneath the dorsal surface. In the tube the cells are arranged around the cavity with their fibres constituting the outer part of the wall. A distinction between internal grey matter and external white matter is thus instituted. The tube varies in calibre and in the sizes of the aggregates of cells at different parts of its length, in accordance with the importance to the animal of the particular region on the exterior of the body with which the cells are in connection. At its anterior end the tube is enlarged, partly in proportion to the degree of development of the animal's senses of smell and taste, and partly in dependence on other considerations. A little further back a region becomes specialised as a centre for vision, while behind that again an auditory centre is established. A capacity for acting as an organ for touch is inherent in practically every part of the animal's exterior, so that no definite touch centre is to be expected; but the anterior end of the

body is peculiarly the region where, in a motile organism, appeal is likely to be made to the tactile sense and, consequently, one finds that the anterior end of the nervous tube is especially associated with the development of the sense of touch. To bring into co-operation the various centres mentioned some further centre is required, and this appears to be supplied by the development of collections of cells in the anterior portion of the tube, the consequent enlargement of that region giving rise to the cerebral hemispheres. In the words of Professor Elliot Smith,[1] "the higher organisation of the brain is brought about by the extension of all the sensory paths up to the cerebrum and the evolution within the hemisphere of mechanisms for receiving and blending the various impressions of an object so as to awaken a consciousness of all its properties as they appeal to the senses of smell, taste, touch, sight and hearing."

The first stage in the process seems to be marked by the appearance of a primitive cortex, called by Ariëns-Kappers the "palæo-cortex," which receives fibres from a region of the original grey matter devoted to the olfactory sense. In the earliest vertebrates this sense seems to have had a special predominance and the evolution of sensory capacity seems to have taken place especially in connection with it. From the anatomical standpoint the result of that evolution was the appearance, first, it is said, in the group of animals known as Amphibia, of a cortex—the "archi-cortex"—having a tertiary

[1] G. Elliot Smith, *Some Problems Relating to the Evolution of the Brain, Arris and Gale Lectures, v. Lancet*, Jan. 5, 1910, p. 151.

connection with the organ of smell by way of the palæocortex. In this way there are laid down a palæopallium and an archi-pallium, corresponding respectively to the pyriform lobe and the hippocampal region of the brain.[1]

As evolution proceeded, the convergence of sensory paths upon the cerebrum became more and more marked, and the importance of that organ as a co-ordinating apparatus became proportionally more pronounced. New collections of cells provided the basis for this extension of function, and there appeared, somewhere about the level of the Reptiles, a new anatomical formation, the neo-pallium, consisting of cortex intercalated between the palæo- and the archi-cortex, and divisible into areas corresponding to the different sense organs. In the lowliest mammals, according to Professor Elliot Smith, such a neo-pallium is present and it is through the growth and differentiation of this structure that we are provided with the various mechanisms which we believe to underlie and make possible the processes of thought.

Without attempting to follow the evolution of the neo-pallium in detail, as is done by Professor Elliot Smith in the lectures alluded to, we may notice three of its salient features. In the first place, a part of the cortex devoted to the reception of tactile impressions becomes modified in such a way that its cells, when stimulated, induce contraction of muscles in various parts of the body. This is the genesis of what is known as the "motor area." Secondly, we

[1] C. U. Ariëns-Kappers, *The Phylogenesis of the Palæo-Cortex and Archi-Cortex, &c., Archives of Neurology and Psychiatry*, 1909, p. 161.

find in each neo-pallial area a differentiation of cells into two groups; the one central and concerned with the reception of sensory impressions, and the other peripheral and concerned with the elaboration of those impressions into idea-complexes. By the extension of these peripheral portions of the various areas, their sensory portions come to be widely separated by what are known as "association areas." Finally, we observe that the increase of the neo-pallium takes place almost entirely in two dimensions, its thickness remaining practically constant. As a consequence of this, folding occurs, and Professor Elliot Smith maintains that, although the fact becomes obscured in the course of the brain's development, the folding follows the lines of separation of the functionally distinct areas in the neo-pallium.

The distinction of a neo-pallium from the rest of the cerebrum is somewhat artificial, as shown by the want of agreement among comparative anatomists as to the stage of the evolution of the brain at which this structural feature is recognised. Its individuality seems to be insisted on mainly because it is thought to be peculiarly the "organ of mind," but the boundaries of mind are too indefinite to justify our limiting the application of the principle of psycho-physical parallelism to a portion only of the nervous apparatus.

By turning from phylogeny to ontogeny we do not obtain very substantial additions to our fund of knowledge. The early stages in the development of the functions of the human nervous system are practically unknown. Our study of fœtal brains

and nerves is based on dead tissues only. We cannot begin to experiment on a child's brain until the child is born and even then the scope of our proceedings is strictly limited. In so far as our investigations might involve interference with the child's comfort, we are confined to such accidental opportunities of confirming or disproving results obtained with lower animals as chance puts in our way.

It would appear from the researches of Flechsig, Ambronn and Held, Soltmann, the Westphals, and various other workers, that in the case of the medullated fibres, which constitute so large a proportion of the nervous system, the specific function of the fibre is not capable of being performed until the fibre has received its medullary sheath. Stoddart[1] proposes to apply this fact in explaining the difference between instinctive and volitional activities. True voluntary acts, he considers, do not make their appearance until the age of seventeen months, *i.e.* at the time when the fibres of the pyramidal tracts have received their sheaths, while instinctive movements occur from birth, and do so because of their dependence on the cortico-rubro-spinal system of fibres which is myelinised at birth.

Whatever may be the anatomical basis of the condition, we find, as a matter of observation, that the various sensation mechanisms already mentioned do not all get into working order at the same stage of the child's growth. Cutaneous sensibility to touch, heat, cold, and pain, is present at birth, though

[1] W. H. B. Stoddart, *On Instinct*, *Journ. of Mental Science*, July, 1906.

the last is probably little developed. A distinction between the protopathic and epicritic systems seems hardly feasible in the circumstances. Visceral sensations, *e.g.* those of hunger and thirst, are also of very early appearance. The sense of hearing seems to be the last to develop, and it is difficult to say when auditory vibrations are differentiated from those appealing to the sense of touch, which usually accompany them. There is said, however, to be evidence of audition on the fourth day. The pupil reacts to light, according to Kussmaul, within an hour after birth. In the second week the child may seem to notice a lighted candle, while at five weeks, according to Raehlmann, it will fix an object which happens to be in its line of sight, and at five months it is able to get its bearings by means of vision. A capacity for distinguishing sweet tastes from bitter is said to be present on the first day, as also a momentary appreciation of powerful odours.

In the case of an infant, the reception of kinæsthetic impressions is not accompanied by objective phenomena of such a kind as would lead to its ready recognition by an observer, but from another point of view it has its own special interest in that it occurs in the cerebellum which, as Myers [1] puts it, "is the great centre where afferent impulses, alike from the labyrinthine and motor apparatus, are gathered together."

With the recognition of phylogenetically separable regions of the cerebrum, a step is taken in the direction of defining the "levels" at which the different stages of co-ordination take place. The

[1] C. S. Myers, *A Text-Book of Experimental Psychology*, 1909, p. 75

number of levels which can be identified is, indeed, largely a question of definition, and the levels are not anatomically susceptible of clear delimitation, for the neo-cortex contains cells of many types and the groups of cells subserving particular functions are not collected in special convolutions, but are distributed throughout considerable extents of cortex.

Fully developed cortex exhibits, under the microscope, a lamination dependent on the presence in it of nerve fibres and nerve cells of different sizes and forms. The cortex is not everywhere alike and there is not universal agreement as to the number of layers which are to be distinguished, but a very general practice is to recognise five, according to the following scheme, in which the strata are enumerated from the surface inwards :

1. The layer of superficial fibres. In addition to the fibres, this layer contains also what are called the "cells of Cajal."
2. The layer of pyramidal cells.
3. The layer of granules.
4. The inner layer of fibres. Here are found, too, in different regions, what are known as "Betz cells" and "solitary cells of Meynert."
5. The layer of polymorphic cells.

J. S. Bolton[1] and G. A. Watson[2] have independently worked out the relation of the cells of the different layers to mental processes. According

[1] J. S. Bolton, *The Histological Basis of Amentia and Dementia*, *Archives of Neurology*, Vol. II., 1903, p. 424.

[2] G. A. Watson, *The Mammalian Cerebral Cortex, &c.*, *Archives of Neurology*, Vol. III., 1907, p. 49.

to the former, the fifth layer is the first to appear and it probably subserves "the lower voluntary functions of the animal economy." He associates the layer of granules, which appears next, with "the reception or immediate transformation of afferent impressions whether from the sense organs or from other parts of the cerebrum." The pyramidal layer is the last to appear, and since its extent varies with the range of the higher mental processes, it may be regarded as subserving "the 'psychic' or associational functions of the cerebrum." Watson's conclusions agree in the main with those of Bolton, although he classifies the layers somewhat differently, calling the pyramidal layer the "supra-granular" and applying the term "infra-granular" to the combined fourth and fifth layers. This infra-granular region he believes to be concerned especially "with the associations necessary for the performance of the instinctive activities, *i.e.* all those which are innate and require for their fulfilment no experience or education." The supra-granular layer he regards as subserving "the higher associations, the capacity for which is shown by the educability of the animal."

Whatever doubt there may be as to the details, we may take it as well established that the cerebral cortex is the seat of chemical and physical changes which, in some mysterious way, express themselves as mental phenomena.

According as its activities involve the building up or the breaking down of the nervous tissue, so, it is taught, will affections of pleasure or pain arise. In the previous chapter we noted the inter-dependence

of affection, volition, and attention, so that we may expect to find near at hand a physical explanation of the last mentioned factor, and also of volition if we decline to accept the hypothesis of a transcendental "Ego." The unit of nervous activity, so far as we can study it objectively, is the reflex, and according to Sherrington:[1]—"The interference of unlike reflexes and the alliance of like reflexes in their action upon their common paths seem to lie at the very root of the great psychical process of 'attention.'"

Without going at length into the question of the human being's psychical growth we may note, in addition to the appearance of volition already referred to, a couple of striking phases. One is the development of the consciousness of self or of the idea of the Ego, which seems to depend mainly on the specialisation of the apparatus for tactile and organic sensations: the other is the differentiation of the centres for language.

The functioning of the mechanism of speech is of predominant importance as a source of psychical events. Just as the introduction of a practice of exchanging counters made possible the growth of our present commercial system from the primitive methods of barter, so the development of the faculty of language has been the chief factor in the intellectual evolution of the human race. The acquisition of language has enabled the race, in accordance with the principle "to him that hath shall be given," to obtain an ever increasing lead in the contest for the headship of the animal kingdom

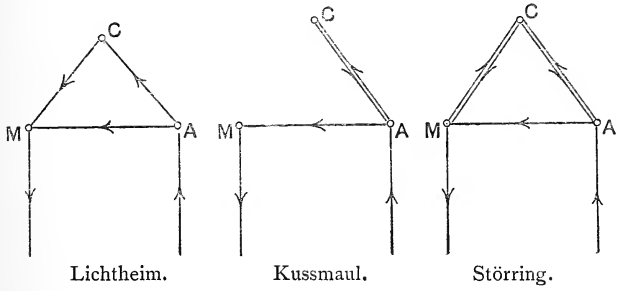
[1] C. S. Sherrington, *op. cit.*

and has, indeed, already established so wide a gulf between Man and his competitors that their respective mental states are hardly comparable.

A round unvarnish'd tale setting forth the extent of our acquaintance with the nervous mechanisms concerned in speech will probably prove rather disappointing, but no useful purpose is served by slurring over the difficulties of the subject, and until the gaps in our knowledge are clearly recognised, they are not likely to be filled.

Let us begin with the simplest case and consider only the reception and emission of vocal sounds. Vibrations of the air set up in the larynx of the speaker fall upon the tympanic membrane of the hearer. Modified in accordance with the physical limitations of the materials along which they are conveyed, they pass to the endings of the cochlear division of the eighth cranial nerve. Since the transmission of nerve impulses involves something other than simple vibration, the energy of the aërial vibrations has to be converted into some new form before it can produce its appropriate effect on the sensorium. Through devious channels, consisting of nerve fibres interrupted at one knows not how many synapses and cell exchanges, some portion of the energy eventually reaches the "auditory centre," which is believed to exist in the grey matter of the first temporal convolution of the left cerebral hemisphere. This region is apparently in direct communication with a "centre," situated somewhere about the hinder end of the inferior frontal convolution and the adjacent part of the ascending frontal convolution, which, when stimulated, will in turn prompt

the muscles of articulation to activity. That we have not even in this comparatively simple case to do merely with a reflex act is evident, since the muscles of articulation may or may not react, and the reaction, if it does occur, is not always the same; there must, consequently, be some intervening agency



Lichtheim. Kussmaul. Störring.

FIG. 1.—DIAGRAMS ILLUSTRATING DIFFERENT CONCEPTIONS OF THE RELATIONS OF THE "CENTRES" CONCERNED IN SPEECH.

M = Motor centre. *A* = Auditory centre. *C* = "Conceptual" centre.

M and *A* are "cortical"; regions central to *M* and *A* are "trans-cortical"; regions peripheral to *M* and *A* are "sub-cortical." Lesions of *M A* cause "conduction" aphasia. Seven types of aphasia—*i.e.*, motor and sensory forms of cortical, trans-cortical, and sub-cortical aphasia; and "conduction" aphasia—are thus theoretically possible.

and this we take to be a third "centre" of even less certain localisation than the others. As to the mode of connection of these three centres with one another, opinions differ. The diagrammatic representations given in Fig. 1, which illustrate the views of the three writers whose names are appended, are all equally plausible.

A word spoken in the circumstances just expounded would, however, be practically valueless: it would mean nothing—be simply *vox et præterea nihil.* Only by the contemporaneous reception of sense

impressions through other channels does a word acquire a meaning, and there are, besides words, the other channels of expression—gesture and writing—to be allowed for. Moreover, we believe all muscular movements to be sources of kinæsthetic impressions. Therefore, in trying to indicate by

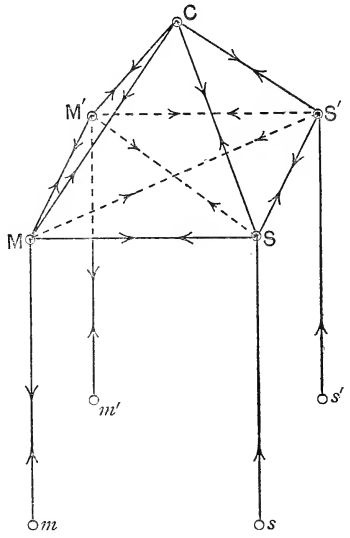


FIG. 2.

s, *s′*, Organs of special sense. *m*, *m′*, Muscular mechanisms of expression. *S*, Combined sensory projection, association and memory centres for auditory impressions. *S′*, Similar centres for visual and other impressions. *M*, Kinæsthetic and psycho-motor centre for articulation. *M′*, Kinæsthetic and psycho-motor centres for movements of writing and gesture. *C*, Controlling or co-ordinating centre or centres in the prefrontal cortex.

means of a diagram the course of the nerve impulses concerned in speech, we must introduce symbols corresponding to these other factors.

Fig. 2, which is sufficiently complex, represents these conditions in their simplest terms. The various "centres," the nature of which is shown in the

diagram, are supposed to be situated at the angles of a quadrangular pyramid, but this arrangement is a purely speculative one. To represent language which is merely thought and not spoken, and without such use of language thought is probably impossible, the diagram may be modified by omitting the lines $s S$ and $s' S'$, and disregarding the projection elements in the centres S S'.

This elaborate machinery may break down at any point and some day we may be in a position to locate the fault with the same precision as in the case of a trans-oceanic cable. At present we can only decide with some degree of probability whether the defect is sensory, motor, or psychic. Further reference to this topic, in so far as it concerns the feeble-minded, will be made in a subsequent chapter.

CHAPTER III

THE FEEBLE MIND

THE preceding description of "Mind" will apply to Minds of all kinds. It is therefore necessary to investigate the characteristics special to the feeble mind and this can only be done by erecting a standard of the normal mind for purposes of comparison. The normal mind is not, however, itself susceptible of accurate definition. It is a mind arbitrarily selected by each observer as representing the average mind of the community at large. No simple numerical formula will express the number, the affective tone, the degree of prominence in consciousness, and so on, of the ideas which make up a normal mind; but nevertheless it can be recognised that departure from the normal constitution of mind does occur, and feeble-mindedness is one of the modes of this departure. Its specific characters are, however, rather temporal than psychical, that is to say, it is distinguished rather by the time at which it appears than by its innate peculiarities. There are no mental phenomena accompanying the processes of cerebral degeneration which may not find their counterpart in defective development of the brain, and the legal employment of the term

"lunatic" as including "an idiot or person of unsound mind" is justified by experience. In all forms of insanity we find abnormalities in the various departments of mind which we have enumerated above, and in proceeding to consider these abnormalities as they appear in feeble-mindedness, we must remember that they do not, by themselves, afford a distinctive picture of that condition.

The analysis of the mental characteristics of the feeble-minded has not yet attained to any great degree of perfection, but it leads us to suppose that we have not to deal with any psychical elements in addition to those already enumerated. A paucity of presentations; an imperfect memory; anomalies of the affective process and limitation of the faculty of attention are the ground-work of mental incompetence. If, further, we admit the existence of an Ego distinct from the manifestations of mind which have an objective reality, we provide ourselves with a means of escape from any difficulties which the employment of the more limited scheme may involve us in.

It is desirable to distinguish, among the factors of mind, such as constitute the initial capital of the individual before personal experience has come into play. This is by no means easy, but a review of the whole position suggests that the only thing transmitted from one generation to another is that capacity for being modified by stimuli which Semon calls the "mneme." As a mere potentiality this can have no counterpart in consciousness until stirred into activity by the incidence of sensations. Without sensations the mind does not begin *to be* at all.

This is in accordance with the results of observation. We know that permanent impairment of even one sense, especially of sight or hearing, is a serious obstacle to normal intellectual development, and a person whose channels of communication with the outside world are extensively restricted does not rise beyond the lowest depths of idiocy.

Inherited capacity, or, as it has been called, "educability," probably differs in different persons, and a well-developed "mneme" will offset a poorly developed sensory apparatus. We need not, therefore, be surprised that in certain cases, *e.g.*, the famous ones of Laura Bridgman and Helen Keller, a painstaking effort on the part of tutors to utilise to the utmost the defective sensory channels has been rewarded by the production of a comparatively high degree of intelligence.

To appreciate fully the importance of sensation in the evolution of the individual mind, it must be remembered that the opening up of communication with the outside world does not begin at birth, but that for a long time prior to that event the mechanism of organic, and perhaps of tactile, sensibility may have been in operation.

The peculiarities of presentation, memory, affection, and attention above mentioned constitute the psychical, as distinct from the physical, symptoms of feeble-mindedness. Let us consider them in a little more detail :—

(1) *Paucity of Presentations.* This may be assumed when there is obviously defective sensibility, but it is difficult to demonstrate it directly, because a consciousness containing only isolated ideas, such,

for example, as that imagined by Condillac in his conception of a statue endowed, step by step, with sense impressions, is unknown to us.

(2) *Imperfection of Memory.* Dependent on memory are:

(*a*) The amount of the mental capital. Since the majority of the ideas in consciousness at any given time are re-presentations, the total content of the mind will be determined very largely by that property of the memory which is called "perseverance" (*cf.* p. 6).

(*b*) The faculty of association. An idea, as we have seen, can cause to be reproduced another with which it has been previously associated either simultaneously or after a short interval of time.

Defects of memory, then, whether as regards perseverance or the scope of the associations permitted, will have a most important bearing on the mental status. Those of the former kind give rise to abnormalities of perception, chiefly in the direction of insufficiency. Hallucinations and illusions are not conspicuous features of feeble-mindedness, so far as an observer is in a position to judge, though their existence may sometimes be inferred. Marked limitation of the field of association is a familiar symptom of idiocy. We meet, for instance, with children who are clearly hungry but who make no attempt to consume food placed before them since the ideas set up in their minds by it are not associated with the idea of satisfying hunger. We meet, too, with the burnt child who does not dread the fire or who, however frequently the

information has been imparted, cannot remember what letter comes after "a."

(3) *Anomalies of the Affective Process.* These may include :

(*a*) Quantitative abnormalities.

There is a certain parallelism between the gradations of the emotional state observable in the feeble-minded and the stages of affective evolution through which the normal mind passes. Idiots of the lowest grade seem to have no feelings at all. At a somewhat higher level they show signs of distinguishing a condition of repletion from one of hunger and thirst ; they may appear to derive some sort of gratification from sensations of colour, tone or sapidity ; and they respond to what, for the normal organism, are unpleasant stimuli in a way which suggests that they also find such stimuli displeasing. Anger and resentment occur at a still higher plane of development, and from this stage onward there may be found in increasing degree, joy and sorrow, hope and fear, like and dislike, and so on through the whole gamut of emotion. The excessive emotional reaction which the feeble-minded sometimes display does not necessarily indicate a more pronounced affective colouring of the ideas constituting the emotion, but is rather to be explained by a deficiency of those relatively neutral ideas which in the normal mind serve, if one may so put it, to "dilute" the emotion.

Owing to the relation which exists between the two we may appropriately pass from a consideration of the emotions to that of the instinctive activities. Many of our actions have an easily recognisable instinctive foundation even though it may be difficult

to decide where foundation gives place to superstructure. On account of this fundamental character defect in the sphere of instinct may be of crucial importance. The idiot with no instinct to seek food must lead a precarious existence. With no instinct of cleanliness it can never be other than a social outcast. With no instinct of imitation it is debarred from intellectual progress.

(*b*) A want of harmony between the affection and the idea with which it is connected.

If, as has been suggested, affections are "mental elements" distinct from and separable from ideas, they may be capable of reproduction in new combinations independently of the original ideas with which they were in relation. Such a capacity would impart a considerable degree of elasticity to the mental structure and to that extent render more intelligible the apparent want of harmony between idea and affection which is sometimes observable in the feeble-minded. Examples of the condition are afforded by the cases in which stimuli, of a kind to give pleasure to the normal individual, produce pain; or those in which, as in filth eating or other depravity of appetite, noxious substances are accepted as beneficial.

This possibility of a dissociation of idea and "affect" seems to lie at the root of the teachings of Professor Sigmund Freud,[1] though it is more particularly in connection with hysteria, neurasthenia,

[1] For an account of Freud's theories reference may be made to, among other works, his books, *Selected Papers on Hysteria and Other Psychoneuroses*, translated by A. A. Brill, 1909, and to *Zur Psychopathologie des Alltagslebens*, 1907; or to *Die psychoanalytische Methode Freuds*, by M. Isserlin in *Zeitschrift für die gesamte Neurologie und Psychiatrie*, Bd. 1, Mar., 1910.

impulsive insanity, and dementia præcox that his views have been promulgated. The field in which such dissociation is especially prone to occur is, according to Freud, that of the sexual life. A study of the lower animals shows us that the interest in reproduction may be as pronounced as the interest in nutrition. Although, as regards human beings, we are accustomed to ignore the influence of the reproductive instinct on conduct until the stage of sexual maturity is reached, the different phases of development through which that instinct has been passing since the organism acquired individuality may have left their impress on the mind's evolution, and it is conceivable that these forgotten factors may, in the case of certain feeble-minded persons, be supplying "affects" which, by coming into relation with ideas to which they did not originally belong, are responsible for the abnormalities displayed.

(4) *Limitation of the Faculty of Attention.*

It will have been gathered from the study of the mind, entered upon in a preceding chapter, that the degree of prominence of ideas in consciousness decides the lines on which the evolution of the mind shall proceed. Any limitation of the power of attending may, consequently, act as a restraining influence in the various departments of thought to which are given the names Judgment, Reasoning, Imagination, and Sentiment. In cases of feeble-mindedness the limitation may appear either (*a*) as a deficiency in the process of attention itself, or (*b*) in the consequences flowing from that deficiency.

(*a*) Indifference to stimuli which, in the case of the ordinary person, would compel attention is

observed in idiots, and such indifference is only intelligible as an abnormality of the receptive apparatus. Presentations vary in clearness with the quality and intensity of the sensations which originated them and with the state of the sense organs and of their central connections. For any particular stimulus, only the second factor, which Titchener calls the "psychophysical disposition," has to be taken into account. Sometimes the difficulty seems to arise in the province of voluntary attention. We meet with a class of feeble-minded persons whose salient characteristics are versatility and superficiality. Before one stimulus can be appreciated another is sought; nothing is retained because nothing is allowed to produce the necessary impression. Perceptions are not developed, because their fundamental ideas have not time to arouse the appropriate concomitants.

In another set of cases the prominent feature is a condition of apathy or torpor which seems to nullify the effort of attention. Here the mental inertia is so great that the will is powerless to overcome it, and therefore ideas never attain to that degree of prominence in consciousness which is required for the arousing of associations.

(*b*) Attention plays its part behind the scenes to so great an extent that the appearances on the psychic stage which we have so far noted represent but a small proportion of its activities. It is to the prominence of re-presentations rather than of presentations that we must look for an explanation of the higher mental processes. If the feeble-minded person does not reason, it is because he cannot

abstract and bring to the focus of his mental vision the particular elements of his idea complexes which it is necessary for him to compare. If he have "no imagination," it is because he cannot fix and sort out from the idea complexes those ideas, or groups of ideas, which are capable of being recombined into something approximately true to nature. If he be without sentiment, it is because not even feelings are capable of occupying a prominent place in his consciousness. Nor are these all the paths along which he can go astray. He may be wrong in his judgments, because he cannot envisage the ideas which he regards as alike sufficiently clearly to enable him to see that they are not alike. His imagination runs riot, as in dreams, because he cannot compare the new groupings which he has evoked with the standard of things as they are supplied to normal minds by experience. His sentiments are vicious because he has not light enough to enable him to choose the better part.

There are also other cases in which the ideas, which expediency would suggest should be prominent in consciousness, fail to occupy that position. In these, probably because they are marked by more of the phenomena which we have learned to associate with exercise of the will, the condition is usually described as due to defective volition. The most obvious case is that in which the supplanting of instincts by voluntarily controlled activities does not occur, or occurs only incompletely; and, in consequence, the adjustment of the individual to his environment is more or less imperfect. Of somewhat similar character are the instances of obsession,

or imperative idea in which the will is powerless to dethrone one idea from its seat at the focus of attention by attending to other ideas.

Ill-regulated instincts supply perhaps the largest group of symptoms observed in the feeble-minded. The instinct to feed may be displayed irrespective of times and seasons: the instinct of cleanliness may find channels of expression which involve much social inconvenience: the instinct of imitation may be incapable of direction only to profitable ends. Instinctive movements are not schooled into an orderly sequence of purposive activities, but show themselves as aimless wandering or the various swaying, nodding, twisting, and other movements embraced under the denomination "tics." In later life the instincts of curiosity, acquisitiveness, destructiveness, amativeness, and so on, will each require guidance by the will and, failing it, may give rise to various anti-social disorders of conduct.

The instinct for the employment of vocal or other signs in language is, perhaps, from a psychological standpoint, the one of most importance in the inherited mental outfit, although, without the development which education occasions, it would play but an insignificant part in the individual's life. Idiots find vent for their emotions in a vocabulary limited to cries of different pitch, timbre, and loudness, comparable with the variations in a dog's bark when the animal is hungry, angry, or frightened. Profitable development is dependent on the individual's power to form concepts. This is often overlooked by teachers of the feeble-minded, who do not realise that the parrot-like repetition of set phrases which

they proudly adduce as evidence of growing intelligence connotes no higher intellectual gifts than those of a parrot. It is because, on the one hand, we may find speech not based on reasoning and, on the other, reasoning unable, on account of a defective mechanism, to find expression in speech, that the mere ability to say certain words does not afford us, as Esquirol too hastily concluded, a satisfactory criterion in estimating mental capacity.

Feeble-minded persons display practically every form of abnormality of speech which is known to exist. Of these, such as have their origin in defective development are peculiar to the class, but since the genesis of the morbid condition is often doubtful, this fact is not of much value for purposes of classification. The most convenient arrangement seems to be one on the basis of the distinction between the main divisions of the linguistic apparatus, and we may therefore recognise three chief groups of speech defect, which do not, however, exclude one another.

(*a*) Those dependent on abnormality of the sensory apparatus :—To the child deaf from birth or from an early age there is available only the vocal material which has come to it by inheritance, and this limited capital, which is quite inadequate to the child's needs, is generally allowed to remain unutilised, the child consequently becoming dumb or only making occasional unintelligible noises eked out by gestures. In such cases it may be possible, by means of other channels, to impart some form of sign language in the use of which the child may attain to a quite remarkable facility.

Blindness which is congenital or of early occurrence need not, of course, affect the reception or emission of sounds, but it will affect their connotation and it will limit considerably inter-communication by means of the symbols which represent words, only such as can be appreciated also by the sense of touch being of any service.

(*b*) Those dependent on abnormality of the motor apparatus :—The machinery of gesture is so extensive and the scope of its employment so restricted that interference with this means of expression is of relatively little importance. Writing involves a smaller range of muscles and its utility is much greater than that of gesture, but even it can be so completely replaced by vocal speech that only the latter calls for notice at any great length. It may, however, be mentioned in passing, that peculiarities of the script analogous to stammering and stuttering are exhibited by the feeble-minded.

To such disturbances of the faculty of speaking as fall within the boundaries of the class under consideration the general term "dysarthria" may be applied. The originating lesion may be in the muscles of articulation, as in trophic or inflammatory changes ; or in the nerves supplying those muscles, as in section or toxic neuritis ; or in the grey matter from which issue the impulses necessary to set the muscles in motion, as in wasting of the bulbar nuclei ; or in the pyramidal tract ; and any of these lesions may serve as the exciting cause of the rest. There may, further, be structural defect of the accessory vocal apparatus, *e.g.*, cleft palate or dental malformation. Frequently it is not possible to

indicate the precise nature and position of the lesions, and consequently, it is impossible to exclude the psychic element, but, somewhat arbitrarily, we may regard the following as attributable rather to incompetence of the organs of expression than to lack of intelligence.

1. Aphonia. — This is a quantitative, not a qualitative, defect of speech. The voice is so low as to be almost inaudible, or the patient speaks in a whisper, or with an amount of effort quite disproportionate to the effect produced.

2. Stammering and stuttering.—These terms are applied indiscriminately by many English writers to conditions in which there is a difficulty in beginning to speak or a sudden interruption of speech, or a repetition of consonantal sounds in speaking. Even though these conditions are usually associated, it is convenient to describe spasmodic interruptions of speech as stammering and the reduplicative anomaly as stuttering.

3. Slurring, scanning, the stumbling over syllables, and the omission of syllables go to form a third group, in which lisping should, perhaps, also be included.

4. Aphthongia.—A rare condition in which an incapacitating spasm of the muscles of articulation occurs when speech is attempted.

5. Bradylalia ; bradylogia ; bradyglossia ; bradyphasia ; bradyphrasia ; are terms which have been applied in an indiscriminate fashion to various disorders of speech having in common the feature of slowness of utterance.

(*c*) Psychic or intellectual defects.—These are

characterised by an absence or a disorder of the mental concomitants of speech. A child may not speak because he has nothing to say, or he may speak in some abnormal fashion because his mental processes are in confusion. Such defects as these have, we must suppose, just as definite a physical basis as the sensory and motor ones already described, and since that basis is not capable of isolation from the sensory and motor apparatus, the recognition of a "psychic" group of morbid states is simply a matter of convenience. This consideration will justify the allocation to the present category of the conditions comprised under the name "aphasia," in which the lack of the power of exact expression is due to inadequacy of the receptive or the emissive mechanism, and also those which have their origin in retarded intellectual development and which Heller [1] entitles "dyslogic." The antithesis between aphasic and dyslogic forms is brought out, according to Heller, by the fact that in the latter the speech defect is secondary to the mental one, while in the former it is the limitation of mental power which is secondary.

Clinically, evidence of the existence of psychic defect of speech is afforded by :—

1. Noise-making. Some idiots make an endeavour to express their wants by crying, shouting, or shrieking noises which can hardly be dignified with the title of language.

2. Lalling. As we have seen, primitive efforts at articulate speech are made in early life, apparently as a result of inherited tendencies. This condition

[1] T. Heller, *Grundriss der Heilpädagogik*, 1904, p. 86.

may persist into later life, the child failing to acquire speech of the ordinary kind and contenting itself with mere babbling.

3. Idioglossia. This is a development of lalling, in which the person uses a private and peculiar language, omitting difficult consonants, or substituting for them easy ones, with fantastic results.

4. Agrammatism. With the limited vocabulary which alone is at his disposal in his earliest years, the child has to make single words do duty for many purposes. For him there is naturally no such thing as syntax, and the distinctions of noun and verb, adjective and adverb, preposition and conjunction, are refinements of which he knows nothing. The power of inflecting words, and arranging them to form sentences is acquired slowly, and the process of acquisition may be interrupted at any stage if the development of the brain ceases. Liebmann[1] describes three forms of agrammatism as met with in the feeble-minded. In the first, only what may be called "key-words" are employed. Thus the word "gee-gee" may be applied to anything which moves, and may indicate the presence of that thing, or any emotion which its appearance has aroused. In the second, the key-words are put together to make the skeleton of a sentence, *e.g.*, "Nana milk give," while in the third, the differentiation of the grammatical classes of words causes this skeleton to be filled out so as to make a sentence of bizarre construction, as in the examples quoted by Liebmann —"Milk get we for the cow butter," "She drinks

[1] A. Liebmann, *v.* Art. "Agrammatismus," in *Enzyklopädisches Handbuch der Heilpädagogik*, 1909.

the woman on the glass." It would appear that in these cases the mental limitation is not so marked as might be expected from the attempts at speech, for the persons concerned may be found to understand much more complicated sentences than they themselves give utterance to.

5. Echolalia. Normal children sometimes repeat what is said to them, apparently with the object of assisting apprehension by strengthening their auditory impressions with kinæsthetic ones, and a somewhat similar practice is occasionally observed among the feeble-minded, though it is perhaps more characteristic of some forms of primary dementia.

6. Verbigeration. This also is most frequently met with, in a well-marked form, as a symptom of primary dementia, but idiots will sometimes occupy themselves for long periods with the repetition of some word or sound, which conveys no meaning to the hearer, and, so far as can be judged, has no significance for the utterer.

7. Word-blindness and word-deafness. In children of a higher grade than the imbecile, there are met with certain intellectual defects of limited extent which take the form of inability to learn to read, or of incapacity to apprehend the significance of spoken words. These conditions, known respectively as word-blindness, and word-deafness, are said to be dependent on definite anatomical abnormalities, referable either to developmental defect, or to a lesion, which may be found in particular regions of the cerebrum. Cases of the kind have been described by many writers, among the most recent

accounts, being those of C. J. Thomas[1] and J. H. Fisher.[2]

There is one manifestation of abnormal tendency in the employment of language which has acquired, in the popular conception of idiocy, a prominence attributable to its curious character rather than to its value as a guide to the mental state. This is what is called "Mirror Writing." One finds rather widely prevalent, the notion that a distinctive characteristic of idiocy is that whereas the normal person writes from left to right and with the right hand, the idiot writes from right to left, with the left hand. What really does happen is, on the face of it, sufficiently remarkable: in certain cases the attempts at writing which the feeble-minded person makes, result in the production of a script which is meaningless until it is held before a mirror, when one is able to decipher it in just the same way as one can decipher the marks on a piece of blotting-paper which has been used to dry ordinary script. Good examples of this kind of writing are rare, at any rate in this country; for idiots either do not write at all, or they produce a scrawl which demands the use of a good deal of ingenuity, in addition to a mirror, if anything is to be made of it. The example given, which is the best that the writer has been able to obtain, will bear out this statement (Fig. 3).

Mirror writing occurs in idiots who are capable of a limited degree of caligraphic attainment but incapable of learning to write properly. The explan-

[1] C. J. Thomas, *The Aphasias of Childhood and Educational Hygiene*, Public Health, May, 1908.

[2] J. H. Fisher, *Lancet*, May 14th, 1910, p. 1348.

ation of its occurrence is probably to be found, as suggested by Heller [1] and Wegener, in the natural tendency of movements at one side of the body to be accompanied by symmetrical movements at the other side. In mirror writing, for some reason, the

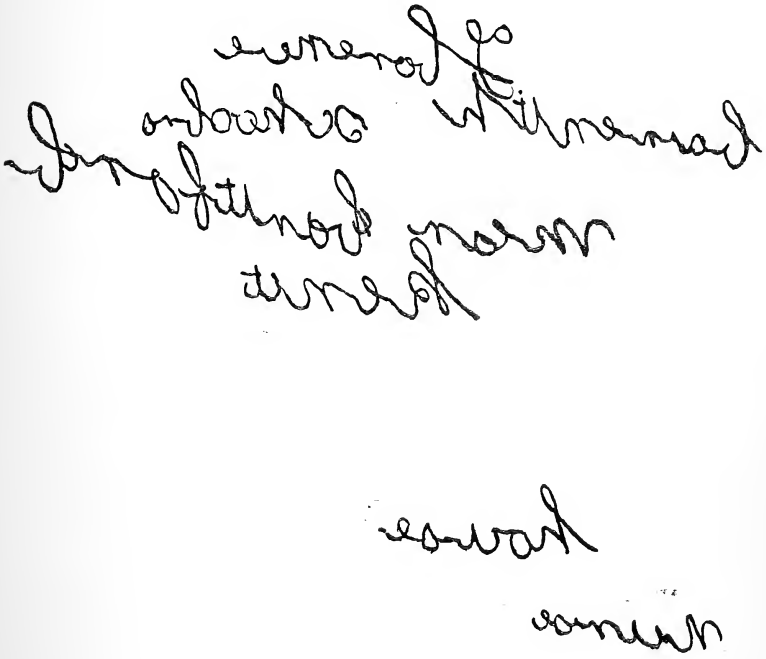


FIG. 3.

attention is directed to what should be the subsidiary movement, *i.e.*, that of the left hand ; and the idea of this movement, in consequence, becomes the more prominent one and therefore controls the form which the activity takes. Ambidexterity, as we shall see, is commoner in idiots than in normal persons and the particular accomplishment which we are considering seems to be merely a special case of it.

[1] T. Heller, *op. cit.*, p. 118.

Having provisionally accepted the hypothesis of an Ego distinct from, and capable of controlling, consciousness, we may as well utilise it to account for the existence of certain mental abnormalities which, while having points of contact with the four groups above enumerated, cannot be easily referred to any one of them. These are the phenomena known as delusions, of which the most prominent characteristic is their dependence on the "Self." The term self is employed with various connotations, but the most intelligible, if not necessarily the most accurate, use of the word is as a name for the assumed entity, which has the relation of subject to the various objective manifestations of mind—the entity which experiences, remembers, imagines, reasons, and wills, in short, thinks ; as distinct from the group of ideas and affections which constitute the raw material of the process. The aberrations of the self in thinking may be temporary and, consequently, of only transient effect, or they may be of such a character as to indicate a permanent "set" in the direction of falsity. In the latter case we get that persistent failure to adapt the mental workings to the conditions imposed by the environment which constitutes delusion. The more highly organised the mind, the greater is the scope for a mischievous self to play pranks with it, and since deficient organisation is the essence of feeble-mindedness, there is no large field for the production of delusions, which are, in fact, an insignificant feature of the undeveloped mind.

Whatever may be the causes producing defective development of the nervous system, it would appear

that their incidence on all parts of that system need not be the same. It is possible, consequently, to have one portion of the apparatus proceeding to attain maturity, while other systems lag behind to a greater or less extent. When this happens, we get ability in some particular field standing out conspicuously against a background of unintellectuality. The contrast is sometimes so striking as to give the impression of phenomenal capacity as regards the department of knowledge concerned, but this appearance is probably misleading. In their own special lines, the "idiots savants," as persons exhibiting the features under consideration are called, are not superior to persons whose general mental level is normal. The exceptional ability of the feeble-minded shows itself more especially in the provinces of mathematics and the arts. Many instances of this kind have now been placed on record. Heller[1] mentions the case of a child of ten whose sole interest in life was to count. When out walking he counted the passing men, horses, and vehicles; the windows and doors of the houses; the number of men with brown or with black boots; those with moustaches; those with whiskers; and so on. Books appealed to him as affording facilities for enumeration, he counted the pages, the words and the letters. Other feeble-minded persons show a noteworthy aptitude for remembering dates, and Sengelmann[2] has reported the case of an imbecile who learned the names and corresponding numbers

[1] T. Heller, *op. cit.*, p. 143.

[2] Quoted from *Handbuch der Schwachsinnigenfürsorge*, by H. Bösbauer, L. Miklas and H. Schiner, 1909, p. 43.

of more than 150 scholars whom he had never seen and for whom the identity of the numbers with the persons was so complete that when he saw the numbers of the hymns on the board in the church which he attended he would say "To-day Meyer's, Müller's, Schröder's songs have been sung."

Of the feats referred to, the first would not, of course, be beyond the power of any normal ten-year old child who was silly enough to attempt it, and as regards the others they have been surpassed by apparently sane persons. A correspondent of *The Daily Telegraph*, for example, has drawn attention to the doings of the youthful son of a well-known American physician, who is said to have been admitted to Harvard University at the age of eleven years and to have been lecturing on advanced mathematics a few months later. Again, as Heller points out, while the famous arithmeticians Zacharius Dase, Buxton, Frankl, and Zaneboni were more or less imbecile, this could not be said of Gauss, Ampère, and Bidder, who were not inferior to them in mathematical gifts. Heller regards Colburn also as having been feeble-minded, but the evidence is hardly sufficient to warrant him in this. In music a similar state of things is met with. Before the Royal Commission on the Feeble-Minded, Mr. W. H. Illingworth[1] described, in the following words, the capabilities of a blind and mentally defective child under his care, "if one sitting at a pianoforte, tuned high or tuned low pitch, strikes as many keys as he can, let it be the finest chord or most ear-

[1] W. H. Illingworth, *Rep. of the Roy. Comm. on the Care and Control of the Feeble-Minded*, vol. 2, p. 276.

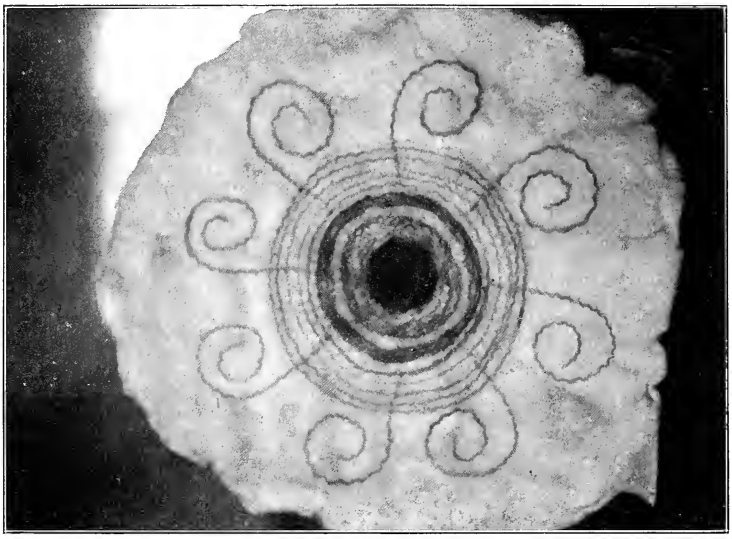


FIG. 4.—Design in coloured threads on a layer of cotton-wool. Made by an idiot, without tuition.

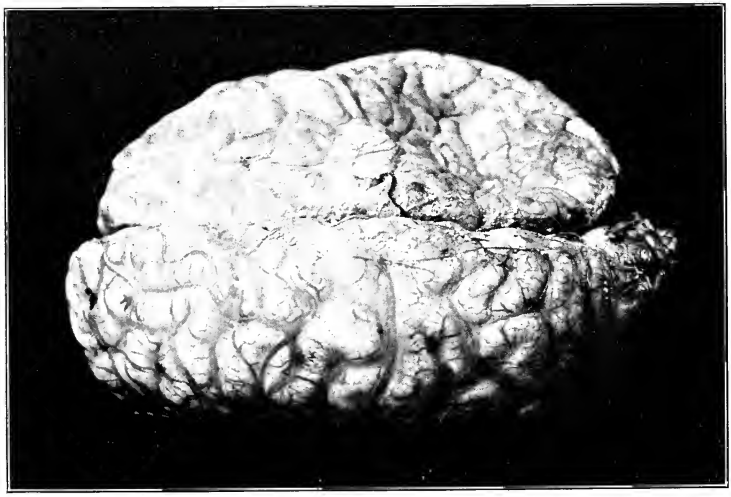


FIG. 5.—Brain of an epileptic idiot aged 18 ; weight of left hemisphere $17\frac{3}{4}$ oz., of the right hemisphere $6\frac{3}{4}$ oz. The opacity of the pia-arachnoid is well shown.

[*Face page* 91.

splitting discord, this boy will name every note struck without the smallest slip or error." There have been sane musicians who could do as much, and probably Mozart, at the same age, could have done a good deal more in the way of contributing to musical knowledge.

Notable aptitude for sketching, for caricaturing, for drawing plans, and for modelling, has been recorded by various observers. An idiot formerly under the writer's care used to amuse himself for hours by preparing elegant designs in coloured wools. A copy of one of these is shown in the accompanying illustration (Fig. 4) which does not, however, do full justice to it, since the different colours are not shown in the photograph. The strands of wool drawn out from any articles of clothing or decoration which happened to fall into the boy's hands are arranged on a pad of cotton wool obtained from the attendant in charge. Dr. Tredgold[1] has described at length the case of a patient at Earlswood Asylum who displayed a considerable amount of artistic and mechanical skill.

[1] A. F. Tredgold, *Mental Deficiency*, 1908, p. 275.

CHAPTER IV

THE BASIS OF THE FEEBLE MIND

The exposition of the physical conditions associated with feebleness of the mind will be facilitated if, as the result of a preliminary survey, the outlines of a scheme of more detailed study be sketched. Let us begin then by considering the salient features of feeble-minded persons, and so arrive at a series of categories into which the particular facts observed and any additions to them may be distributed.

Well-marked cases of mental defect will provide the best introduction to the subject. If one observes a group of idiots, one finds that they display bodily abnormalities in great variety and in much higher proportion than would a group of persons of corresponding social status and of sound mind. Poor general development; deformities of head, trunk, and limbs; irregularities of muscular action, *e.g.*, paralysis, spasm, or inco-ordination; defects of the organs of special sense and of speech, are common. After death the viscera may be found to be of less than normal weight and to present structural differences from the organs of healthy

persons. The brain in particular may display, in some cases to the unaided eye and in some cases under the microscope, wide departures from the standard of normality which anatomy has provided us with.

To the interpretation of these appearances some postulates are necessary. Let it be granted that the existence of mind is conditioned by the existence of nervous tissue. Let it be granted, further, that the units of nervous tissue are cells with processes. "I am sometimes tempted to ask," says Dr. W. W. Ireland, "Is the assumption correct that we have reached through the highest power of the microscope the ultimate elements of the brain?"[1] The question is interesting, but as no satisfactory answer is forthcoming from Dr. Ireland or from anyone else we need not let it prevent our accepting the above dicta. For an explanation of mental abnormality we must look then to the state of the nerve cells. But man does not consist of nerve cells alone, and the health of the nerve cells is dependent, to an extent which we cannot as yet exactly define, on the integrity of cells in other parts of the body.

The development of an individual human being from a fertilised egg-cell is the resultant of certain obscure forces which can be roughly classified with the help of the evolutionary hypothesis. Primitive bioplasm has a power of responding to stimulation which becomes more marked as differentiation in the direction of nervous tissue takes place, but is not lost even when the differentiation is in some other

[1] W. W. Ireland, *The Mental Affections of Children*, 1900, p. 72.

direction. The state of any particular cell and, consequently, of any aggregate of cells such as that constituting a tissue in a highly organised type like Man, will depend on its intrinsic power of response ; on the mysterious control of its nutrition which we ascribe to the trophic influence of the nervous system ; and on the control of its functional activity which may be exercised by the nervous system. Nervous and non-nervous cells are thus mutually dependent and we need not therefore be surprised to find that one system does not suffer without involving the other in its misfortunes.

The physical factors of feeble-mindedness are to be sought then in the following fields.

(1) The nature and relations of the nerve cells.

(2) The nature and relations of non-nervous elements.

Since in any given case it may be, and probably will be, impossible to assign the pathological condition observed to its exact position in the above scheme, the suggested fields must be regarded as overlapping to a greater or less extent.

In preparing this account of the pathology of feeble-mindedness, use has been made of several series of cases at some time under the writer's care. Different aspects of the subject have been under review at the times when the different series were worked over, so that the total number of cases is not available as a basis for statistics in regard to each point dealt with. The various groups which have supplied data will, however, be sufficiently indicated in connection with the special points they serve to illustrate.

The notes on the post-mortem appearances, *i.e.*, on what is ordinarily included under pathological anatomy, are derived from the study of the bodies of the patients comprised in the following series :—

A. One hundred males between the ages of sixteen and forty-nine years. These patients were all idiots or imbeciles, so that the degree of mental impairment exhibited during life was considerable. No cases diagnosed during life as general paralysis of the insane are included.

A′. One hundred males corresponding in the main to series A, but modified so as to comprise fifty epileptic and fifty non-epileptic patients.

B. A number of persons of all ages and both sexes in regard to whom the reports of the autopsies are less complete.

An investigation of the abnormalities observable during life was conducted with the help of the following material :—

C. A series of 150 male patients at the Belmont Asylum. The ages of these ranged from sixteen to fifty years.

D. A series of 250 male children and 250 female children between the ages of five and sixteen years.

E. A series of 100 males between the ages of sixteen and forty years who were subjected to a special craniometric examination by Dr. R. J. Gladstone.

The cases in series D and E were inmates of the Darenth Industrial Colony and Training School for Imbeciles.

(1) *The nature and relations of the nerve-cells.*—These may be observed directly or may be inferred from the results of the activities of the nerve cells. They may be conveniently studied from three points of view.

(*a*) *The number of the nerve-cells.*—Pathologists are very generally of opinion that a normal mind is never found associated with a brain of less than a certain weight, *e.g.*, 36 ozs. for an adult human being. Above the limit mentioned there is no simple relation between the weight of the brain and the degree of mental capacity, but it is worthy of note that the mean weight of the brain in mentally defective persons is definitely below the mean weight of normal brains. In series A the brains ranged from a maximum of 55 ozs. to a minimum of $15\frac{1}{4}$ ozs.[1] giving a mean of about 42 ozs., whereas the average weight of the brain in mentally normal male adults, as ascertained for me by Dr. Braxton Hicks, was 49 ozs., an estimate agreeing with that generally accepted.

A paucity of nerve cells such as is here suggested may be due to the fact that an adequate supply has never been provided or to the loss of cells formerly present, and the mere absence of cells does not throw any light on the matter. There is, however, reason to think that both factors play their parts in the production of the "feeble" brain. An obvious gap in a layer of nerve-cells such as some of my preparations have shown, affords strong evidence that cells

[1] This brain had been preserved in formalin, a method which, according to Harper (*v. Archives of Neurology*, vol. iii., 1907, p. 202), adds 10% to the weight.

once present have been replaced by something else. That "something" is usually the neuroglia and this aspect of the lack of cells can be dealt with more satisfactorily when that tissue is being considered. It appears, however, that in the brains of the feeble-minded there is an actual non-development of nerve-cells. This, at any rate, is the deduction from his careful measurements of the cortical layers which was made by Dr. J. S. Bolton whose paper in the Archives of Neurology[1] is worthy of careful study.

(*b*) *The quality of the nerve-cells.*—The normal histology of the brain has hardly, as yet, been worked out with sufficient thoroughness to render practicable a correct interpretation of the appearances observed when the nerve-cells of defective brains are studied microscopically. Bevan Lewis and Tredgold have described an embryonic type of cell with few processes, large ovoid nucleus, and rounded contour as specially characteristic of mental deficiency. By the former these cells were thought to occur only in cases complicated by epilepsy, but the latter observer does not agree with this view. Tredgold[2] has described pigmentation of the cortical nerve cells and the writer's own preparations from other regions of the brain have afforded instances of a similar condition. Of the cases in series A, fifteen were examined microscopically after staining by Nissl's method, the regions from which sections were taken being usually the hippocampal gyrus and

[1] J. S. Bolton, "The Histological Basis of Amentia and Dementia," *Archives of Neurology*, vol. 2, 1903, p. 424.

[2] A. F. Tredgold, *Mental Deficiency*, 1908, p. 58

the red nucleus. In most of the brains there was evidence of nerve-cell degeneration, which amounted in the slighter cases to chromatolysis and in the more advanced to loss of the cell processes, swelling of the nucleus, and disintegration.

(*c*) *The proportion of the different types of cells.*—While admitting that nerve-cells are the physical basis of mind, one has to recognise that, apparently, all nerve cells are not of equal importance in the production of psychical manifestations. The physiological activity of some of the nerve cells does not appear to affect consciousness perceptibly, while that of others commands instant attention. As a result of piecing together odd fragments of knowledge acquired in the course of ages, we have come to regard the cells in the cortex of the cerebral hemispheres as especially endowed with the function of "mentation," and as the amount of white matter in the hemispheres is dependent on the amount of grey, we might expect that the mass of the hemispheres, as compared with that of the whole brain, would be proportionately less than in normal brains. "The statistics of various observers," says W. Ford Robertson, "appear to prove that the smaller average weight of the brain of the insane as compared with those of the mentally sound is dependent upon the cerebral hemispheres alone."[1] In order to discover whether the principle so enunciated applied to the brains of the feeble-minded the ratio of the weight of the cerebrum to that of the whole encephalon was

[1] W. Ford Robertson, *A Text-book of Pathology in Relation to Mental Diseases*, 1900, p. 279.

worked out for the brains in series A. The proportion varied widely in the different cases, ranging from a maximum of 92% to a minimum of 77%, the mean of the 100 brains being 87%. On the strength of observations made by Huschke, the ratio of the cerebrum to that of the whole brain in normal persons has also been stated as 87 to 100. Dr. Braxton Hicks, Assistant Pathologist to the Westminster Hospital, has supplied me with a set of figures derived from the brains of twenty-five mentally sound male patients for comparison with those obtained from the idiot and imbecile patients in series A. The ratio of cerebrum to whole brain varied from 89% to 82%, *i.e.*, not nearly so widely as in the case of the mentally defective persons, but the mean ratio was only 85·5%. *i.e.*, 1·5% below the mean for series A. We get therefore no corroboration of the view that in idiots and imbeciles the cerebrum is relatively less developed than in the sane, indeed the evidence points in the opposite direction.

A common feature of idiot and imbecile brains, which may be conveniently dealt with here, is Asymmetry, shown particularly by a difference in weight of the cerebral hemispheres with which is associated a difference in the opposite direction between the weight of the lateral lobes of the cerebellum. Differences of this kind occur also in normal persons, but rarely to a marked extent.

In one case of series A, the right cerebral hemisphere weighed $6\frac{3}{4}$ ozs., the left $17\frac{3}{4}$ ozs., while the

right lobe of the cerebellum weighed $2\frac{1}{4}$ ozs. and the left $1\frac{3}{4}$ ozs.; in another the weights were:

Right hemisphere		$19\frac{3}{4}$ ozs.
Left hemisphere		13 ozs.
Cerebellum	right lobe	2 ozs.
	left lobe	$2\frac{1}{4}$ ozs.

These were the brains shown in Figs. 5, 6 and 7.

The relation of asymmetry to the mental state is not always clear. In the most marked cases there are usually associated with it sensory and motor defects of one half of the body which are not, apparently, of great psychical moment. There must be, however, in addition, a disturbance of the psychical equilibrium which may have far-reaching consequences. The frequency with which epileptic seizures were known to have occurred in patients exhibiting cerebral asymmetry led the writer to enquire to what extent this relation was to be regarded as merely accidental. For this purpose a series of a hundred brains corresponding in part to series A, but selected so as to comprise the brains of fifty epileptic and fifty non-epileptic idiots and imbeciles (series A′) was weighed and the difference between the weights of the two hemispheres noted. Among the epileptics there was no difference in fourteen cases; in three of the remaining thirty-six the differences recorded were respectively 11 ozs., $9\frac{3}{4}$ ozs., and $6\frac{3}{4}$ ozs., and the mean difference for the whole fifty brains was 1·19 ozs. Of the non-epileptic brains, one, a case of cerebral tumour, had the right hemisphere weighing $6\frac{3}{4}$ ozs. more than the left, but apart from this the greatest difference

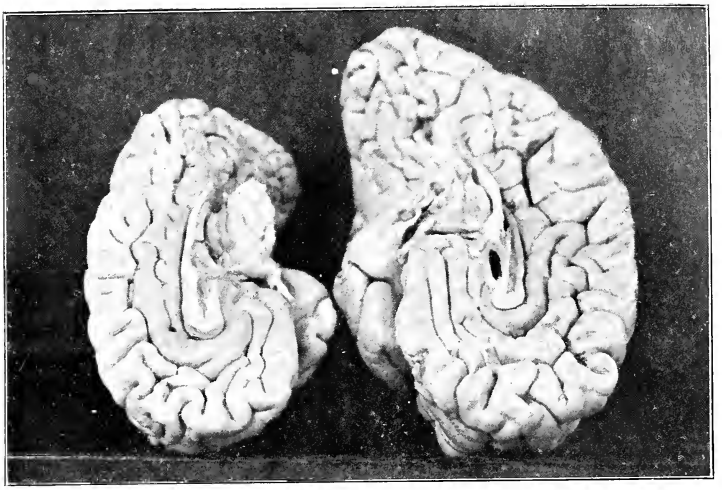


FIG. 6.—The same brain as in Fig. 5. The hemispheres are separated and placed so as to emphasise the difference in size.

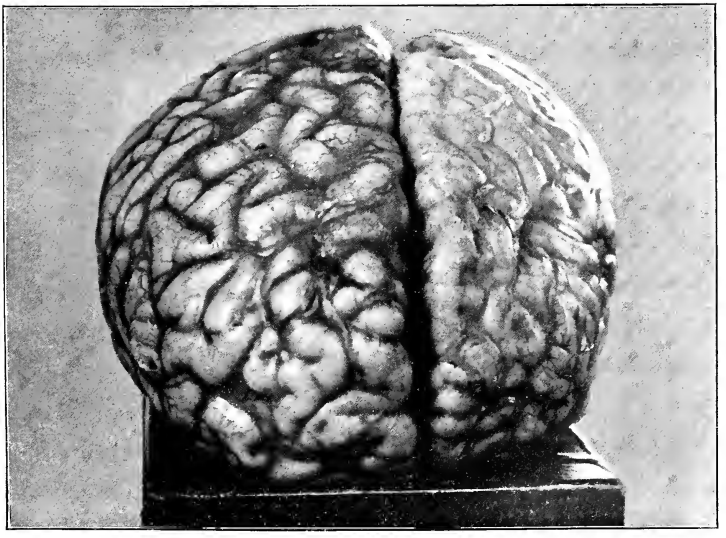


FIG. 7.—Brain of an epileptic idiot seen from the front. The right hemisphere weighed $19\frac{3}{4}$ oz.; the left, 13 oz. Note the opacity of the pia-arachnoid over the left hemisphere.

[*Face page* 100.

observed was 3 ozs. (in two cases). In twenty-one cases there was no difference, and the mean difference for the whole series was ·59 oz. Too much stress must not be laid on the curious fact that the ratio of the two means is almost exactly 2 : 1, but it certainly appears that, as detected by weighing, asymmetry occurs in the brains of epileptic idiots and imbeciles to a much greater extent than in non-epileptics of the same class.

The cerebrum may also show departures from the normal condition as regards the folds into which the cortical region is thrown. The term "normal" in this connection is sufficiently elastic to cover a good deal of variety in the arrangement of the cerebral convolutions, but healthy brains do not show such extreme diversity as is found in the brains of mentally defective persons of low grade. The difficulty of correlating the observed abnormalities with the peculiarities of the mental state prevents our attaching great importance to the convolutional pattern of the brain. It will suffice to call attention to the most striking features of idiot brains from the topographical standpoint.

The cerebral hemispheres, as met with in persons of normal development, though presenting numerous differences in detail, conform to a certain standard as regards the disposition of the chief folds and furrows which the surface exhibits. The fissures of Sylvius and Rolando and those fissures or sulci known as the parieto-occipital, the calcarine, the intra-parietal, the parallel and the collateral, to name only the chief, have a fairly constant relation to each other in the brains of the sane. This convolutional

pattern is, however, often departed from in the brains of idiots and imbeciles, especially when the brain is very small. The brain depicted in Figs. 16—18 affords a good example of such an abnormality. At both sides the parieto-occipital fissure is confluent with the intra-parietal, while at the right side the fissures of Sylvius and Rolando are merged in a single furrow. Apart from such striking anomalies as these, it was noted that very generally the brains in series A showed, as compared with the normal brain, a simplicity in the convolutional arrangement suggestive of the conditions found in animals of a much lower grade than that attained to by Man.

Apparently any region of the cerebrum may display convolutions which are much larger or much smaller than the average size for the brain. The former condition, called macrogyria,[1] is rarely pronounced, and the large convolutions seem to be due simply to a more or less perfect fusion of ordinary convolutions.

Microgyria, in which some of the convolutions are unduly small, is of more frequent occurrence. Two types of it can be recognised. In the first, which is illustrated in Fig. 8, there appears to be a simple under-development of some particular portion of the cortex. In the second, which will be better dealt with later, the smallness of the convolutions is to be explained as the result of atrophic changes.

Marked disturbance of the arrangement of the convolutions is found also in the condition known as

[1] Schwalbe (*Die Morphologie der Missbildungen des Menschen und der Tiere*) follows Oekonomakis in preferring the term "pachygyria."

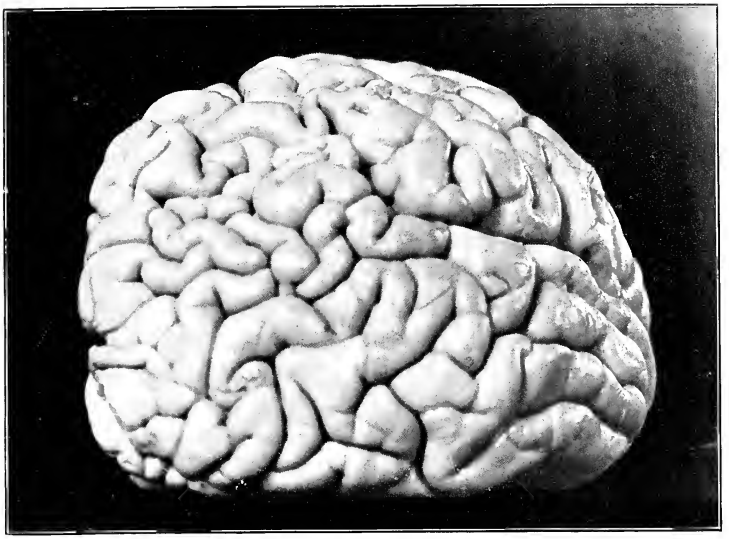


FIG. 8.—Parietal region of the right hemisphere of an idiot boy aged 17, showing microgyria.

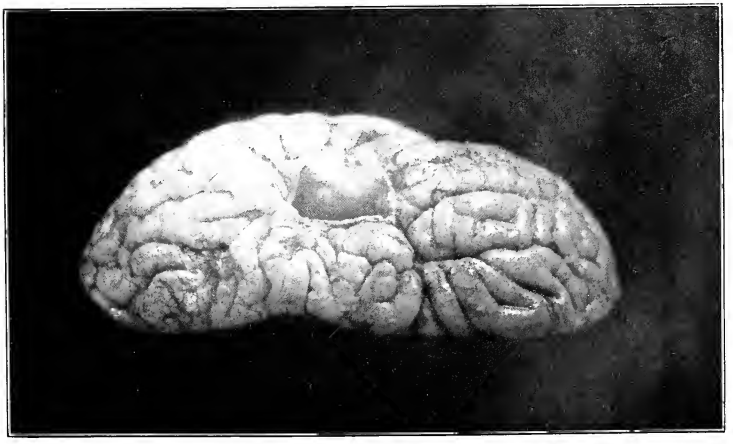


FIG. 9.—Left hemisphere of the brain of an idiot, showing a condition of true porencephaly.

[*Face page* 102.

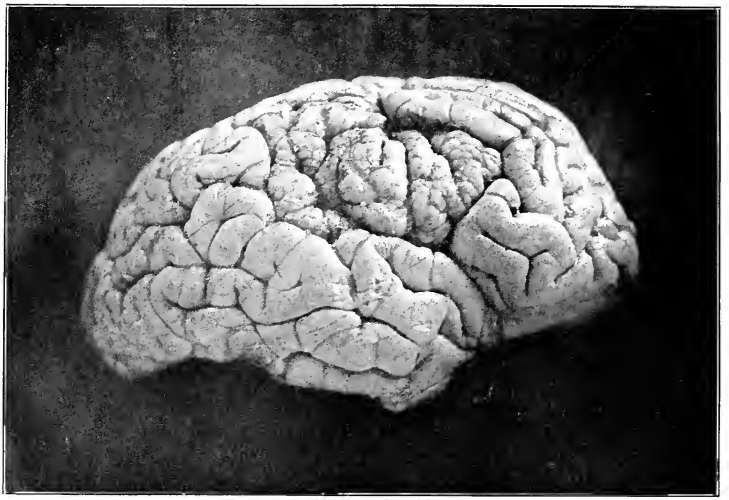


FIG. 10.—The right hemisphere of the brain represented in Fig. 9, showing, instead of a perforation of the ventricular wall, a depressed area with irregular convolutions.

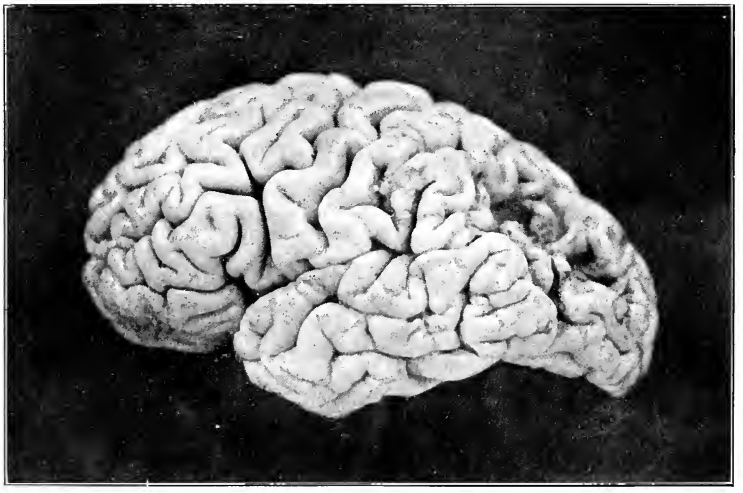


FIG. 11.—Brain showing the condition known as pseudo-porencephaly.

[*Face page* 103.

porencephaly, in which there is a gap in one or both of the cerebral hemispheres, the resulting cavity, in a well-defined case, being continuous with the lateral ventricle. As in the case of microgyria, two forms of porencephaly are met with. Both seem to own a vascular origin, but in the first the defect is developmental and to be attributed to a want of growth of certain parts owing to the absence of a sufficient supply of blood to them, while in the second it is consequent on a breaking down of tissue in the affected part following thrombosis or embolism of the vessels leading to it. In the former type the region affected is usually that supplied by the middle cerebral artery, so that the perforation is found either about the posterior part of the Sylvian fissure, as in the brain shown in Fig. 9, or along the whole length of the normal site of that fissure, as in the case described and figured by Conolly Norman and Alec Frazer.[1] As will be seen from Fig. 9 the occurrence of this type of porencephaly is associated with a radial arrangement of the convolutions about the cavity which makes the ordinary nomenclature inapplicable. This brain was from an infant female idiot not included in series A. One case in the series, that of a male aged at death 37 years, showed a condition of porencephaly affecting the greater part of the middle and lower frontal convolutions at the right side. In both cases the remaining hemisphere was also abnormal, though there was no perforation (*v.* Fig. 10). Fig. 11 shows the second type of porencephaly. The brain was that of a

[1] Conolly Norman and Alec Frazer, "A Case of Porencephaly," *Journal of Mental Science*, Oct., 1894.

female who died at the age of 73 years in a demented condition. In this instance the mental defect was probably not congenital, but, as illustrating a point in pathological anatomy, the case will serve.

The cerebrum is not the only part of the brain to exhibit abnormality; both the cerebellum and the spinal cord may be involved in the morbid conditions which have given rise to mental defect. In addition to the asymmetry and the relative smallness as compared with the cerebrum which have been already referred to, the cerebellum may show complete failure of development of one or other hemisphere, sclerosis, microgyria, agyria, or heterotopia (*v. infra*). A moulding of the hinder region to the shape of the foramen magnum was several times observed in association with hydrocephalus, apparently owing to the increase in the intra-cranial pressure, and there are on record cases in which this process of compression has advanced so far that the fourth ventricle has been obliterated or the cerebellum has been flattened out over the upper part of the spinal cord.

The medulla oblongata has been found deformed, especially in the direction of a more or less complete splitting into two lateral portions, and similar division of the cord has been noted. One of seven cords examined from series A showed a condition of hydromyelia, and heterotopia occurs in the cord just as in other parts of the central nervous system. It has been laid down by Flechsig and others that nerve fibres of the medullated order do not become efficient until the medullary sheath is developed

Certain of the nerve fibres, *e.g.*, those of the pyramidal tract, do not ordinarily become medullated until after birth, and it appears that the acquisition of voluntary control proceeds *pari passu* with the myelination of the fibres of those tracts. It might, consequently, be expected that the defective volition of idiots would be associated with a want of development of the pyramidal tract fibres. This anticipation is not fully realised. Sections of the spinal cord in idiots show areas of degeneration corresponding to gross cerebral lesions, but there does not seem to be in cases of congenital mental defect characterised by volitional incapacity a persistence of the primitive condition of non-myelination such as would explain the patients' deficiency in this respect. In seven cords from cases in series A no very definite features which could be correlated with the mental state were observed, but, in several, degenerated nerve fibres were found scattered through the white matter.

As was noted when the basis of the normal mind was under consideration, the nerve cells in the cerebrum have not all the same function. A disproportion, as compared with the ratio observed in the normal brain, in the cortical areas corresponding to sensorimotor and associational functions is often observable in the brains of idiots, but it follows no simple rule, and its relation to the character of the mental defect is not usually obvious. Sometimes, as in several of the brains figured, the distinction between the lobes is so much obscured that it is difficult to decide what regions are to be compared with normal sensorimotor and association areas.

If, proceeding a stage further, we try to infer the kind or degree of mental defect from the proportions of small, medium and large pyramidal cells, to say nothing of the other varieties of nerve cells, in a particular portion of the cortex of an idiot's brain, our ignorance of the respective functions of these different types of cells in the normal cortex prevents our arriving at very definite conclusions. Some valuable information on the subject has, however, been contributed by J. S. Bolton,[1] who has measured in a number of brains the thickness of the different cortical layers. Four imbecile brains examined by him showed marked reduction in this respect as compared with the normal brain. This appears from the following table, in which, the whole thickness of the normal cortex being represented by 100, the average thickness of each of the various layers was approximately as stated.

No. of layer.	Normal brain.	Imbecile brain.
1. Superficial fibres	14·5	13·5
2. Pyramidal	44	35·5
3. Granular	13	10
4. Inner fibres	12·5	10·5
5. Polymorphic cell	16	14·5
	100	84

It is interesting to note that the ratio of the different kinds of cells in the brain of the imbecile when estimated by this method does not differ in any significant way from the ratio in the healthy brain.

(*d*) *The connections of the nerve-cells.*—In the chapter on the basis of the normal mind reference has

[1] J. S. Bolton, *loc. cit.*

already been made to the conflicting views which are held by rival schools of anatomists as to the nature of the connection between the nerve-cells. Such connection is admittedly effected by means of the processes given off from the cells, but whether the processes are actually continuous with one another or not remains in doubt. The neuronic doctrine which assumes the existence of gaps or "synapses" between the processes has something to recommend it in that it greatly facilitates the explanation of the way in which the nerve-cells interact. At any rate it is clear that undue separation of nerve-cells, or rather of their processes, would involve serious interference with the proper performance of their functions, and it is possible that this is one of the ways in which the overgrowth of neuroglia, which diseased brains sometimes show, produces its injurious effects.

The particular conformation of the central nervous system with which we are familiar, although no doubt determined by efficient if not very intelligible forces, does not appear theoretically to be essential to the proper performance of its functions. A given mass of nerve-cells might conceivably be arranged in different ways without interruption of the communicating channels between the cells. Abnormality in the relative distribution of grey and white matter in the brain may consequently be of little or much significance from a psychic standpoint. Heterotopia, as this condition is called, occasionally occurs in association with mental defect. The few cases known exhibit considerable diversity as to form. Von Monakow described six types, and later

H. Vogt arranged the recorded cases in five groups. A review of their respective schemes is given by Schwalbe.[1] For a detailed study of a case reference may be made to the paper by H. G. Stewart[2] in the Archives of Neurology and Psychiatry. Another rare abnormality is absence of the corpus callosum. Of this condition there was one instance in series A, the hemispheres being connected dorsally to the third ventricle only by a thin band of tissue continuous with the lining of the lateral ventricles.

(2) *The nature and relations of non-nervous cells.* —It is something more than an accidental circumstance that, as recorded in every description of the feeble-minded which aims at completeness, bodily defects should occupy so prominent a place in the clinical picture. A section on the "physical" characteristics or "bodily symptoms" is a recognised institution in the preparation of a text-book dealing with the feeble-minded, and it would be improper to disregard this aspect of the subject. It would be well, however, to adopt a somewhat more critical attitude than is usually taken up in assigning to the "stigmata" of feeble-mindedness, as they are called, their correct place as diagnostic criteria. In speaking of the cells other than nerve cells which may be implicated in cerebral defects they will only, except in special cases, be considered in the mass as constituting tissues and organs, for the process of physiological analysis has not yet reached such a

[1] E. Schwalbe, *Die Morphologie der Missbildungen des Menschen und der Tiere.* 3 *Teil*, 1909.

[2] H. G. Stewart, "A Description of the Brain of an Epileptic Imbecile, Showing Extensive Heterotopia of the Grey Matter," *Archives of Neurology and Psychiatry*, 1909, p. 289.

degree of thoroughness as to supply data of other than the most general character. Abnormalities of non-nervous cells are here only of interest in so far as they are associated with nerve-cell defects. The relation between the two kinds of cells is twofold, in that the changes in either may be secondary to changes in the other. Of the peculiarities which the bodies of the feeble-minded display, some may be regarded as due to nerve-cell lesions, while others are to be looked upon as causes and not as consequences of nerve defects. The paralysis and wasting of a limb which follow on a cerebral hæmorrhage are of the former variety, while the degeneration of nerve cells which follows an intra-uterine amputation of that limb, or the rupture during the act of birth of the nerves supplying it, belongs to the latter. In general there is an interaction of the two sets of conditions which makes it useless to attempt to designate one of them as a cause in opposition to the other. Take, for instance, the sequence of events which Ford Robertson describes as occurring in cerebral degeneration. As a result of "more metabolism in the cerebral tissues," or of "a morbid condition of the blood from which the fluid is derived," the cerebro-spinal fluid becomes abnormal. In this condition it produces changes, those in the dura mater being of special importance, which result in lymphatic obstruction. This obstruction causes disturbances of the intra-cranial pressure and progressive contamination of the cerebro-spinal fluid which, of course, react injuriously on the nutrition of the nerve cells. Thus a vicious circle is set up which promotes steady depre-

ciation in the value of the brain as an organ of mind.

In describing abnormalities of the non-nervous cells, tissues, or organs, one may begin with those in the most intimate anatomical relationship with the purely nervous elements.

1. First in importance comes the *internal supporting and connective tissue* of the central nervous system. This, according to Ford Robertson, is derived from two sources, the one being the primitive external layer of the body, the epiblast, from which the nerve cells also are derived, and the other the primitive middle layer or mesoblast. He reserves the name neuroglia for the first type of tissue, and designates the second mesoglia. Although the two forms are said to be present in about equal proportions, it is apparently the neuroglia in which take place the changes associated with abnormality of the nerve cells. To the mesoglia elements Ford Robertson refers the formation of amyloid bodies, and the colloid bodies found in some of the writer's preparations may perhaps have a similar origin.

(*a*) The neuroglia is, it would appear, susceptible of a general or local overgrowth (gliosis), which may or may not be followed by a shrinking of the overgrown tissue leading to induration. We may consider these conditions under the following heads.

I. General hypertrophy. Of the brains in series A some exceeded in weight the average of the normal brain. The heaviest weighed 55 ozs., while others were respectively $52\frac{1}{4}$ ozs., $51\frac{1}{2}$ ozs., and 51 ozs., while much heavier brains, *e.g.*, one weighing

71 ozs. from a patient formerly under the writer's care, have been from time to time recorded. That it should be possible to have brains of such magnitude identified with obvious defect of intelligence is to be explained by supposing that the excess in weight is due to other than nervous tissue, and a relative excess of neuroglia is demonstrable in such cases under the microscope.

II. Localised hypertrophy. In nine of the cases in series A the walls of the lateral ventricles and of the fourth ventricle showed a condition of granulation, while in six others the change was confined to the fourth ventricle. These granulations are generally held to be due to an irregular overgrowth of the neuroglia, and perhaps one should include as due to the same cause the appearance of granulation of the cerebral cortex which was noted in five cases of the series, and a peculiar "cross-hatching" of the upper ends of the ascending frontal and ascending parietal convolutions which was observed in one case.

(*b*) Sometimes as a result of contraction of the neuroglia, and sometimes without there being diminution in the bulk of the affected part, the brain substance is found to display increased resistance to pressure or to the knife. A certain amount of induration seems also to characterise the hypertrophy above mentioned. To such a change the term sclerosis is applied. The sclerotic process, like the gliotic, may involve much or little of the cerebral structure. To it are to be referred the most marked instances of asymmetry, as for example that shown in Fig. 5.

The forms of secondary microgyria, as illustrated by Fig. 12, are also attributable to sclerosis. A third and quite distinct variety unaccompanied by contraction is the "tuberose" which will be considered in greater detail subsequently.

Prominence has been given by various writers to a reputed connection between epilepsy and a sclerosis of the part of the brain known as the cornu Ammonis. In order to test the correctness of an idea so generally prevalent the writer examined microscopically sections from the hippocampal region of fifteen brains. These comprised eleven from cases of idiocy and imbecility complicated by epilepsy; three from cases of non-epileptic idiocy; and one from a case of general paralysis of the insane. The results obtained may be stated briefly thus:—

1. Non-epileptic: cornu normal at both sides.
2. Non-epileptic: extensive degeneration, but no marked sclerosis.
3. Non-epileptic: right cornu sclerotic.
4. Epilepsy of exceptionally severe character: slight sclerosis.
5. Epilepsy of mild character: slight sclerosis.
6. Epilepsy of medium character: degeneration, but no definite sclerosis.
7. Like 6.
8. Epilepsy—patient had only one fit in eighteen months: there was extreme sclerosis at the right side.
9. Epilepsy of moderately severe type: slight sclerosis.
10. Epilepsy of mild type—about two fits per

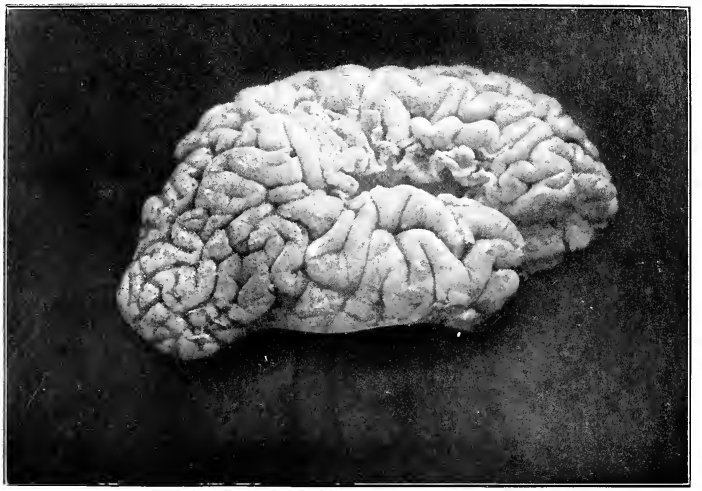


FIG. 12.—Right hemisphere of the brain of an idiot, showing microgyria.

FIG. 13.—A Mongolian imbecile.

[*Face page* 112.

month : marked sclerosis, especially at the right side.

11. Epilepsy of mild type—about one fit per month : moderate sclerosis both sides.

12. Epilepsy of mild type—about one fit per month : marked sclerosis, especially at the right side.

13. Epilepsy of severe character : sclerosis both sides.

14. Epilepsy of moderate severity : slight sclerosis.

15. General paralysis : no sclerosis.

There was thus no simple relation between the frequency or the severity of the epileptic seizures and the degree of sclerosis observed, though there was some sort of proportion between the amount of sclerosis and the intensity of the mental defect exhibited.

2. *The ependyma.*—The cavities of the brain and cord are lined by a delicate epithelial layer, which does not usually show any obvious abnormality in defective brains, for the granulations sometimes visible upon its surface are probably, as mentioned above, to be referred to the neuroglia. In the brain which was found to lack a corpus callosum, the ependyma of the lateral ventricle was so thick and tough that it could be stripped off as a definite membrane. In another case the aqueduct of Sylvius was occupied by a strand of white tissue which appeared to spring from a point in the ependyma at the upper part of the opening of the aqueduct into the third ventricle. This might have been regarded as a clot formed from the cerebro-spinal fluid but for the fact that the cerebro-spinal

fluid is not known to clot. The case of porencephaly illustrated in Fig. 9 showed the apparently normal ependyma of the ventricle thickened around the inner orifice of the perforation, and gradually acquiring the characters of the abnormal pia-arachnoid which lined the more superficial parts of the opening.

3. *The vascular system.*—Gross lesions of the intra-cranial blood-vessels were not a conspicuous feature of the brains in series A, although irregularities in the distribution of the arteries supplying the brain were observed in association with the encephalic deformities already mentioned. One case showed the remains of a small hæmorrhage in the corpus striatum, while another had a larger one in the left lobe of the cerebellum. In two others there were patches of softening in various parts of the hemispheres, and in a third the choroid plexuses were cystic. The most significant feature in this connection was, however, the prevalence of a condition characterised by a superabundance of cerebro-spinal fluid. In forty-eight of a hundred cases there was definite excess of cerebro-spinal fluid as compared with the normal state, and in thirty-six of the cases the excess was pronounced. Thirteen of the last mentioned cases had one or both lateral ventricles definitely enlarged with associated thinning of the hemisphere wall and flattening of the convolutions, but in the remaining cases the accumulation of fluid had occurred chiefly between the dura and the surface of the brain.

4. *The meninges.*

(*a*) The pia-arachnoid. Opacity, localised or

general, increase in thickness and an exaggerated toughness are the morbid conditions which are most commonly displayed by the pia-arachnoid. These changes proceed along approximately parallel lines and are usually attributed by pathologists to degenerative processes affecting the membrane. They were present together in twenty-four cases belonging to series A, while of the rest fifteen displayed opacity without any special thickening and in nine the pia-arachnoid, though thick and tough, was not noticeably opaque. The condition was usually most marked over the frontal lobe. In nine of the forty-eight cases just mentioned the pia-arachnoid was adherent to the convolutions. Adhesion of the adjacent faces of the hemispheres was common and the membrane covering one of the spinal cords examined showed a large number of osteoid plates. In two cases there were adhesions between the pia-arachnoid and the dura mater. Illustrations of thickened and opaque pia-arachnoid are shown in Figs. 5 and 7.

(*b*) The dura mater. The morbid conditions observed in this structure may be summed up as follows:

Unduly adherent to the skull	5%
Increased in thickness	6%
Studded with tubercles	1%
Subdural false membrane	1%

In one of the cases showing increased thickness it was noted that the dura was soft and easily separable into layers.

5. *The skull-cap.*—Abnormalities of varied character are found in connection with mental defect.

Those recorded in this section are in regard to thickness and density. They may be thus arranged for series A.

	Normal density.	Softening.	Hardening.
Normal thickness ...	—	—	1
Thinning	18	2	1
Thickening	12	—	10

These figures, which include all degrees of the condition, were obtained by rough and ready methods, the only standard of comparison being the observer's mental picture, at the time, of the state of the normal skull-cap. Although no examples occurred in this series, softening is sometimes found associated with both thickening and normal thickness of the bone.

6. *The scalp.*—One instance of the rare and rather striking condition known as hypertrophy, in which the scalp is raised into a number of antero-posterior folds as though it were too big for the underlying skull, occurred in the series. The case was that of the microcephalic idiot whose brain is shown in Fig. 19.

7. *The sense-organs.*—A cursory inspection of the cases in series C and D revealed the following abnormalities in the organs of sight and hearing.

The eyes:—

	Males (400).	Females (250).
Blindness	5	6
Unequal pupils	24	3
Squint	15	11
Ptosis	10	—
Nystagmus	6	4
Cataract	4	1

In addition all grades of defective vision were found.

The ears :—

	Males (400).	Females (250).
Different in shape, size, or prominence	26	4
Different in position	9	—
Large and prominent	15	3

Deafness of all degrees was also noted.

8. *The mouth.*—This may be considered as regards :

(*a*) The palate. From time to time a good deal of stress has been laid on the supposed connection between mental and palatal abnormalities. Without committing ourselves to any statement as to their significance we may note that defects of the bony palate do, in fact, occur fairly frequently among the feeble-minded. There is endless diversity in regard to the forms of defect found, but for the purpose of classification the scheme employed in the following table will prove convenient.

	Males (400).	Females (250).
Normal	206	136
Wide and flat	43	43
Narrow and high	110	63
Deformed	41	8
	400	250

In the writer's experience, if there be any one of these types which is especially characteristic of idiocy it is the second, which, so far as he is aware, has not previously had attention directed to it.

(*b*) The teeth. The teeth of idiots and imbeciles are often defective, but anything like a complete description of the conditions found would occupy far too much space. Undue crowding or separation and other irregularities of arrangement, together with abnormalities as regards size, shape, or the

state of the enamel, are met with. Sollier described as peculiar to idiots a condition in which the mouth cannot be completely closed, the hindmost molars alone coming into apposition.

The following notes, which have been kindly contributed by Mr. C. Edward Wallis, will be of interest in this connection.

"An experience of many years in attending to the mouths and teeth of imbecile and epileptic children shows clearly that the statements that are copied from one text-book to another as to maxillary and dental deformities are devoid of any appreciable foundation.

"Speaking broadly, one finds far more well-shaped jaws among these children than among the so-called normal children to be seen in everyday life, whether in public elementary schools or in private practice amongst the better classes.

"The mistake has perhaps arisen in the past from a want of discrimination on the part of medical examiners between deformities of the jaws which are real and deformities which are apparent; that is to say, in which the maxilla appear to be too high or perhaps asymmetrical owing to a general irregularity produced by misplaced teeth, the result of neglect in childhood.

"A detailed examination of some thousands of these children over a long period leads me to think that, as compared with the ordinary, epileptic and imbecile children have, as a class, exceedingly well-developed jaws, and are above the average as regards freedom from caries.

"In Mongolian imbeciles one not infrequently finds an hypertrophy of the mucous membrane of the sides of the palate leading to the appearance of a high, narrow palatine arch, whereas the actual bony arch may be exceedingly well-shaped."

For some time past Mr. Wallis has been making observations on the subject of the "torus palatinus" or palatine ridge, and he has come to the conclusion that in bad cases of imbecility this ridge is more pronounced than among less advanced cases, though as to the genesis of this "torus" we are completely in the dark at present.

As regards the lower jaw Mr. Wallis notes that "the mandible is seldom deformed in imbeciles though here and there, owing to an imperfect

development of the maxilla, the lower teeth may bite in front of the upper ones and produce the deformity known as underhung jaw or 'inferior protrusion.'"

9. *The head as a whole.*—(*a*) Asymmetry:—Note was made in reviewing the cases in series C and D as to the presence or absence of unlikeness between the right side and the left so far as the head was concerned. Such asymmetry as was due to differences in the regions of attachment of the ears or to optical defects has been already referred to. Other forms are grouped together according to their degree in the following table.

	Slight.	Well-marked.
Males (400)	47	22
Females (250)	11	16

(*b*) Head measurements:—For the notes in this connection series C and E were employed. The measurements in the first group were made by myself while those in the second were made with somewhat greater exactitude by Dr. Gladstone. In both series, since the patients were living, the thickness of the scalp has to be taken into consideration.

Series C.—The following measurements were taken to the nearest $\frac{1}{2}$ cm.

(*c*) Circumference along a line passing in front just above the upper margins of the orbits and behind over the occipital protuberance.

(*l*) Distance from the glabella to the occipital point.

(*b*) Maximum parieto-squamous diameter.

The cephalic index, which is obtained by multiplying the measurement *b* by 100 and dividing the

product by l, was estimated in each of the 150 cases. Details are given in a contribution to the Annual Report of the Metropolitan Asylums Board, 1907, but a summary of the results will suffice for our present purpose. Indices ranging from 88·8 to 71·42 were obtained, the average being 77·9. The greatest circumference noted was 65 cm. and the least 48 cm., the average being 53·69 cm.

Dr. Ford Robertson gives as average measurements of the normal British skull,

Cephalic Index, 78; Circumference, 503 to 534 mm.

Allowance being made for the thickness of the skull, which would affect more particularly the circumference, the evidence indicates that so far as the circumference and the cephalic index are concerned, idiots and imbeciles depart very little from the normal.

Series E.—During the course of an enquiry which he was conducting into the relation of the size and shape of the head to mental ability, Dr. R. J. Gladstone measured the heads of 100 patients at Darenth Asylum. Two groups were selected for him, care being take to exclude any cases displaying striking abnormalities such as microcephaly or hydrocephaly. The first group consisted of 50 males between 20 and 40 years of age who were capable of doing useful work under supervision and who were employed in workshops on the premises as tailors, shoemakers, carpenters, etc. The second comprised 50 males of similar age to those in group 1, but incapable of doing any useful work and of a distinctly lower grade of intelligence than were the patients in group 1. The measurements taken were :—

(*l*) Length of head from glabella to occipital point.

(*b*) Breadth of head, *i.e.*, maximum transverse diameter, above the level of the zygomatic arches.

(*h*) Height of head, *i.e.*, the vertical distance from the biauricular line to the bregma.

Dr. Gladstone has kindly placed at my disposal the following figures which he obtained. The measurements are expressed in millimetres.

	Maximum.	Average.	Minimum.
Length of head.			
Workers	209	186·5	156
Non-workers	203·5	184·5	165
Breadth of head.			
Workers	171	145·4	126
Non-workers	165·5	144·4	129
Height of head.			
Workers	144·1	127·8	112
Non-workers	150·7	125·7	112

"It will be observed," he says, "on comparing the mean diameter of the heads of the workers with that of the non-workers that there is a diminution in each of the principal dimensions amounting to 2 mm. in the longitudinal diameter, 1 mm. in the transverse, and 2·1 mm. in the vertical. It will also be noticed that there is a very considerable difference between the maximum and minimum diameters in both classes which far exceeds that which would be present in an equal number of sane individuals of the same age and sex. This greater variability in the size of the head in imbeciles as compared with the sane may be readily seen by comparing the tables given above with a table showing the same measurements in normal individuals."

For comparison with the above figures the following table, which shows the corresponding measurements for a group of 230 adult males, mostly of the Professional class, was prepared by Dr. Gladstone :—

	Maximum.	Average.	Minimum.
Length of head	210	197	183
Breadth of head	163	153	138
Height of head...	155	138	121

Two facts appear from the above data. In the first place the mean diameters of the head are considerably greater in the normal individuals than in the imbeciles, and in the second, the variability in size of the heads of the imbeciles exceeds that of the sane individuals to quite a marked degree. It is worthy of notice that owing to the process of selection which Dr. Gladstone's cases underwent, the differences between the maximum and minimum diameters, although considerable, are even less than in the cases measured by me, which were taken as they came.

Dr. Gladstone worked out the "index of size"[1] of the different groups together with that of a further group consisting of 50 male inmates of a London workhouse and found them to have the following ratios.

Professional class	4,219
Workhouse inmates...	3,933
Workers (Darenth Asylum)	3,465
Non-workers (Darenth Asylum)	3,347

From these figures he estimated the mean weight

[1] The "index of size" is the number of cubic centimetres contained in a rectangular solid having the same diameters as the average length, breadth and height of the heads in the different groups.

of the brain in the last two classes to be approximately

Workers	1,247 grms.
Non-workers	1,218 „

It is interesting to compare with the last figure the average weight, obtained directly, of the 100 brains derived from a somewhat similar class of patients in series A, which worked out at about 1,193 grms. If the cephalic index be estimated from Dr. Gladstone's figures it will be found to be for

Workers...	77·96
Non-workers	78·26
Mean	78·1

which approximates closely to the normal and to the result of the measurement in series A.

10. *The remaining parts of the body.*—Of these we may take first the muscular system which is peculiarly the medium for the expression of mental activity. Defect in the muscular apparatus may take the form of inco-ordination, weakness, or over-action, though it may be difficult to decide as to the precise share of each of these morbid conditions in the production of the observed phenomena. Inco-ordination is probably responsible for some of the forms of imperfect speech which occur in the feeble-minded. Paralysis is a common feature of the class: the subjoined table will give some idea of the frequency of its occurrence.

Type.	Males (400).	Females (250)
All limbs	8	12
Hemiplegia	27	6
Paraplegia	25	18
Facial	10	—

Over-action of muscles, apart from the occurrence

of definite epileptiform seizures, becomes obvious chiefly in the erratic movements called "tics." Using the term in its widest sense to cover all forms of swaying, nodding, tapping, picking and other motions which idiots indulge in, tics were observed in 64 of the 400 males and 47 of the 250 females above referred to.

Reflexes. There may be mentioned in this connection the subject of reflexes. In series C the condition as regards knee-jerk, ankle-clonus, and the Babinski phenomenon was noted with the following result :—

Knee jerk :—

Normal	50
Increased both sides	58
Diminished both sides...	30
Greater on right side	6
Greater on left side	6
	150

In five cases ankle-clonus was obtained at both sides and in three at one side only, while the Babinski reflex was obtained at both sides in five cases and at one side in six cases.

Left handedness. An attempt was made to estimate the degree of prevalence of left-handedness in the 650 cases already alluded to. Excluding cases of paralysis, it was found that 32 of the males and 8 of the females exhibited this condition pretty definitely, but the results obtained were in many cases so ambiguous that no particular value attaches to these figures. It was, however, noticeable that ambidexterity, which may here be taken to signify equal degrees of helplessness of the hands, was much more commonly found than among normal indi-

viduals. This experience agrees with that of Dr. W. W. Ireland.[1]

The thoracic and abdominal viscera. As a rule the idiot or imbecile is physically a poor creature and the thoracic and abdominal viscera share in the bodily shortcomings. This is shown by the following figures collected for the heart, liver, and spleen from 50 cases, among those in series A, which did not exhibit gross disease of one or other organ.[1] As regards the kidneys, a larger proportion of the cases conformed to this requirement and the list of 100 was obtained by the substitution from other sources of a few to replace those that had to be excluded. Disease of the lungs, on the contrary, was so general that it seemed hopeless to get figures for this organ which would be of the least value, and the lung weights are therefore disregarded.

Organ.	Average weight in ozs. (50 cases).		Normal weight in ozs.	
Heart	6·25		11	
Liver.....	30·3		50–60	
Spleen	3·4		6–7	
	Right.	Left.	Right.	Left.
Kidney (100).	3·45	3·55	5·25	5·5

Any physical abnormality traceable to developmental errors which is known to occur in the mentally sound may be looked for among the feeble-minded, with the confident anticipation that it is even more likely to be discoverable in this class

[1] W. W. Ireland, *loc. cit.*, p. 329.

[2] Sollier, in his article in *Twentieth Century Practice*, says that idiots are peculiarly susceptible to abscess of the liver. The writer has not found anything in his cases to corroborate this statement.

than it was in the former. The index of any treatise on pathological anatomy may be turned to for a summary of the appearances met with and recorded by various observers. All that have any value as pathognomonic signs have been already mentioned or will be alluded to in the descriptions of the chief clinical types. In estimating that value, a critical attitude must be maintained in view of the uncertainty surrounding even the most widely accepted facts. Our postulate as to the supreme importance of the nerve cells, for example, may be called in question. It may be, as suggested by Lugaro and others, that the neuroglia plays an important part in controlling the nutrition and consequent efficiency of the nerve cells by neutralising toxic agents which are either brought to the nerve cell by the blood or result from the katabolism of the nerve cell. We are, again, in doubt as to the interpretation of the changes which nerve cells undergo. "Modifications in Nissl's substance," says Lugaro, "do not constitute an index of functional variation, but rather of modifications in the state of the nervous elements' nutrition. These morphological modifications are compatible within certain limits with complete functional integrity even when they are quite obvious under the microscope."[1] Similarly, there is no simple and clear connection between functional disturbance and morphological alteration in the neurofibrils. As we have seen, the condition of pyramidal tract fibres as regards myelination is not such as to suggest that a persistent infantilism is responsible for the defective volition of the

[1] E. Lugaro, *Modern Problems in Psychiatry*, 1909, p. 124.

feeble-minded. Of the mode in which nerve cells affect each other, we are too ignorant to be able to estimate the part played by conduction or induction in promoting or inhibiting, accelerating or restraining the quasi-electrical "fluid" which is the vehicle for the conveyance of nervous impressions. Still less do we know of that intimate physico-chemistry of the nerve cells which conditions the "mneme" and on which depends the faculty of memory.

In assigning to the observations recorded in this chapter their due meed of importance, it must be borne in mind that the personal equation of the observer has to be allowed for. Opacity of the pia-arachnoid, hardness of the skull-cap, excess of cerebro-spinal fluid, and so on, exhibit degrees which do not admit of being stated with any great precision, partly because no ordinary pathological laboratory is supplied with the elaborate physical apparatus which would be necessary, and partly because of the absence of any clearly defined standard of comparison. We are in little better case when trying to use the data provided by the balance or the measuring tape. Height and weight, which are regarded as affording some basis of comparison between different individuals, are not always in practice ascertainable with any great approximation to accuracy. It is not usually feasible to weigh a dying person or even a corpse, so that the proportion of the body weight which is constituted by the weight, obtained at an autopsy, of some viscus will not be capable of exact statement. The height of an individual does not vary so much as his weight, but in the case of an idiot suffering, as many do,

from deformity of some kind, the measurement of the height is often no simple matter. For the reason just given the following figures, though of interest from the unexpectedness of the conclusions to which they lead, need not be taken too seriously.

A. The relation of brain weight to that of the body.

In the normal man, according to Dubois, the brain weight has to the body weight the ratio 1 : 46. For fifteen cases of idiocy and imbecility taken at random the ratios were :—

1.—1 : 22	2.—1 : 25	3.—1 : 30
4.—1 : 30	5.—1 : 32	6.—1 : 32
7.—1 : 33	8.—1 : 34	9.—1 : 35
10.—1 : 38	11.—1 : 39	12.—1 : 39
13.—1 : 40	14.—1 : 41	15.—1 : 46

giving an average of 1 : 34, which is equivalent to an assertion that the idiot or imbecile has more brain to the unit of body weight than the normal person can lay claim to. How little importance attaches to this ratio may be judged by a comparison of the figures obtained for various animals. Warncke has compiled a lengthy record of the ratios found in the animal kingdom. These vary from 1 : 10571 in one of the whales to 1 : 23 in the insectivore Sorex vulgaris. Even within the limits of the Primates the range is from 1 : 213 to 1 : 26½.

The following consideration would lead us to anticipate that no simple relation between brain weight and intellectual capacity is likely to be established : there is as great a gap mentally between an idiot and a person of average intelligence as between the latter and a genius. Now a genius of the first

rank has been estimated to be, perhaps, a hundred times more capable than the ordinary man. We might, then, expect to find that the brain of a genius weighed ten thousand times as much as that of an idiot—a condition of things so completely inconsistent with our experience as to savour of the ludicrous.

The weight of the brain is dependent on at least two groups of factors; the somatic, *i.e.*, the mass of tissue which has to be centrally represented, and the psychical, *i.e.*, the degree of mental development. As regards the former it may be noted that all parts of the body are not equally innervated. It has been suggested that the chief determining factor of the mass of the brain is the extent of the surface of the body, and that the greater magnitude of the brain of man as compared with that of the ape is in a measure to be accounted for by the comparatively hairless condition of man and the consequent greater development in him of a tactile sense. Estimates of the proportion of the somatic and psychical elements in various animals have been made by Dubois, Warncke,[1] and others, who have deduced from their results a "cephalisation factor" which they believe to indicate the respective degrees of intelligence of the animals concerned. It is no doubt satisfactory to find that Homo sapiens comes out at the top of the list.

B. The relation of brain weight to height.

In connection with an investigation already

[1] Paul Warncke, *Mitteilung neuer Gehirn und Körpergewichtsbestimmungen bei Säugern*, etc. *Festschrift zu Forels Sechzigstem Geburtstag. Journal für Psychologie und Neurologie*, Bd. 13, 1908, p. 355.

alluded to, Dr. R. J. Gladstone worked out the relation between the (estimated) brain weights and the heights of the fifty "workers" and fifty "non-workers" seen by him at Darenth Asylum, as shown in the following table.

Class.	Mean weight of brain.	Mean stature.
Workers	1,247 grms.	1,609 mm.
Non-workers ...	1,218 „	1,505 „

From these figures it appears that the non-workers averaged slightly more brain to the unit height than did the workers.

What appears to be brought out most clearly by the investigations recorded is the limitation of the statistical method. Owing to the different, and frequently opposite, directions in which departures from the normal occur, the effect of striking averages is to obscure rather than to elucidate the differences which experience shows to exist. Thus the extremes in the way of cranial abnormality which were displayed by different patients among the 250 measured by myself and Dr. Gladstone cancel out so as to give a "cephalic index" which is almost exactly normal. The existence of a high degree of variability is established by the data so far available, but we find nothing to justify the separation of a distinctive type characteristic of feeble-mindedness.

A large number of data on the lines of those given in this chapter have now been accumulated, and, though they are not without scientific value, their abundance, unfortunately, serves to obscure the fact that cerebral pathology is yet in its earliest infancy. About the raw material of mind, those

sensory phenomena which are the results of the action of the environment on the individual, a good deal is now known, but the processes of manufacture, the methods by which sense impressions are reproduced and rearranged, remain enshrouded in darkness.

As considered more fully in the chapter on Causation, abnormalities of the brain may be referred to innate defect of development or to the influence of an unfavourable environment. The distinction is of practical value, though the first named factor may be regarded as only a special case of the second. Developmental error may, it is taught, occur in one of three forms. There may be simple retardation, there may be a return to a more primitive type of organisation, or there may be progress in a new direction. These various forms are not, however, independent either of one another or of the environment. We may, for example, meet with what the Germans call "Korrekturbildung," a condition in which, owing to deficient development of the phylogenetically younger parts, the phylogenetically older undergo compensatory hypertrophy, and this may be complicated by the lack of normal resistive power against injurious agents which imperfectly developed tissues exhibit. A similar compensatory activity of unimplicated regions may follow localised injury to any part of the nervous system and may involve such an interference with the normal functions of the hypertrophied part that the initial defect is not simply compensated for, but replaced by one of a new character. But we have to take into consideration

also another biological factor, the tendency of the organism to a specialisation and delimiting of an affected region owing to the development of antagonistic influences which strive to nullify its evil effects.

Taking into account only the broad distinction between developmental and acquired abnormalities, it is of interest to note that the evidence obtained from the cases in series A points to a greater prominence of the latter forms than might have been anticipated. In 48 per cent. of the cases there was excess of cerebro-spinal fluid, a condition clearly pointing to degenerative changes in the brain. "I think," says W. Ford Robertson,[1] "it may be affirmed that an excess of cerebro-spinal fluid is generally compensatory for brain atrophy, and that it only rarely has any other significance." J. S. Bolton[2] has stated that he "cannot too strongly emphasise the importance of excess of intra-cranial fluid in the pathology of dementia," and in the same article he expressed the opinion that "dilation of the lateral ventricle is . . . . evidence of loss of cerebral tissue." The opacity and thickening of the pia-arachnoid observed in 24 per cent. of the cases point in the same direction, for one can hardly attribute such features to errors of development in view of the frequency of their occurrence in the brains of sufferers from general paralysis and senile dementia. The brains of idiots have, indeed, in many instances, much in common with those of

[1] W. Ford Robertson, *loc. cit.*, p. 310.

[2] J. S. Bolton, "Amentia and Dementia," *Journal of Mental Science*, 1905, pp. 326–7.

general paralytics and differ from those of senile dements chiefly in the absence of the gross changes in the cerebral vessels which occur so conspicuously in the latter. One is led to the conclusion that the mental defect which dates from birth or from an early age may be characterised by a large element of "dementia" as distinct from what is called "amentia," that is to say, the idiot brain has undergone a process of degeneration and has not merely been arrested in its growth.

Series A comprised, as already mentioned, brains from persons who had displayed very limited intelligence. To what extent deductions drawn from a study of these brains apply to those of persons exhibiting only slight degrees of feeble-mindedness is uncertain. Eminent Continental psychiatrists have taken up different attitudes in regard to this matter. According to Tanzi,[1] "imbecility is congenital, while idiocy is acquired, it may be, in the earliest stages of existence." He reserves the term idiot for "all those cases of deficiency that do not present the clinical picture of mental degeneration but that of the infantile cerebro-pathies, notwithstanding the occasionally very slight degree of their deficiency." His conception of idiocy thus appears to be one of a "nervous" disease which happens to be complicated by "mental" symptoms. Sollier's view is that "all idiots present cerebral lesion, while imbeciles have none."[2] On the whole it seems most satisfactory to follow Ziehen, Herfort, and others, in holding that

[1] E. Tanzi, *A Text-book of Mental Diseases*, 1909, pp. 747–8.
[2] P. Sollier, Art. "Idiocy" in *XXth Century Practice*, 1897, p. 264.

"a congenital weak-mindedness of purely functional nature, that is to say, with an anatomically intact cerebral cortex, does not exist,"[1] though with our present imperfect methods of research, the defect may not always be demonstrable.

The investigation of the physical substrata of aberrant complex mental processes presents much greater difficulty than the recording of abnormalities of the sensory or motor apparatus, which is all that most workers among the feeble-minded have opportunity for. All departments of biology—embryology ; normal and morbid anatomy both human and comparative ; physiology and psychology must be called upon if further progress is to be made, and it is a dawning perception of this fact which is the most significant as well as the most hopeful feature of modern tendencies in the investigation of the pathology of mind.

[1] K. Herfort, *Die pathologische Anatomie der Idiotie*, Eos. 1908.

CHAPTER V

THE CAUSATION OF FEEBLE-MINDEDNESS

Of the causes which lead to incomplete psychical development extremely little is known with certainty. It is, however, undisputed that feeble-mindedness is often associated with obvious imperfection or arrest of cerebral development. As to the nature of this association, something has been said in Chap. IV. Even when the application of current scientific methods fails to supply definite information, we cannot exclude the possibility that what are called "errors of metabolism" are the responsible agents.

Whatever theory of the relation of mind and brain is adopted, the problem of the origin of mental defect resolves itself into an investigation of the circumstances in which the development of the brain is injuriously interfered with.

There are, it would appear, two chief sets of factors in development :—

(1) The innate tendency to develop.

(2) The influences of the environment.

And theoretically these may be further subdivided as follows :—

(*a*) Normal tendency.

(*a*) Abnormal tendency.

(b) Environment favourable to normal development.

(β) Environment unfavourable to normal development.

Of these (a) and (a) are mutually exclusive and so are (b) and (β), so that the possible combinations are reduced to four, viz., (a) (b) ; (a) (β) ; (a) (b) ; (a) (β) ; but the combination (a) (b) represents the condition of normal development, so that in the production of abnormal conditions we have to do with the three sets of relations which are expressed by the formulæ (a) (β) ; (a) (b) ; (a) (β).

We seem, therefore, to have three groups of cases to consider :—

(1) Those in which the innate developmental tendency is normal, but is modified by the influence of an unfavourable environment.

(2) Those in which an abnormal innate tendency gives rise to pathological conditions although the environment exercises no unfavourable influence.

(3) Those in which the innate tendency and the environment combine to produce pathological conditions.

Observed facts are not, however, readily susceptible of classification in accordance with this simple scheme, and in order to understand what modifications it may require, to bring it into accordance with those facts, we must consider briefly what the terms "innate tendency" and "environment" really signify. To begin with, we may note that they are not factors of quite the same order, although we may suppose both to have a physical basis. While it is conceivable that an innate tendency might, without the intervention of any other agency, control

the development of a germinal cell, we have in actual practice no knowledge of such a state of things. We only know the tendency in so far as its expression is conditioned by its environment. We have assumed that innate tendency and environment may vary independently, and, on reviewing such facts as are accessible to us, this seems to be the more convenient hypothesis, but it is open to anyone to suggest that the differences which individuals display, whether they belong to the same or successive generations, are determined solely by the influence of the environment. The suggestion becomes the more plausible when we recognise, with Dr. Archdall Reid,[1] that much of what is regarded as "innate" is really attributable to the effects of the stimuli which are incidental to the processes of nutrition. For the purposes of this chapter, it will suffice to divide the cases of defective cerebral development into two groups, in one of which the innate tendency is believed to be the important factor, while in the other a preponderating influence is attributed to the environment.

(A) Innate tendency Predominant.

We enter here upon the domain of Heredity and are at once faced by difficulties arising from the confusion which exists as to the significance of that term. Heredity, according to Professor J. A. Thomson,[2] is "just a name for the reproductive or genetic relation between parents and offspring," while Inheritance is "all that the organism is or has to start with in

[1] G. Archdall Reid, *The Laws of Heredity*, 1910.
[2] J. A. Thomson, *Heredity*, 1908, p. 68 and p. 517.

virtue of its hereditary relation to parents and ancestors." These definitions express with sufficient clearness the connotation of the words as here employed.

The salient feature of Inheritance is the existence of some degree of resemblance between parent and offspring, and a distinction must at the outset be drawn between uniformity of type in the individuals themselves, and uniformity of type in their environment. A son is said to "inherit" peculiarities of form and disposition from his father; he is also said to "inherit" the social conditions with which the father has surrounded himself. In regard to the second use of the term, it may be argued that, although Professor Thomson's definition might be strained so as to cover it, there is no "inheritance" in the strict sense; and that the case is one in which the influence of the environment is paramount. The discussion of this point may conveniently stand over for the time being, since certain considerations bearing upon it will be more readily intelligible when the cases more directly referable to the existence of an innate tendency have been mentioned.

To return then to the instances in which uniformity of type as regards morphological features is the expression of the inheritance. The question immediately arises: Why should the child resemble the parent at all?

The simplest explanation is that the two have a common origin. Let us see if by the light of evolution we can arrive at some conception of where that origin is to be found. The exposition which follows may or may not be correct, but it has sufficient

plausibility to serve to connect together in an intelligible way the admitted facts about heredity.

Starting with a primitive bioplasmic mass (some organism, we may suppose, of the nature of the lowly creature we call Amœba) we may reasonably postulate for it a power of growing. We may then be prepared to find, in view of Spencer's law, that the mass divides and that each part grows to the original size, and again divides. Each generation will be lost in its descendants, but the original bioplasm does not cease to exist. At a somewhat higher zoological level, *e.g.*, in the case of Paramœcium, there is such a degree of specialisation of various regions that the two organisms resulting from the process of fission are at first dissimilar. Each, however, develops the features in which it is lacking, so that when the process is completed the resulting individuals are similar to each other.

As one proceeds upwards through the ranks of more and more complex organisms, the process of fission becomes more and more obscured by the circumstances attending it, so that, by the time the mammalia are reached, it is at first difficult to correlate the special germinal cells with the portion of bioplasm separated off from Amœba or Paramœcium to produce a new individual. We must, however, regard what are called the "organs" of the higher animals as adventitious growths superposed upon a structure of specialised bioplasm which, it would appear, is of relatively small amount and of uncertain distribution in the organism. From this specialised bioplasm fragments are separated off at intervals, and these fragments, having, like the mass from

which they sprang, the potentialities of generating the organs which serve to distinguish the individual, grow into forms resembling the parent as closely as the conditions of growth will allow.

Biologists are in the main agreed that the capacity for transmitting characteristics which bioplasm displays is dependent on the presence in its substance of certain definite elements.[1] Herbert Spencer postulated "physiological" or "constitutional" units —"ultimate life bearing elements intermediate between the chemical molecules and the cell." For Weismann[2] these elements are "very small individual particles, far below the limits of microscopic visibility, vital units which feed, grow, and multiply by division." These he calls "determinants." The "gemmules" of Darwin and the "pangens" of de Vries appear to be much the same thing as determinants although a different origin is assumed for them. Bateson's conception of the units which serve as vehicles for the transmission of heritable characters is that of bodies which, in some cases at least, have the power of producing ferments. Bateson[3] differs from the majority of biologists in supposing that the elementary bodies are not necessarily confined to the nuclei of the cells containing them, and this to some extent meets the objection urged by Adami[4] that the various theories referred to above involve the assumption of physical

[1] J. A. Thomson, *op. cit.*, p. 455.

[2] A. Weismann, "The Selection Theory," in *Darwin and Modern Science*, 1909, p. 36.

[3] W. Bateson, "Heredity and Variation in Modern Lights," in *Darwin and Modern Science*, 1909.

[4] J. G. Adami, *The Principles of Pathology*, 1909, p. 121.

impossibilities since "determinants," for example, must be molecular groupings of a size which makes the packing of a sufficient number of them into a nucleus quite inconceivable. Loeb[1] attaches so much importance to the influence of the environment in controlling the development of bioplasm that he does not postulate for the germ anything more than the transmission of "a certain form of irritability."

On the whole, we seem justified in accepting Thomson's[2] dictum that "everything points to the conclusion that there is a definite hereditary material"; and it is convenient to accept also the view that this material consists of "vital units" or "bioplasm," without attempting to define these with any great pretence of accuracy.[3]

Apart from conditions of growth, heredity involves differences between parent and offspring which are no less important than the resemblances with which we have so far been concerned. Let us take again the primitive organism. Some particular descendant may display a new feature. Let us suppose it exhibits a cilium. If its descendants also exhibit each a cilium this will indicate that a new character has been impressed upon the original bioplasm. Change in the direction of more cilia may follow, a new variety of bioplasm thus coming into existence. A fragment of the new variety, endowed with the potentiality of developing

[1] J. Loeb, "Experimental Study of the Influence of Environment on Animals," in *Darwin and Modern Science*, 1909.

[2] J. A. Thomson, *op. cit.*, p. 431.

[3] For a review of the various theories as to the constitution of bioplasm, see *Darwinism To-day*, by Professor Vernon L. Kellogg, 1907, pp. 214–228.

many cilia though actually at the outset bearing none, may be separated and grow up. On these lines the possibility of endowing a germ with huge potentialities is conceivable. Thus some portion of the bioplasm which has now been converted into a many-cilia-bearing kind may become so changed as to be capable of developing a pigment spot from which an organ of vision may be evolved, and so the process may go on to higher and higher degrees of complexity. Alteration from generation to generation proceeding in some such way as this has been observed to occur in the case of Paramœcium,[1] and the fact affords us an illustration of the evolutionary principle which all modern biologists accept as explaining how living creatures came to be as they are.

The bioplasmic basis, it would appear, is susceptible of changes of at least two kinds. There may be :—

(*a*) *Slight alterations affecting some existing attribute.* These are not of a permanent character unless fixed by natural or artificial selection. Such changes are called Variations. What is loosely called "The Law of Healthy Birth" (a matter to which we shall again refer), which lays down the principle that organisms tend to return to the normal, is merely a statement that variations are sometimes not so fixed by selection.

(*b*) *Slight or great alterations involving the appearance of a new attribute.* These are called Mutations and, being permanent changes in the

[1] H. S. Jennings, "Heredity, Variation and Evolution in Protozoa," *Journ. of Exper. Zoology*, 1908, p. 577.

bioplasm, they naturally characterise the descendants also.

The definitions just given are such that in all probability they will not be accepted without criticism by any biologist, but they seem to include what little is common to the innumerable conflicting views respecting the method of evolution. Dr. A. Reid, one of the most recent writers on the subject, regards variations as additions to or abbreviations of the recapitulation of parental development which in their own development offspring exhibit. He does not attempt to define precisely what is to be understood by mutations, but for him they are apparently large and "discontinuous" variations which can hardly advance the process of evolution, since to be effective they require numerous co-adapted mutations, and since, too, they must almost of necessity overshoot the mark because of the initial adaptation to the environment which species display.

Why changes take place in the bioplasm at all is a question which has not yet been satisfactorily answered. Weismann supposes that the determinants vary with variations in the amount of nutriment they receive, and, having varied, may have so become endowed with a capacity for controlling their own nutrition which renders them independent of the circumstances which initiated the variation. The "hereditary individual variation" so arising will therefore be permanent. As to the causation of the alterations in nutrition he can only say that they occur "by chance, that is, for reasons unknown to us,"[1] and Bateson is equally unillumi-

[1] A. Weismann, "The Selection Theory," p. 37.

nating in regard to the causes which determine the mode of segregation of his "unit-characters." Professor J. Loeb is unable to convince himself of the validity of the claims to have succeeded in producing mutations by physico-chemical means which certain authors make. Professor George Klebs, however, admits the possibility that "sudden and special disturbances in the relations of the cell substances have a directive influence on the inner organisation of the sexual cells, so that not only inconstant but also constant varieties will be formed," [1] while Professor Adami holds that "it is impossible to arrive at any other conclusion than that variation originates primarily in the action of modified environment upon the labile bioplasm." [2]

Dr. Archdall Reid insists on the insusceptibility of germ-plasm to environmental influences and holds that practically all variations are spontaneous. The tendency to vary "is itself an adaptation which is subject to variations," and, like all other adaptations, it "results from the Natural Selection of favourable variations." [3]

But in the vast majority of animals and plants, the germ from which a new individual springs is a combination of bioplasm from two separate sources. An additional factor in the production of differences between parent and offspring is thus introduced, for we have now to take into account

[1] G. Klebs, "The Influence of the Environment on the Forms of Plants," in *Darwin and Modern Science*, 1909, p. 246.

[2] J. G. Adami, *op. cit.* p. 171; *cf.* also the Art. "The Direct Influence of Environment," by D. T. MacDougal in *Fifty Years of Darwinism*, 1909.

[3] G. Archdall Reid, *op. cit.*, p. 436.

not only the variability which may depend on environmental conditions, but also possibilities in the way of blending which the two different kinds of bioplasm admit of. It is, however, so difficult to distinguish between the respective effects of these separate factors that we must perforce consider them together as responsible for the departures from the parent type. The need for such a wide definition of heredity as is implied in saying that it is simply "the genetic relation between parents and offspring" becomes intelligible when we regard the diversity which that relation may exhibit. The various grades of inheritance may be grouped in the following scheme, the artificiality of which must be excused by its convenience.

(1) *Cases in which the resemblance of offspring to parents is the prevailing characteristic.*

In his Law of Ancestral Inheritance, Sir Francis Galton laid down the proposition that the contributions from successive generations of ancestors, *i.e.*, parents, grand-parents, great-grand-parents, and so on, to the characters of the individual are, respectively, in the proportions of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, etc., the whole inheritance, represented by the figure 1, being the sum of the contributions from an indefinite series of ancestors. Modifications of the law have been advanced as expressing the situation more accurately, but the general principle, which is all that we are now concerned with, appears to be conformed to in some cases at least.

The shares contributed by father and mother, whatever those shares may be, do not always

become evident in the same way, the following varieties of inheritance being met with.

(*a*) Sometimes the paternal and maternal characters are so intimately intermingled that the offspring exhibits what may be described as a compromise between the parents, as in the case of the mule. This may be called "Blended Inheritance."

(*b*) Sometimes the offspring display paternal characters in one part of the body and maternal in another. This is called "Particulate Inheritance." In the special case where the characters from the respective sources are distributed widely and in small groups, we get one of the forms to which the term "Mosaic Inheritance" has been applied.

(*c*) As regards certain factors, the contribution of one parent may be not at all evident, so that the offspring conspicuously resemble one parent only. This is what is called "Exclusive Inheritance." It may, of course, be regarded as another special case of particulate inheritance, since in that also the presence of a particular paternal or maternal character involves the absence of the corresponding maternal or paternal character. But the use of the term "exclusive" is generally restricted to certain varieties of inheritance which are of sufficient importance to deserve separate notice.

(*a*) Sexual Dimorphism. When the paternal and maternal character are mutually so antagonistic that anything in the way of compromise between them would defeat the purposes of their existence one will exclude the other in inheritance. This is peculiarly the condition of affairs in regard to the organs which mark the distinction of sex.

(β) Sex Limitation. Certain characters seem to be in some mysterious way bound up in sex although they are not obviously what would be called "sexual" in the ordinary acceptation of the term. It is, for example, a familiar fact that certain diseases, *e.g.*, pseudo-hypertrophic muscular paralysis, haemophilia, and colour-blindness only appear in males: a fact which does not become any less remarkable when we note that they appear to be transmitted only by females.

(γ) Of late years the attention of biologists has been concentrated on some experiments in breeding plants and animals which were made about half a century ago by Gregor Johann Mendel, Abbot of Brünn. The literature dealing with this matter is now very extensive and easily accessible, and in any case a detailed account of Mendel's teachings would be out of place here, but a brief notice of them is demanded owing to the importance which they have assumed.

Before the fire in the room where this is being written there lies a commonplace "tabby" cat. That she is commonplace is, however, when one stops to think of it, perhaps the most surprising thing about her. Of "pedigree" in the conventional connotation of that word she has none. Natural selection has doubtless played some part in her production, but of artificial selection—that process of controlled breeding by which we endeavour to fix types—there is no evidence. She is just a casual product of the promiscuous intercourse in which the domestic cat indulges when allowed to wander at large. Yet she has perfectly distinctive characters

which relegate her to one of the two distinctive classes into which "tabby" cats can be divided. Throughout the indiscriminate breeding which has been taking place for countless generations, certain features of colouration and marking have been transmitted unchanged to the exclusion of other characters which some ancestor must have possessed. There has been no blending of the particular character with others. We have here, according to Mr. R. J. Pocock,[1] an example of Mendelian inheritance. Mendel's own experiments were, in the main, conducted with the edible pea. He crossed individuals having distinctive characters, *e.g.*, those yielding smooth round seeds with those yielding angular wrinkled seeds, and found that the offspring yielded only seeds of the former kind. To characters thus transmitted at the expense of corresponding characters he applied the name "dominant." Further, he found that when the plants so obtained were bred amongst themselves, the new generation contained individuals of which some displayed the dominant character, which was alone present in their parent form, while others produced the angular wrinkled seeds absent from the parental form, but found in one of the grand-parental forms. This grand-parental character, which had been temporarily suppressed, he called "recessive."

At the present day attempts are being made by a particular school of biologists to bring within the scope of Mendelian rules peculiarities of hereditary transmission of all kinds. It will be time enough to

[1] R. J. Pocock, "On English Domestic Cats," *Proc. Zool. Soc. of London*, 1907, p. 143.

deal with these when they have passed the bounds of controversy and when their general acceptance makes a study of their applicability to practical questions imperative. We may, however, notice one interesting development, since it bears upon a matter—that of sexual dimorphism—to which allusion has been made above. Professor W. Bateson, the great protagonist of Mendelism in this country, has stated that he feels little doubt that we shall succeed in proving that in Vertebrates and in some other types, "femaleness is a definite Mendelian factor absent from the male and following the ordinary Mendelian rules."[1]

Dr. Archdall Reid's way of accounting for the above forms of resemblance between parents and offspring has elements of novelty which claim attention. His views may be thus summarised, though it is desirable that the reader should study them as expounded in Dr. Reid's own book in order to get a thorough grasp of them. Parental characters ordinarily blend in the offspring—indeed, the object of conjugation is to secure this blending. But of mutually incompatible characters, since these cannot blend, one or other becomes latent. Mendelism has concerned itself with characters of this class, which includes the sexual characters and some others. "The apparent non-blending of the sexual and Mendelian characters" is "due to the fact that the patent set from the one parent blends with the latent set from the other." Instead, therefore, of sexual dimorphism being a special case of Mendelian inheritance, we are to regard Mendelian reproduction

[1] W. Bateson, *The Method and Scope of Genetics*, 1908, p. 39.

as "an anomaly of sexual reproduction whereby non-sexual characters are reproduced and blended in the same mode as sexual characters, one of each allelomorphic pair being patent and the other latent."[1]

(2) *Reversion.* We have now to consider a group of cases in which the inheritance is said to be "reversionary." The cases have little in common beyond the fact that such resemblance as exists between the individual and his ancestors is of a kind from which, as regards the special features under notice, the immediate ancestors, *i.e.*, the parents, are excluded. Professor A. Thomson[2] makes the term "reversion" cover "all cases where, through inheritance, there reappears in an individual some character or combination of characters which was not expressed in his immediate lineage, but which had occurred in a remoter, but not hypothetical ancestor." Bateson's definition is somewhat more elastic. He uses the term to signify "that particular addition or subtraction which brings the total of the elements back to something it had been before in the history of the race."[3]

We may note, incidentally, that evolution is twofold. In developing from the fertilised ovum, the individual passes through a certain series of phases which together constitute the ontogeny. But the race to which the individual belongs has similarly passed through a series of phases—constituting the phylogeny—of which the onto-

[1] G. Archdall Reid, *op. cit.*, p. 437.
[2] J. A. Thomson, *op. cit.*, p. 123.
[3] W. Bateson, *The Method and Scope of Genetics*, 1908, p. 48.

genetic series is only, according to modern views, an imperfect reiteration. Theoretically, therefore, the individual may "revert" to a stage in either series and on this basis a distinction between "reversion" and "atavism" has been founded. This distinction is, however, of no practical value and may be disregarded.

Variations, as we have seen, are considered by Dr. Archdall Reid to be either progressive or retrogressive alterations of recapitulation, and the retrogressive variations, which are correlated with cessation of selection, give rise to one of the two forms of reversion, the other being the reproduction of a "dormant ancestral trait." It follows from the occurrence of retrogression that "ancestors are represented by the individual, not *en masse*, but in orderly succession." [1]

How difficult it is to arrive at a satisfactory conception of what is meant by reversion will appear when one reflects that Professor Thomson's definition will embrace all the cases to which either Galton's Law of Ancestral Inheritance, or Mendel's principles apply. It is, however, convenient to restrict the use of the term to instances in which the characters drawn from the stock comprised in the series of contributions, one-quarter, one-eighth, one-sixteenth, etc., which together make up the one-half of the inheritance not directly referable to the parents, are especially prominent. Cases in point are, doubtless, those which Galton himself described as examples of what he calls the Law of Filial Regression, which may be regarded as probably the

[1] G. Archdall Reid, *op. cit.*, p. 208.

scientific equivalent of the Law of Healthy Birth, to which allusion has already been made. A conception of what is meant by filial regression may be arrived at in this way :—Every individual is represented in the past by a multitude of ancestors, the number being directly proportional to the number of generations through which we count back and inversely proportional to the amount of inter-breeding which has taken place between the ancestors. Thus if one counted only a dozen generations back, and assumed that the branches of the genealogical tree had never intertwined, any particular individual would have behind him an army of 4096 persons. Exactly what the number is in any given case is, however, a secondary matter. It suffices that the number is large and that, in consequence, the "mean" of the ancestors will be approximately that of the general population. Now since the individual is a mosaic of ancestral characters he also will tend to approximate to the mean of the general population. There will, that is to say, be a tendency for offspring to "regress" towards the average in respect of any character with which the parents are specially endowed or in regard to which they are conspicuously deficient.

(3) *Anomalous cases.* These have little obvious application to human beings and they are mentioned chiefly for the sake of completeness. At the same time they may serve to indicate directions in which, with the help afforded by the scientific use of the imagination, the mysteries of heredity may be further probed.

(*a*) Telegony. This term is used to denote "the supposed influence of a previous sire on offspring subsequently borne by the same female to a different sire." The widespread belief in the occurrence of phenomena of this kind seems to have so slender a basis that, failing more convincing evidence, we need not dwell upon it.

(*b*) Metagenesis. In certain plants and animals the offspring is altogether different in type from its parent. Thus the plant which develops from the spore produced by an ordinary bracken fern is wholly unlike that fern; and the freely swimming organism—the medusa—to which a hydrozoan zoophyte gives rise, bears no resemblance to that zoophyte. To these new creatures succeed forms unlike them but like the forms of the first generation. We have, that is to say, an alternation of generations. The significant difference between the alternating forms is that they are, respectively, asexual and sexual as regards their mode of giving rise to the succeeding generation. Something in the nature of alternation of generations can be traced in the highest plants, and attempts have been made to interpret certain features of the reproductive process even in Man himself on similar lines. Still more complicated examples of alternation are familiar to the zoologist. One need only allude, in illustration, to the life histories of liver flukes and plant lice.

(*c*) Xenia. This is a form of inheritance dependent on a process of double fertilisation, which has been observed in some species of maize. Not only is the egg-cell fertilised, but a second

nucleus from the pollen tube unites with the polar nuclei extruded from the egg-cell in maturation to give rise to the endosperm.

(*d*) Pædogenesis. The Mexican Axolotl is a lacustrine gilled amphibian, which, under conditions favourable to the change, can shed its gills and continue life as a terrestrial form (called Amblystoma) so different from the Axolotl that for a long time the relationship between the two was not recognised, since the Axolotl bred freely and gave rise to forms similar to itself. In the light of its subsequent history it is obvious then that Amblystoma is capable of reproduction while still in the larval stage of its development.

(*e*) Seasonal Dimorphism. Weismann long ago drew attention to the fact that certain butterflies of apparently different species were in reality summer and winter forms of the same species, it being possible, by employing a suitable temperature, to convert the winter form into the summer one, though in ordinary circumstances the two forms alternated according to the season at which they appeared. Both this case and that of the Axolotl are described in Weismann's *Studies in the Theory of Descent*, and it is interesting to note that Weismann regarded them as instances of reversion.

As we saw above, the application of the term "Inheritance" is not usually restricted to the manifestations of innate tendency of which we have so far been speaking, and it would appear that the legal and other uses of the word are themselves not without biological significance. As Darwin pointed out, inheritance involves not only the transmission,

but the development of characters. This development is conditioned by the environment, but the cases which we are now considering are not, therefore, to be relegated to the second of our primary classes, for while the *expression* of inheritance is dependent on the circumstances in which development takes place, its *possibility* is to be explained by reference to the innate tendency which is the essential characteristic of the first class of cases.

It is a fact of common observation that latent characters are being continually brought to the light of day by the changing conditions of life. The humdrum citizen, suddenly faced for the first time by a critical situation, may display qualities of courage or cowardice, promptness or vacillation, delicacy or boorishness, of which he had previously given no sign. An epidemic of disease will bring out the fact that different persons have exhibited and have presumably inherited different degrees of susceptibility to its influence. Instincts which ordinarily cease in early life to be of value to the individual may persist to years of maturity if the special conditions which abrogate them are not forthcoming.

We can only judge of heredity by the way in which it manifests itself, and, in so far as factors in the environment have to do with the manifestation, we may legitimately regard them as factors of inheritance. All the elements which go to make up the special kind of environment which is conventionally described as "inherited" are not necessarily factors of this kind, but it is peculiarly among those elements that factors are to be found.

Having now obtained some notion of what is meant by inheritance, we may proceed to enquire what innate tendencies have to do with the causation of feeble-mindedness. Very little can be done in the way of allocating to its particular category any case of defectiveness which is admitted to be hereditary, since the psychical elements which afford the means of comparison are not very clearly definable. Moreover, although it may be admitted that the psychical elements have anatomical substrata, the admission is, as yet, of no particular value, for we do not know, except in the most general way, what psychical phenomena are associated with particular anatomical features, and if we should discover this we might find that the anatomical features themselves were not sufficiently distinctive to lend us any assistance.

All that we seem justified in asserting is that the bioplasmic basis, or (to employ the terminology of Weismann) the germ-plasm, derived from either parent, may, "for reasons unknown to us," exhibit in the offspring changes in the nature of variation or mutation. In this way an unsound stock may be derived from a sound one and, conversely, a sound from an unsound one. On the lines laid down above, a character of unsoundness may be transmitted so as to appear as an example of one or other of the modes of inheritance which have been mentioned. By a "character of unsoundness" is meant, in the circumstances with which we are at present concerned, what is called the "Insane Diathesis," for there is practically no evidence that particular mental defects are heritable quantities, although this

fact may simply be an expression of the deficiency of trustworthy information bearing upon the matter. Certainly, as far as feeble-mindedness is in question, unless the relationship to it, in heredity, of insanity, epilepsy, hysteria, neurasthenia, and even gross cerebral lesions were admitted, the case for inheritance would be a weak one.

Even in regard to the insane diathesis there is a plentiful lack of reliable data. Speaking during the course of a discussion on "The Influence of Heredity on Disease," Dr. C. Mercier [1] expressed the opinion that the "compilation of the statistics of inheritance which appear in the Report of the Commissioners in Lunacy is a gigantic waste of time and labour. The statistics are of no value at all for any practical or scientific purpose." Somewhat more satisfactory are the records compiled by individual observers in special instances to demonstrate the "effects of heredity," but from the statistical standpoint these records also are to a great extent vitiated by the absence of a standard of normal heredity with which to compare them.

Mr. David Heron,[2] whose studies in this connection are among the few which have been conducted on scientific lines, has stated that "the whole of the medical data hitherto published on the subject seem lacking in the precision needful to give a logical proof. . . . Heredity is over and over again recorded as a principal or contributory cause of insanity, although the average number of the insane

[1] C. Mercier, *Proc. Royal Society of Medicine*, Jan. 1909, p. 45.

[2] D. Heron, *A First Study of the Statistics of Insanity and the Inheritance of the Insane Diathesis*, 1907, p. 21.

in the stock of the same individual has not been discussed."

We may, however, quote some of the more recent figures which have been collected, in circumstances which eliminate to a great extent the purely speculative element. In his evidence before the Royal Commission on the Care and Control of the Feeble-Minded, Dr. W. A. Potts[1] tendered the following tables as summarising the results of an enquiry which he had made :—

INSANE, FEEBLE-MINDED, AND EPILEPTIC HEREDITY.

—	Direct.	Collateral.	Total.
Defective children	28·4%	10%	38·4%
Normal children	10%	12%	22%

From figures given by Mrs. Bramwell Booth,[2] it appears that of 205 children born to feeble-minded women 25 were "of average intellect (so far as it was possible to tell)"; 67 were "mentally weak"; while about the remaining 113 there was "no information." Assuming that the proportion of "mentally weak" children among the 113 was the same as among the 92 in regard to whom particulars could be ascertained, this would mean that over 70 per cent. of the children of feeble-minded mothers are mentally defective.

A few cases quoted in the 13th Annual Report (1909) of the National Association for the Feeble-Minded hardly bear out the view. "A careful

[1] W. A. Potts, *Report of Roy. Comm. on Feeble-Minded*, vol. 2, p. 474.

[2] B. Booth, *Report of Roy. Comm. on Feeble-Minded*, vol. 2, p. 572.

examination of the children at the North Finchley Home," it is stated, showed that "2 out of 12 children of 12 mothers, all of whom are definitely feeble-minded, can at present be considered mentally defective." This works out at less than 17 per cent., but in regard to both sets of figures much more information is required before they can be satisfactorily compared.

Dr. A. Eichholz,[1] in his evidence before the Royal Commission, contended that the influence of heredity is not to be expressed in such simple fashion as this. "Apart from the associated conditions of physical degeneracy which," he says, "are responsible for a considerable proportion of the feeble-minded, it may be said that the chances of mentally defective offspring reside evenly among the whole population, and that they do not pertain to any particular type of parent. This is a direct result of the operation of heredity in virtue of which the physical inheritance of the individual is derived from a very far-reaching line of ancestors, the large majority of whom are normal." Dr. Eichholz, it would appear, applies rather too absolutely the principle of filial regression.

Mr. Heron's conclusions, which, from the nature of the methods employed, have a special value, are that "The insane diathesis is inherited with at least as great an intensity as any physical or mental character in man. It forms, considering the difficulties and assumptions of the investigation, probably no exception to an orderly system of

[1] A. Eichholz, *Report of Roy. Comm. on Feeble-Minded*, vol. 1, p. 206.

inheritance in man, whereby on an average about half of the mean parental character, whether physical, mental, or pathological, will be found in the child. It is accordingly highly probable that it is in the same manner as other physical characters capable of selection or elimination by unwise or prudential mating in the course of two or three generations."[1] Mental characters thus appear to conform to Galton's Law of Ancestral Inheritance as far as the parents are concerned. Whether the Law is of more extended application remains to be seen.

A subsidiary result obtained by Mr. Heron is also worthy of notice. He found that there is "no reduction in, possibly rather an augmentation of, the fertility of insane stocks, when compared with that of sane stocks."[2]

Attempts have been made to account for the inheritance of mental unsoundness on Mendelian principles, insanity being regarded as the recessive character, and sanity as the dominant one, but this interpretation is not borne out by Mr. Heron's figures, as is shown, for example, by the following table given by him :—[3]

Nature of parents as to insanity.	Total Offspring.		Percentage Offspring.	
	Insane.	Sane.	Insane.	Sane.
Both sane	314	1,179	21	79
One insane	93	299	24	76
Both insane	4	4	50	50

Possibly the "insane diathesis" may eventually admit of being split up into a number of diatheses each

[1] D. Heron, *op. cit.*, p. 21. [2] *Ibid.*, p. 32.
[3] *Ibid.*, p. 17.

capable of recognition as a specific hereditary and perhaps Mendelian character.

Sir E. Ray Lankester[1] would place the facts of inheritance, as regards mental defect, in yet another category. "There is," he says, "no reason whatever to suppose that true feeble-mindedness is anything but a congenital condition, due to heredity and to nothing else; a reversion of the brain to an earlier level of development."

In cases of mental deficiency we may find, as associated conditions, other forms of hereditary defect, and much confusion has resulted from the gratuitous assumption that the latter have a causal relation to the want of intellectual capacity. Fairly definitely in the case of alcohol; less so in the case of tubercle; and only doubtfully as regards syphilis and other toxic agencies, we can recognise that the injurious effects of these agents are contributed to by the lack of resistive power in the organism. But in this fact there lies no justification for assuming that the particular defect which the bioplasm may display is capable of engendering defect of some other kind. Therefore, when we find that the forebears of a mentally defective person are alcoholic or tuberculous we have not sufficient ground for inferring that alcohol or tubercle was responsible for his intellectual shortcomings.

Such evidence as there is for associating tuberculosis and insanity lies in the fact that the incidence of tuberculosis upon the insane is relatively high; but this association may be indirect in that the

[1] E. Ray Lankester, *Report of Roy. Comm. on Feeble-Minded*, vol. 5, p. 246.

existence of insanity may involve the acquiring of characters in the way of defective nutrition which render the individual more susceptible to the action of the tubercle bacillus, apart from any innate weakness in that direction. If there be, as Mr. Heron maintains, "a close correspondence between the inheritance of the insane diathesis and that of pulmonary tuberculosis,"[1] this must be taken to mean that the different pathological conditions are inherited on parallel lines, and not that one condition is convertible into another. Even parallelism to this extent is not without its confusing aspect, for while the tubercular diathesis (if it exists at all)[2] denotes a capacity for reacting with abnormal ease to the influence of only one particular toxin, the insane diathesis would appear to involve a many-sided weakness expressed as susceptibility to many and various toxins, to say nothing of mechanical and even more obscure agencies.

Alcoholism is on a somewhat different footing, since it is, theoretically at least, under the control of the will. The germinal defect involved in alcoholism may therefore be either a special susceptibility to the action of the toxin—an alcoholic diathesis—or a paresis of volition which brings the organism within the sphere of action of the toxin—a form of the insane diathesis.

The part which consanguinity plays in the causation of weak-mindedness becomes intelligible in the light of our conception of heredity. If the

[1] D. Heron, *op. cit.*, p. 32.

[2] See in regard to this point the discussion on Heredity reported in *Proc. Roy. Soc. of Medicine*, Jan., 1909.

bioplasmic stock from which the closely related persons come is of the kind which generates defective brains, the chance of the occurrence of two independent parental variations which would be necessary to eliminate this quality is so small that the transmission of the quality by one or both lines of descent is probable. If the stock is free from this peculiarity, it is no more likely to vary in the direction of producing it than any other healthy stock.

(B) Environmental Influences Predominant.

In the first set of cases the environment was seen to play a part apparently insignificant and certainly obscure ; here, on the other hand, we suppose it to have special importance. As far as the human race is concerned, natural selection has become greatly restricted,[1] and artificial selection has been carried on either haphazard or with a view to the perpetuation of other qualities than the intellectual. The mean intellectual level of the community is apparently no higher than, for example, in the Elizabethan period ; indeed, there are reasons for regarding it as lower : and yet we have advanced since those days. It has been pointed out by Lloyd Morgan and others that present-day evolution is rather of the environment than of the race. The children start where the fathers left off, not only because they have inherited

[1] "The present progressive evolution of man, at any rate of civilised man, is chiefly, if not exclusively, against disease, which is apparently the only selective agency acting on him sufficiently stringent to do more than merely maintain characters previously evolved."—G. Archdall Reid, *The Laws of Heredity*, 1910, p. 438.

the favourable mutations and variations of bioplasm which the father experienced, but because they have come into the store of favourable conditions which successive generations have accumulated.

During recent years some remarkable results have been obtained by Professor J. Loeb[1] in his investigations of the effects which temperature, light, gravitation, and chemical agencies, acting upon the germ, have in modifying both the bodily form and the instinctive reactions of animals. Although his experiments have little direct bearing upon human development, they open up fields of interesting possibilities which may eventually be productive of valuable contributions to embryological science. So far as our present knowledge goes, the environmental factors which have the most obvious relation to the production of mental defect may be thus classified :—

(1) *Mental and physical strains and stresses.*— These may be considered either in connection with their influence on the parent before the separate existence of the child or as acting on the child directly. It appears, on the face of it, reasonable to suppose that an insanitary milieu and want of suitable food may prejudicially affect intra-uterine development. We have for instance the figures given by Legrand du Saulle as to the "siege children" in Paris. Of 92 conceived during the siege of 1870–71 not one was thoroughly healthy, and 29 of them displayed symptoms of mental disorder. There is also some evidence that attempts to procure abortion are occasionally

[1] J. Loeb, *op. cit.*

responsible for the development of feeble-mindedness in the children whose nutrition is thus interfered with.

On the subject of "maternal impressions," to which allusion will no doubt be expected, the remark which seems appropriate is that we should keep an open mind, in the hope that some day there may be forthcoming more conclusive evidence. The presumption is, however, against the view that maternal impressions can have important effects in controlling the development of the fœtus if only for the following reason. In spite of the intimacy of the relation which exists between mother and child during gestation, there is not ordinarily a preponderance of maternal characteristics over paternal. As compared with the influence which the mother is bringing to bear during a prolonged period, the incidence of an isolated and temporary emotion might reasonably be expected to be trivial, and since it appears that the former is of no particular moment, we may regard the latter as of very little consequence indeed.

The incidents of birth afford ample scope for the intervention of injurious agencies, but the topic is one that need not detain us, since the possibilities in this regard are such as anyone may readily think out for himself. Reference is, however, permissible to the work of Little,[1] since his name has been applied to a condition in which certain accidents at birth may be associated with feeble-mindedness. Some degree of paralysis was observable in Little's cases, but it has been suggested that a form of

[1] W. J. Little, *Trans. of the London Obstetrical Society*, 1861, p. 293.

infantile "cerebroplegia," which is not accompanied by paralysis, may occur.

A view very generally approved, *e.g.*, by Heller,[1] is that first-born children are more likely to be mentally defective than those afterwards born to the same parents. This is said to be due to the fact that first labours are usually more prolonged and difficult than subsequent ones. Dr. Tredgold[2] maintains the contrary opinion. "As a matter of fact," he says, "I believe the statement that an undue proportion of idiots are first-born children is decidedly open to question, and my own experience is to the effect that it is more common for the later-born, and not the first-born, to be affected." It may be noted in this connection that Mr. Heron, in the research already alluded to, found that "the incidence of insanity does not appear to be equally distributed over the family, but to fall more heavily on the elder members."[3] Mr. Heron does not suggest, and probably would not accept the suggestion, that the explanation of his results is to be found in the mechanical conditions of parturition.

After birth the child is still exposed to the influences of strains and stresses, though from these we must arbitrarily exclude, out of respect to the scheme of classification adopted in this book, such as do not act at "an early age." Of special importance are the ones which, for any reason, *e.g.*, by causing abnormalities of sense-organs or by limiting educational opportunities, result in the child's not

[1] T. Heller, *Grundriss der Heilpädagogik*, 1904, p. 168.
[2] A. F. Tredgold, *Mental Deficiency*, 1908, p. 30.
[3] D. Heron, *op. cit.*, p. 32.

acquiring the necessary capital of sense-impressions. To the instances of mental defect arising in this way Ireland and others apply the name Idiocy by Deprivation, and the class includes cases like those of Laura Bridgman and Helen Keller on the one hand, and on the other, the "wild boys" and "wolf children" who formerly attracted so much attention.

We may notice, in passing, Griesinger's [1] suggestion that an injurious state of cerebral congestion may be produced in children by keeping their heads too closely wrapped up or by allowing them to sleep in too close proximity to a stove.

The importance to be attached to psychical stresses will depend somewhat on our interpretation of what constitutes "an early age." Very young children are not sufficiently appreciative of their surroundings to find in them occasion for the development of profound emotions. Heller [2] quotes instances in which children of, respectively, six and eight years of age, previously of normal intelligence, became permanently weak-minded in consequence of severe frights. For practical purposes such cases might well be included among the "feeble-minded," though it might be argued that our definitions do not cover them.

(2) *Toxic Agencies.*—These might, of course, be brought under the heading "strains and stresses" just given above, but it is more convenient to take them separately. They may be applied directly to the individual; thus the child may be given alcohol,

[1] H. Bösbauer, L. Miklas and H. Schiner, *Handbuch der Schwachsinnigenfürsorge*, 1909, p. 87.

[2] T. Heller, *op. cit.*, pp. 14 and 15.

or may acquire syphilis, malaria, or one of the acute infections at a sufficiently early age to bring it within the limits of our conception of feeble-mindedness as a condition dating "from birth or from an early age." In general, however, they influence the child *viâ* the parent. The most important ones are, it would appear:

(*a*) *Syphilis.*—The degree of probability that syphilis is the cause of the mental defect observed is fairly high in a case where one finds, as one sometimes does find, a gumma in the brain; or where, after a definite history of infection, parent and child alike suffer from general paralysis (using that term in its specific sense). With this justification for assuming some connection between syphilis and feeble-mindedness, an investigation was conducted as carefully as circumstances would permit into the family history of 90 patients over 16 years of age. In 13 of these cases, *i.e.*, 14·4%, there was satisfactory evidence that one or other of the parents had had syphilis. If it be remembered how widespread this disease is among the general public, it seems probable that if one took children who were not mentally defective and investigated their family history as thoroughly, one would find quite as much parental syphilis—the normal children taken might indeed very well be the brothers and sisters of the idiots in the first batch of cases. The Wassermann reaction provides a more satisfactory means of diagnosing the existence of syphilitic infection than is afforded either by inspection or by inquiries into the history of the person concerned. Dean[1] has

[1] H. R. Dean, "An Examination of the Blood Serum of Idiots by the Wassermann Reaction," *Lancet*, July 23, 1910, p. 227.

recorded the results of an examination, by Wassermann's method, of blood serum from 330 cases of idiocy. He found that in 51, *i.e.*, 15·4%, a positive reaction was obtained. Included among the 51 cases were 7 with definite signs of syphilis and 3 or 4 in which syphilis might have been suspected. It is interesting to note how closely Dean's figures approximate to those quoted above, which were yielded by an investigation of the family history.

(*b*) *Tuberculosis.*—This disease is perhaps more widely spread than syphilis, and its association with feeble-mindedness proves nothing in the absence of figures to show that the association is really more frequent than the occurrence of a family history of phthisis in the sane. It is, however, quite conceivable that tuberculosis in the mother may interfere with the nutrition of the embryo as suggested by Weygandt.[1]

(*c*) *Alcohol.*—The argument from association of conditions is even more feeble in this case than in the preceding. In the great majority of the compilations of statistics dealing with this subject no attempt is made to show the percentage of cases in which there is a direct or indirect action of alcohol on the healthy embryo. It is, however, credible that alcohol in such circumstances would be injurious, and that the brain might suffer as well as other parts of the body. Some confirmatory evidence on this point is afforded by Dr. G. Schenker,[2] Director of the Biberstein Asylum, near Aarau in

[1] W. Weygandt, *Die Behandlung idiotischer und imbeciller Kinder*, 1900, p. 8.

[2] G. Schenker, *Beobachtungen an schwachsinnigen Kindern*, 1899, p. 7.

Switzerland. "Before the introduction of the alcohol monopoly," he says, "there were certain towns and districts where the consumption of brandy was excessive. The physical and psychical state of the people in these regions was such that frequently hardly a third of them would be considered fit for military service. A large number of idiotic and semi-idiotic children were there produced. Alcoholism was chiefly responsible for these, for in other districts where alcohol was little indulged in, and a more rational mode of living was observed, strong, well-built and mentally well-developed persons were the rule."

Of the same purport is the statement made by Mr. R. J. Parr,[1] Director of the National Society for the Prevention of Cruelty to Children, in his evidence before the Royal Commission on the Care and Control of the Feeble-Minded. He submitted a list of 13 inebriate women in regard to whom it was noted that "the younger children born during the period of the women's inebriety" were weak-minded, while those born prior to that period were sound.

Against the view that there is any such simple dependence of feeble-mindedness in the offspring on alcoholism in the parent must be set the experience of Miss E. M. Elderton and Professor Karl Pearson, as recorded in No. 10 of the Eugenics Laboratory Memoirs. As a result of analysing two series of statistics, collected, the one by the Edinburgh Charity Organisation Society and the other by Miss Mary Dendy of Manchester, no marked

[1] R. J. Parr, *Rep. of Roy. Comm. on Feeble-Minded*, vol. 2, pp. 138 and 147.

relation was found "between the intelligence, physique or disease of the offspring and parental alcoholism in any of the categories investigated"; and the opinion is expressed that "the danger of alcoholic parentage lies chiefly in the direct and cross-hereditary factors of which it is the outward or somatic mark." It has been pointed out in regard to these contentions: (1) that the influence of parental alcoholism might have become obvious if the children concerned had been examined at a later age; and (2) that no information is supplied as to whether the parents' alcoholism existed prior to the birth of the children.[1] Both these criticisms seem legitimate and due weight must be assigned to them in arriving at a conclusion on the matter.

As to the pernicious influence of alcohol when given to the child directly there is little question. In this country alcohol is administered to children by careless or vicious parents with deplorable frequency, while among the lower classes in Germany it is said to be customary to reduce infants to a state of torpor by dipping the teats of their feeders in brandy or by rubbing that liquid into their faces. Bourneville and Baumgarten[2] have recorded a case of alcoholism in a child of 4 years. It appears too that sufficient alcohol may be excreted in the milk of nursing mothers to produce pernicious effects on the infant. Thus in his work "Le Nourisson," Professor Pierre Budin relates the story of a woman who, while suckling her child, was advised by her

[1] *Vide* Communications by Dr. Maurice Craig and Dr. W. C. Sullivan in the *Lancet* for June 25th and July 2nd, 1910.

[2] Bourneville and Baumgarten, *Alcoolisme chez un enfant de 4 ans. Recherches sur L'Épilepsie, etc.*, 1887, p. 142.

doctor to take quinine wine and who added thereto bordeaux, champagne, beer, and liqueurs on her own responsibility. At the age of 5 weeks the child had two convulsions after having been for several days "nervous" with disturbed sleep. A third and subsequent severe convulsions led to the discontinuance of the mother's milk and the child then speedily recovered.

(*d*) *Other Toxic Agents.*—Heller [1] refers to three cases in which the mothers of feeble-minded children suffered from malaria during pregnancy. Séguin [2] states, as a matter of personal observation, that idiocy is common in the class of artisans who work in copper, while, according to Roque and others, idiocy, imbecility, and epilepsy occur with abnormal frequency in the children of workers in lead. It is suggested also that the widely spread practice of giving soothing syrups and similar opiates to children has perhaps contributed in some measure to the imperfect cerebral evolution of those children.

There are to be found in the various English and foreign works treating of idiocy and its congeners numerous statistical tables setting forth the percentage of cases in which the different agencies above enumerated, and possibly others, have been credited with "causing" feeble-mindedness.

Unless we are in a position to judge of the competence of an observer and of his disinterestedness we cannot estimate correctly the worth of any evidence he may submit and there can be no question that the raw material of the statistics of

[1] T. Heller, *op. cit.*, p. 163.

[2] E. Séguin, *Traitement Moral, Hygiène et Éducation des Idiots, etc.*, 1846, p. 182.

etiology is to a great extent furnished by persons who are neither capable nor free from bias. Information supplied by the relatives and friends of the feeble-minded may require to be discounted very considerably before its true value can be arrived at, and it is not always clear that this process has been properly carried out. Sufficient proof of the need for the adoption of an attitude of scepticism in regard to the explanation of their relatives' condition proffered by the common people is to be found in the following table, taken from the Report of the Commission on the Care and Control of the Feeble-Minded. Here the causes are stated just as they were given, in apparent good faith, by various relatives.

(*a*) Conditions affecting the mothers :—

Mental shock during gestation	14 cases.
Physical injury	4 „
Accidents of parturition	5 „

(*b*) Conditions affecting the patient only :—

Physical injury, usually a fall	12 cases.
"Fits"	6 „
Frights	4 „
Rupture, vaccination, rickets, and scarlet fever ; of each	2 „
"Brain fever," "brain affection," "closing of the skull," hydrocephalus, operation for adenoids, removal of the tonsils, heart disease, teething, measles, typhoid fever, eczema, pain in the back, and dog-bite ; of each	1 „

In only one case was there any suggestion that inheritance had played a part. The reply ran—"Have no idea unless it is taken through the family."

It is interesting to note that the cause most

frequently given was "maternal impressions" and that alcoholism is not once mentioned.

The necessity for maintaining a critical attitude being realised we may venture to study the statistical data to which allusion has been made. Of these the English ones are readily accessible, and our illustrations may therefore be drawn more profitably from foreign sources. At Lucerne in 1903 there was laid before the 4th Swiss Conference on Idiocy by Direktor Friedrich Kölle, of Zürich, a compilation from the sources indicated in the following table.

	Name of Recorder.	Völker.	Schwenk.	Piper.	Zeitschrift.
A. Originating before birth.	Hereditary defect..	53%	31%	27%	18%
	Family history of tubercle... ...	22·9%	—	23%	—
	Family history of alcoholism ...	21%	10·3%	10%	9·5%
	Maternal impressions	10·3%	7%	10%	3·6%
	Consanguinity ...	4·7%	3·5%	3%	5%
	Acute disease of, or injury to, the the mother ...	3·1%	—	2.5%	—
	Parental syphilis...	1%	—	5%	—
B. Originating at birth.	Primogeniture...	23·2%	29%	32%	35%
	Prolonged labour	9·7%	2%	6%	—
	Premature birth	0·6%	3%	2%	13%
C. Originating after birth.	Convulsions soon after birth ...	33·1%	34·3%	—	31·3%
	Acute infectious diseases ...	11%	12%	27%	6%
	Meningitis and apoplexy ...	8%	6%	9%	22%
	Rickets	3·9%	13%	9%	4%
	Ill-treatment and neglect	5·4%	—	—	7%
	Head injuries ...	3·7%	4%	20%	11%
	Scrofula	0·1%	2%	—	—

The total number of cases, upon which the percentages given are based, was thus made up :—

Völker 2037 (except in section "B," where it was 332). Schwenk 175. Piper 416.

Zeitschrift für die Behandlung Schwachsinniger und Epileptiker 1287.

It is obvious that there exists among those concerned with the care of the feeble-minded some considerable diversity of opinion in regard to the relative importance in etiology of the cardinal factors, innate and environmental, which we have been studying. As already mentioned this is no doubt primarily due to the lack of precise information on the point, but it seems to indicate also a regrettable want of the scientific spirit on the part of those who make confident pronouncements on the matter. As a set-off to the views already ventilated, and without any pretence of assuming other than a strictly neutral position, we may quote an opinion expressed by G. Archdall Reid.[1] "We have," he says, "no option but to believe that medical men are mistaken in supposing that morbid conditions affecting parents tend to render offspring degenerate."

We must note also the results obtained by workers in the Galton Laboratory of the University of London. Statistical inquiry was made into (among other things): (α) The influence of drink in the parents on the height, weight, general health, and intelligence of the children; and (β) The influence of overcrowding, bad economic condition

[1] G. Archdall Reid, *Rep. of Roy. Comm. on the Feeble-Minded*, vol. 5, p. 248.

of the home, and the moral and physical condition of the parents on the intelligence, eyesight, glands, and hearing of the children.

The investigations, so far as they have gone, "show clearly the small influence of environment." The various conditions enumerated appear to have exercised practically no effect on the intelligence of the children or, for that matter, on any of the qualities mentioned.[1]

It would seem then, on reviewing the whole position, that we may accept as most in accordance with modern ideas the conclusion of the Commission on the Feeble-Minded:—

"That both on the grounds of fact and theory there is the highest probability that feeble-mindedness is usually spontaneous in origin—that is, not due to influences acting on the parent—and tends strongly to be inherited."[2]

Before the subject of etiology is dismissed the vexed question of what is called "the transmission of acquired characters" may be briefly noticed. In the light of the theory of heredity here adopted it does not present any special difficulty. We have seen that the portions of bioplasm which are separated off for the purpose of reproduction may exhibit variations or mutations, arising "spontaneously" or as the result of some unknown environmental influence, which may persist and be handed down from generation to generation. To this extent, then, acquired characters are transmitted. In the second

[1] E. M. Elderton, *The Relative Strength of Nurture and Nature*, 1909.

[2] *Report of Roy. Comm. on the Feeble-Minded*, vol. 8, p. 185.

group of cases with which we have just been dealing we had, again, living matter altering under the action of various forces. But of this living matter the bioplasm which is the basis of continuity forms only a small part. The process of alteration may therefore not reach it at all. The lopping off of a limb, or similar mutilation, could hardly affect the germinal substance and it is inconceivable that such a "modification," as a biologist would term it, should be transmitted. If, however, the germinal substance is reached by an injurious agent, *e.g.*, a poison circulating in the blood, it may respond by undergoing either a "variation," which, like other variations, will be permanent or not according as it is fixed by natural or artificial selection; or a "mutation" which will remain as a permanent character. Again, a modification may act indirectly by making an opening for the appearance of a variation or mutation, and in the former case its continued operation during many generations may become evident in heredity through the appearance of what is seemingly a mutation.

As this matter of the handing on of acquirements is one to which Dr. Archdall Reid[1] has devoted special attention, it will be fitting to give a summary of his views on the point. "Living beings," he says, "develop mainly under the influence of three distinct kinds of stimuli—nutriment, use, and injury." What are ordinarily called "acquirements" are characters arising under the stimulus of use or injury. The capacity to develop "acquirements" is present "only in structures where it is useful, to the extent to which it is useful, and during the time it is useful." Al-

[1] G. Archdall Reid, *The Laws of Heredity*, 1910.

though the "power of responding to the stimulus of injury is clearly allied to, and is derived from, the power of responding to the stimulus of nutriment," there is so great a difference between them that in order to explain the appearance of "acquirements" in offspring we should have to assume not so much a "transmission" as a "transmutation" of characters in the sense that features which were evoked in the case of the parent by means of the stimulus of injury would be called forth in the offspring by nutritional stimuli. This consideration applies equally to the effects of use, which, however, come less frequently into the question, since the capacity for responding to the stimulus of use is more limited than that of responding to the stimulus of injury.

The need for the doctrine of the transmission of acquirements depends on the view taken as to the adequacy of Natural Selection in accounting for evolution, and since Dr. Reid finds in Natural Selection a sufficient explanation of the phenomena, the Lamarckian hypothesis is for him superfluous, to say the least of it.

But all biologists are not satisfied that Natural Selection is the only method of evolution, and there are cases in which the supposition that characters acquired by a parent can be transmitted to offspring involves fewer difficulties than the view that only the weeding-out process of the struggle for existence has been in operation. A recent statement of the case for the transmission of acquired characters is that of Professor R. Meyer.[1]

[1] R. Meyer, "Gibt es Vererbung erworbener Eigenschaften? *Deutsche Medizinische Wochenschrift*, June 9, 1910, p. 1086.

It is the conception of the isolation of the germ-plasm as the sole vehicle for inheritance which puts out of court even the most plausible story of the handing on of an acquirement. But if that isolation is not complete; if, that is, some portion of "somatic," as distinct from "germ," plasm goes to the formation of a new individual, the case for "acquirements" is greatly strengthened. Dr. Paul Buchner[1] has described such a condition of affairs as actually existing in the organism known as Sagitta, where, according to his observations, chromatin from an epithelial cell wanders into the "ovocyte" and plays a part in the subsequent development of the egg.

[1] P. Buchner, "Keimbahn und Ovogenese von Sagitta," *Anatomischer Anzeiger*, Bd. 35, Jan. 1910, p. 433.

CHAPTER VI

THE VARIETIES OF FEEBLE-MINDED PERSONS

Since no two cases of feeble-mindedness are alike, the making of a classification involves the acceptance of certain conventions. There must be agreement as to the respects in which likeness exists, and as to the degree of likeness, in any particular respect, which is to be regarded as constituting similarity. Classification is akin to the formation of concepts. Its aim is to render a mass of facts more easily handled by substituting one for many, and its utility will depend on the amount of information which the type form supplies as to the characteristics of the group for which it stands.

In drawing up a scheme of classification many interests, some of them conflicting, have to be consulted. We shall get a notion of the difficulties which arise by considering what are the features which a good classification should exhibit.

1. It should be based on matters of fact rather than of opinion.

2. It should be complete and exclusive. A division of human beings into those with red hair, those who subscribe to *The Times*, and those who take sugar in their tea will at once be seen to leave

much to be desired; yet on such lines as these are some of the existing systems drawn up. Take, for instance, Dr. Ireland's familiar classification of idiots into genetous, microcephalic, hydrocephalic, eclampsic, epileptic, paralytic, traumatic, inflammatory, sclerotic, and syphilitic varieties, to which are added cretins and idiots by deprivation. Here the cases are arranged in sections, of which the distinguishing features are now anatomical, now physiological, now etiological. This objection is to be met by introducing a further consideration in regard to classification.

3. It should have, at any rate for groups at the same level, a constant determining factor. In Dr. Ireland's arrangement the principle of uniformity is not carried out even to the extent of providing a common grammatical form for the terminology. This criticism is not offered with any desire to belittle Dr. Ireland's work. The defects of his system are, to a great extent, inherent in the subject, as will be appreciated if one attempts to devise a better scheme. No single aspect of feeble-mindedness has been studied with sufficient thoroughness to provide an adequate foundation for the satisfactory erection of species, genera, and orders. In the present state of our knowledge a classification on strictly anatomical, etiological, or even psychological, lines would be as artificial and as little indicative of the number of points of contact between different forms as is the Linnean system in its application to plants. Thus schemes based on head measurements; or on assumed modes of causation; or, as in Esquirol's case, on the power of speech; would

bring together cases having nothing in common except the arbitrarily selected factor. It would be pedantic, then, to insist too strongly upon uniformity of plan in a taxonomic arrangement of which the chief *raison d'être* is convenience.

4. It should be based on definitions of universal acceptance. The value of any convention, considered *qua* convention, is proportional to the number of persons who subscribe to it. However much ingenuity may have been expended on a scheme its utility will be small if nobody employs it but its author.

5. It should be authoritative. There is, on their merits, so little to choose between the different systems which have been proposed by various writers that the selection of a particular one by some acknowledged authority supplies a strong argument for employing it to the exclusion of others.

Keeping these considerations before us we may briefly review some of the almost innumerable suggestions for classifying the feeble-minded which have been propounded. Fanciful analogies, such as that which gave us Brephoid, Theroid, and Ethnoid types, or that underlying the distinction of Kalmuck, Aztec, Papuan, etc., types, have no more than some slight historical interest. On the basis of his studies in pathological anatomy Bourneville distinguished forms of idiocy marked by the following conditions:

1. Meningitis.
2. Meningo-encephalitis.
3. Simple arrest of development.
4. Atrophic sclerosis.
5. Hypertrophic sclerosis.

6. Primary porencephaly.
7. Secondary porencephaly.
8. Hydrocephaly.
9. Cretinism.
10. Microcephaly.

Although this arrangement has merit, in that it serves as a reminder of the chief forms of cerebral defect found at post-mortem examinations of idiots, it is open to objection as being of little use during life, as assigning to the different conditions enumerated a fictitious independence, and as leaving undifferentiated all except the most marked cases of feeble-mindedness.

In the section dealing with causation reasons were adduced for recognising innate and environmental etiological factors. This distinction supplies the foundation for various systems, *e.g.*, those of Heller and Tredgold, in which the first step in classification is the separation of a group of primary or inherent mental defects from a group of secondary or acquired defects. Such systems are practically valueless. The uncertainty attending the mode of origin of cerebral abnormalities leaves us with no test which is applicable to the great majority of cases. Tredgold admits that the so-called congenital cases may be either "primary" or "secondary," and his tabular statement of the "primary" and "secondary" types shows a marked absence of those differentia which he charges other authors with neglecting.

Since we are admittedly concerned with a disorder of the mind, a classification on the lines of psychology would appear to be most rational. This thought

has occurred to many, and has resulted in the production of a number of schemes, some of which are purely academic, while others aim at being practical. Sollier measured the degree of mental defect by noting the extent to which the faculty of attention was impaired. He made three classes :—

1. Absolute idiocy : complete absence and impossibility of attention.

2. Simple idiocy : weakness and difficulty of attention.

3. Imbecility : instability of attention.

Wildermuth attempted to define various grades of idiocy by comparing them with stages of the development of normal persons on the assumption that idiocy was simply the result of an arrest of the processes of growth. This attempt is chiefly of interest in that its failure serves as a reminder of the complexity of the etiological problem.

Voisin and Weygandt have regarded the idiot's capacity for being educated as affording the most useful criterion, though, as Heller shrewdly remarks, this depends not only on the mental state of the taught but also on the skill and experience of the teacher. Weygandt's arrangement is as follows.[1]

1. Idiots incapable of being taught.
2. Idiots capable of being taught.
   a. Apathetic type.
   b. Excitable type.
3. Imbeciles.
   a. Apathetic type.
   b. Excitable type.

[1] W. Weygandt, *Die Behandlung idiotischer und imbeciller Kinder*, 1900.

In Germany this distinction of apathetic (apathische) and excitable (erethische) forms is very generally accepted. It is adopted, for example, by Kraepelin in his classical treatise on insanity. Heller, however, holds that most weak-minded children cannot be relegated to one or the other group with certainty, and this accords with the present writer's experience. A rough distinction can be drawn between the superficial, shallow minds which, within the narrow limits of their powers, learn easily, to forget as easily, and minds which, being impressed only with difficulty yet retain the impression made for a relatively long period. This latter distinction, which has practically no taxonomic value, seems to depend on the affective reaction to stimuli.

The best classification on practical lines is that suggested by the Royal College of Physicians of London and adopted from considerations of utility by the Royal Commission on the Feeble-Minded. It is no worse than those quoted above as regards the first four criteria mentioned and it has, since it represents the considered judgment of a body of able persons, the merit of being authoritative. The following groups are recognised:—

Idiots, *i.e.*, persons so deeply defective in mind from birth or from an early age that they are unable to guard themselves from common physical dangers, such as in the case of young children would prevent their parents from leaving them alone.

Imbeciles, *i.e.*, persons who are capable of guarding themselves against common physical dangers but who are incapable of earning their own living

by reason of mental defect existing from birth or from an early age.

Feeble-Minded, i.e., persons who may be capable of earning a living in favourable circumstances, but are incapable from mental defect existing from birth or from an early age: (*a*) of competing on equal terms with their normal fellows; or (*b*) of managing themselves and their affairs with ordinary prudence.

Moral Imbeciles, i.e., persons who from an early age display some mental defect coupled with strong vicious or criminal propensities on which punishment has little or no deterrent effect.

Criticism has been directed at the above scheme on the ground that no definition is given of what constitutes "an early age," and, further, that the test of capacity for work is not applicable to the children who form a large proportion of the feeble-minded. As regards the latter of these contentions it may be said that for practical purposes the difficulty is not a serious one, and that it could be met by reading "learning to earn" for "earning," wherever necessary. There is, unquestionably, about the phrase "an early age" a want of explicitness which detracts from the value of the definition of which it forms part. The Commissioners in Lunacy have tried to avoid this pitfall in the definitions of the kinds of unsoundness of mind recognised by them, by speaking of a "congenital or infantile mental deficiency (Idiocy or Imbecility) occurring as early in life as it can be observed." By common agreement "congenital" means, in the language of the Standard Dictionary, "born with us: existing

from birth." But the term "infantile" cannot be so easily disposed of. "Infancy" from a chronological standpoint may be taken to signify the first few months of life, which is the way in which medical men employ the description, or the word may be used in one of its legal bearings to denote periods expiring at the age of seven, or fourteen, or twenty-one years. If the first mentioned interpretation is to be accepted, it must not be lost sight of that certain mental qualities do not appear till long after the first year of life and, consequently, any aberration involving them, occurring "as early in life as it can be observed" cannot be either "congenital" or "infantile."

Another objection to the scheme of the Royal Commission on the Feeble-Minded is that it does not go far enough, since it takes no heed of obvious differences between the members of each primary grouping, and therefore fails to convey so much information about the individuals concerned as an ideal classification should. We cannot, then, dispense, as yet, with the old empirical principles, and in order to cover the ground more completely we must combine the scheme of the Commissioners with a preliminary subdivision of the cases on clinical lines by picking out from the aggregate such as have distinctive points of resemblance, even though these points are not all of the same order.

A combination of the different systems mentioned would appear to give the most generally useful arrangement. Taking the whole range of persons of unsound mind we may distinguish two "sub-kingdoms" thus :—

1. THE FEEBLE-MINDED:—In whom the defect dates from "as early in life as it can be observed."

2. THE INSANE:—In whom the defect occurs "later in life." We are concerned only with the former group, which includes—

1*a*. *The morally feeble-minded*; those who display incorrigible criminal propensities.

1*b*. *The intellectually feeble-minded*; those in whom the defect is, primarily, one of intelligence.

In this latter class there can be distinguished, clinically, families, the members of which, in view of their salient characteristics, may be described, respectively, as—

A. Ateleiotic.
B. Mongolian.
C. Microcephalic.
D. Macrocephalic.
E. Cretinous.
F. Epiloiac.
G. Plegic.
H. Progressive.
I. Residual.

Each of these groupings will supply instances of three grades of mental defect which may be called, respectively, "Idiocy," "Imbecility," and "Weak-Mindedness."

Details of the above scheme of classification will be more conveniently considered under the different headings, but before proceeding further some remarks are called for on the position which is to be assigned to epilepsy. From the point of view of treatment the existence of epilepsy is of great

moment, but its manifestations are so widely spread among the feeble-minded that they do not afford much assistance in classification. We may note however that, in spite of this fact, according to the scheme approved by the Commissioners in Lunacy, cases of congenital intellectual deficiency are divided into those complicated by epilepsy and those not so complicated.

Moral Feeble-Mindedness

The distinction which has been drawn, for the purposes of classification, between moral and intellectual defect is, perhaps, an artificial one, and the propriety of making it calls for some discussion before its adoption is approved. It is easy to understand why, as common experience teaches, obvious intellectual defects are accompanied by moral ones, for no individual can be expected to follow rules of life which are incomprehensible to him, but whether moral defect can exist apart from intellectual is more difficult to decide.

In his treatise on psychiatry Kraepelin[1] expresses the view that in cases of moral feeble-mindedness one never fails to find some diminution of the reasoning faculty, and, as already noted, the Commission on the Feeble-Minded include in their definition of moral imbecility the phrase "some mental defect." On the other hand, Maier,[2] after reviewing the whole position, comes to the con-

[1] E. Kraepelin, *Psychiatrie*, 1904, Bd. 2, p. 817.

[2] H. W. Maier, "Über moralische Idiotie. Festschrift zu Forels Sechzigstem Geburtstag," *Journal für Psychologie und Neurologie*, Bd. XIII, 1908, p. 57.

clusion that "there is a congenital moral defect, that is to say, a want of appreciation of the moral conditions of the environment, associated with normal intellectual tendencies." Cramer,[1] again, gives it as his opinion that "there is only one certain clinical sign of moral idiocy and that is a more or less well-marked ethical defect."

If the intellectual sentiments were of earlier evolution than the ethical, the existence of a purely moral defect would be intelligible, and the possibility that such may be the case is not excluded by the fact that some dull people are virtuous, while some clever ones are not, for a certain grade of morality is appropriate to every intellectual level, and its failure to appear at that level might be due to arrested development. We get some indication of a process of this kind in the cases to which Sir James Crichton Browne[2] referred in his evidence before the Royal Commission on the Feeble-Minded. "Many nervous children in good circumstances," he remarked, "at certain epochs of development, suddenly take to motiveless and systematic lying or stealing. Wisely treated they soon get over it and return to the paths of rectitude."

From the psychical standpoint moral defect seems to be due to a failure of development in the affective sphere. We have seen already that to the primitive organism the maintenance of its nutrition is the first consideration and that closely bound up with the question of nutrition is that of reproduction. Such

[1] A. Cramer, *Gerichtliche Psychiatrie*, 1903, p. 352.

[2] J. Crichton Browne, *Rep. of the Roy. Comm. on the Feeble-Minded*, vol. 1, p. 333.

acts as further these interests are fundamentally pleasant and therefore tend to determine the will in the direction of continuing them. The acts which are opposed to nutrition and reproduction are fundamentally unpleasant and tend to be discontinued. The various functions involved in obtaining and assimilating food, excreting waste products and propagating the species have thus an inherent pleasurable quality, which constitutes them the dominating motives of the organism, but to render them of maximum advantage they require to be exercised with due regard to the environmental conditions, some present sacrifice being counterbalanced by a greater future gain. The primitive idea thus becomes associated with other ideas in a complex of which the affective tone may be different from that of the original motive and the resulting activity will be modified accordingly. It is an inability to associate affected ideas, expressing itself as defect in the evolution of the sentiments, which chiefly characterises the immoral mind. The defect may show itself on the æsthetic side, which is not a matter of great practical moment; or on the logical side, as seems to be the case in what is called pathological lying. Particularly, however, it becomes manifest in regard to the sentiment of expediency. But, as we have seen, the sentiments involve judgments, and, that being so, it is difficult to see how the exclusion of an "intellectual" element from moral feeble-mindedness is to be justified. The discussion as to the possible existence of a purely moral defect has, indeed, turned to a very great extent on the meaning attached to the term "intellectual." It is merely

because we do, in practice, meet with cases in which, though there is obvious immorality, the ordinary methods of examination fail to detect any intellectual shortcomings; or in which the moral deficiency is so much more in evidence than the intellectual; that it is convenient to establish a special class for the reception of such cases.

Clinically the signs of moral feeble-mindedness are, in a typical case, those of unqualified viciousness, by which is meant that the activities of the individual are designed to satisfy his present desires without any reference to the bearing of such a course on himself or others. Judged by the accepted standard of morals, he is purely selfish. He has no affection for his relatives, no sense of personal or family honour, and no reverence for family ties; and he will commit an offence against a member of his family as readily as against a stranger: there is thus not even a rudiment of the social instinct. In his relations with the world at large, he shows an entire lack of sympathy with man and beast, and may even be actively cruel. Altruism is entirely foreign to his nature; he is untruthful, obscene, lustful, unstable, restless, devoid of discretion, and unregulated as to his imagination. He makes no friends, and is averse from doing any work; he knows neither gratitude, shame, nor repentance, and is, as Maier found in a well-marked case, so completely impervious to reproaches and appeals that they produce in him no obvious emotional reaction, whether as regards facial expression, bodily movement, the pulse and respiration rates, or speech. To the law he is known as thief, train-wrecker, incendiary, or

murderer; or as addicted to assaults, and sexual offences of all kinds.

Grades of moral feeble-mindedness designated as moral idiocy, moral imbecility, and moral debility, have been distinguished, but, since the criteria employed in the differentiation are not the capacity for avoiding "common physical dangers" and the ability to earn a livelihood, this mode of classification is unsuitable. As met with in practice, members of the class under consideration may show a special prominence of some only of the moral failings above enumerated, so that it is possible to distinguish at least the following types, individual examples of which may exhibit any stage between mere brutishness and a shallow but audacious cunning.

(1) *The Unstable.*—In this group are included many of the anti-social individuals whom we call "the unemployable." These are the people who when they can be made to work are laggards in beginning but prompt in discontinuance: such imagination as they possess is employed in finding excuses for resting; the hours are too long, the pay is too small, they have no tools, the work demanded of them is such as should be assigned to some other craftsman, and so on: they suffer frequently from minor ailments of an elusive but seriously disabling character and require lengthy periods for recuperation: they are well content to live at the expense of their relatives or of the community, and if the path of intemperance is open to them they will follow it to the end. Other members of the group are beggars, vagrants, and prostitutes.

(2) *The Mendacious.*—Most people who move about in the world have made acquaintance with persons "whose word no man relies on": they give promises which they make no attempt to keep; they borrow money which they have no intention of returning; they treat with disdain the accepted canons of honour and probity; "good form" has no meaning for them, and they have no reverence for the, it must be admitted, rather quaint fetich which men call "sportsmanship." In more extreme cases they are thieves or swindlers or romancers, whose inaccuracy of statement is so phenomenal that it has been dignified by Delbrück and others with the imposing name of "pseudologia phantastica." From time to time, through the intermediation of the sensational reporter, public sympathies are harrowed by a tale of woe unfolded in the police court by some youthful offender. With an appearance of truthfulness which carries conviction to all except the most experienced minds, the small boy (or girl) tells how he has been driven into his present predicament through oppression on the part of cruel parents or relatives, and the hearers are raised to heights of righteous indignation from which they fail to detect little inconsistencies or contradictions. Inquiries are set on foot and it soon appears that the statements made are untrue in every material particular. Harassed parents or guardians, whose good faith is clearly beyond question, appear to remove the delinquent and he enlivens the journey home with an account of the abuses of which he has been the victim while in the hands of the police, and, being restored to his original circle, brags about

the exploits which he has performed during his absence.

(3) *The Sexual.*—In these cases there is more evidence of physiological abnormality than in the others, for not only is the sexual instinct irregular in its mode of manifestation but it exhibits a precocity of development which points to a definitely pathological state of the organs involved. No lengthy account of sexual aberrations is needed, for the topic is one which runs no risk of being overlooked so long as an enterprising press continues to regale us with columns of information respecting its various forms. The exposition of the subject is not, of course, confined to our newspapers, and there is a vast fund of literature on more scientific lines now available. Whether the fact that such literature is mainly Continental is to be regarded as evidence that in our own country the moral level is higher may perhaps be doubted. One caution is necessary in regard to this matter. It is peculiarly in the province of ethics which deals with questions relating to the instinct of sex that the difficulty of forming a correct judgment as to the expediency of actions is met with. The canon of sexual propriety varies with the latitude, and in all latitudes is more or less obsolete, since nowhere is it established on biological principles. One redeeming feature of the ventilation which sexual matters have received of late years is a partial blowing away of the mists of ignorance, prejudice, and superstition which made anything like a rational philosophy of the reproductive process impossible. So long as the scientific spirit actuates those who carry on the

work of investigation, nothing but benefit to society at large can result from a critical study of our conceptions of sexual morality.

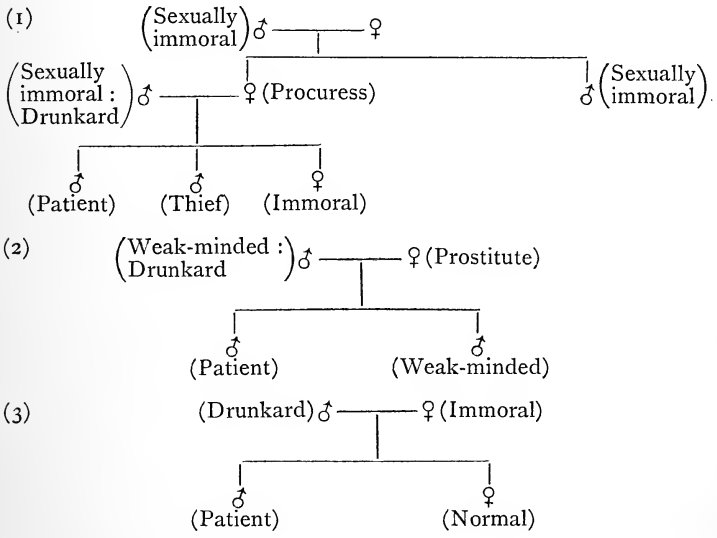
(4) *The Contentious.*—Kraepelin[1] has described a group of morally defective persons to whom he applies the name "pseudo-querulanten." They are unduly sensitive in regard to their own interests and violently resent any real or fancied interference with what they esteem to be their rights. They accept, without proof, any statement which is in accordance with their prejudices and refuse to listen to anything of contrary tenor. They hug their grievances and devote themselves to revenge, pursuing those whom they believe to be opposed to them with malicious stories, molestation, abusive language, slander, and legal process, in which they do not hesitate to commit perjury. Their persistence brings them into conflict with all sorts of people on whom they try to vent their ill-will until at last every man's hand is against them and the exhaustion of their resources reduces them to impotent anger. According to Kraepelin, this type of moral defect is quite distinct from the cases of insanity with delusions of persecution : it represents a temperamental peculiarity dating back to early life and therefore to be classified as a manifestation of feeble-mindedness.

There is but little to be said as regards the pathology and the etiology of moral feeble-mindedness. Kraepelin refers to two cases in which Nissl found evidence of chronic changes in the cortical cells. Cramer remarks that there may be no discoverable anatomical lesion to account for the

[1] E. Kraepelin, *op. cit.*, p. 836.

condition in cases of this kind. Bodily abnormalities of all kinds may occur just as in the other groups of the feeble-minded, but there is about these nothing definitive. As regards etiology it is to be noted that the persons under consideration generally come of demonstrably bad stocks.

The family histories ascertained by Maier in three of the cases which he describes at length are shown in the following diagrams :



In the fourth case the paternity of the child was doubtful though there was good ground for believing him to be the son of a moral idiot with a bad family history.

The differential diagnosis of moral feeble-mindedness has to be considered under two aspects, the medical and the legal. We have to distinguish, on the one hand, moral insanity, and on the other,

criminality. The former task is relatively unimportant: all that need be said is that cases of "acquired" immorality do not differ in their general character from those of "developmental" origin, and that the history of any given case will afford the most satisfactory means of defining it. The second topic supplies one of the most prolific sources of disagreement between the medical and the legal professions—the question of criminal responsibility.

So much confusion has resulted from the discussion as to what is the true test of responsibility for wrongful actions that in practice every judge is, to a great extent, a law unto himself. There are, however, well recognised underlying principles derived from the famous "Answers of the Judges" in the MacNaghten case. The following summary of these is taken from Dr. Oppenheimer's recent work.[1]

"To establish a defence on the ground of insanity it must be proved that at the time of committing the act, the accused was prevented by disease affecting his mind from knowing the nature and quality of his act, or from knowing that the act was wrong."

"A person labouring under specific delusions but in other respects sane shall not be allowed to benefit by the plea of insanity unless the delusions caused him to believe in the existence of some state of things which, if it existed, would justify or excuse his act."

Whether "wrong" means either "morally wrong" or "illegal," or both, is still in dispute. One may

[1] H. Oppenheimer, *The Criminal Responsibity of Lunatics*, 1909, p. 19.

comparatively easily define, in terms of the common law or of the statute law, what constitutes illegality, but to decide whether a thing is immoral or not is a much more difficult matter. It is felt by many persons that to adopt a purely legal interpretation of the word "wrong" is inexpedient. A person suffering from chorea who destroys the sight of another by an involuntary movement set up by some unexpected stimulus can hardly be absolved from the legal consequences of his act on the ground that he was prevented "by disease affecting his mind from knowing the nature and quality of his act or from knowing that the act was wrong," and Sir James Stephen is doubtful whether there should not be added to the above statement of the law a clause excusing him who is prevented "from controlling his own conduct unless the absence of the power of control has been produced by his own default." In his book on "Criminal Responsibility" Mercier exhaustively considers what constitutes wrong-doing and he concludes that "to incur responsibility by a harmful act the actor must will the act: intend the harm: desire primarily his own gratification. Furthermore, the act must be unprovoked and the actor must know and appreciate the circumstances in which the act is done." This teaching certainly shows a truer appreciation of the problem than did the answers of the judges, but it is admittedly not an exposition of the law as it is. One deduction may, for our present purpose, be profitably drawn from these various dicta: it is that in each case the test is an "intellectual" and not a "moral" one, and that to regard "moral feeble-mindedness" as involving no

intellectual defect is to drag those displaying it from the sanctuary of irresponsibility.

A similar attitude is taken up by the criminal law of Germany, under which, as Cramer[1] remarks, "accountability for moral defect is only excluded when that defect is due to pathological disturbance." It may be noted in this connection that the English law, unlike that of Scotland, Denmark, Greece, Italy, Sweden, and some of the Swiss Cantons, does not provide for mitigation of punishment by formally recognising *grades* of responsibility, although its indefiniteness leaves to the judges a fairly free hand.

Mercier's analysis of "responsibility," though not perhaps intended to do so, raises doubts as to whether the law relating to crime is not fundamentally unsound. A responsible person is, according to him, one who is "liable to punishment on grounds that appear fair and just to the ordinary man when they are explained to him—grounds that commend themselves as equitable and right, not to the faddist, the pedant, or enthusiast, but to the common sense of the common man of this time and this country." The arbiter of the destinies of society is thus to be "the man in the street." To a great extent this is the case already. The criminal law is an idol which men have fashioned with their own hands and have set up in a high place. To it they have dedicated temples and for the adornment of its priests they have fabricated robes of silk and ermine. Deceived by the pretences with which they have themselves surrounded the god, they forget that

[1] A. Cramer, *op. cit.*, p. 353.

his voice is but that of the people and that the utterances which appear to proceed from his lips are but echoes of the cries for vengeance in which their crude passions express themselves. Is this the best which philosophy can do for us? Can it not provide us with some more practical ideal than the satisfaction of that primitive instinct of retaliation which was appropriate to a long past stage of evolution? Let us desist from the pursuit of that *ignis fatuus*, a criterion of "responsibility," and realise that the interest of society in any member of its community, good or bad, sane or insane, consists, primarily, not in speculating as to his moral worth, but in devising schemes for turning to the best account such powers as he possesses.

Intellectual Feeble-Mindedness

Feeble-mindedness of what has been distinguished as the "intellectual," as opposed to the "moral," form exhibits no less diversity than marks the latter. The infirmity of mind ranges from mere defect of educability to degradation of such an extreme type as almost to remove the subject of it from the pale of human sympathy. Examples of the slighter degrees of feeble-mindedness are provided by the children who, in spite of the most skilful teaching, cannot keep pace with their fellows at school. Later in life the deficient capacity will be expressed in different ways according to the sex and the social status of the individual. If a worse fate does not befall her, the girl of the lower classes will become a slatternly drudge, while the one born

in the purple will, perhaps, after suffering many things at the hands of parents and tutors engaged upon the task of moulding her to the conventional pattern of her class, cut the Gordian knot by leaving home with the footman or the chauffeur. The boy, if compelled to earn his own living, will be the butt of his workshop, and will never be able to carry out other than the roughest forms of unskilled labour. With a suitable environment, he may become a hooligan, or a thief, or a deserter. Aided by the numerous advantages which the possession of adequate pecuniary resources confers, he may be able to enter upon a business or professional career, which in due course may lead him to the almshouse, or the penitentiary; or, if no attempt has been made to turn his energies into profitable channels, he becomes a wastrel and a prodigal, distributing his means among the hoard of rascals who will have attached themselves to him.

At the other end of the scale occur cases, fortunately few in comparison, which are such painful caricatures of humanity that members of the general public, seeing them for the first time, usually suggest the establishment of a lethal chamber, as affording the only feasible method of dealing with them. Entering a ward in one of our asylums for idiots, one may observe huddled up on a bed, since it can neither stand nor sit, a piece of life's flotsam with mis-shapen head, deformed chest, twisted spine, and distorted limbs. Its hands are claws, and if it exhibits only two complicated forms of club-foot, that is, apparently, because the circumstances do not permit of more. At intervals it shrieks in an

uncanny way for the food with which it is unable to feed itself and over which it would choke but for the care of the attendant. Saliva dribbles from its mouth as it gnaws at the bed-clothes, and its excretory organs perform their functions without control. The expressionless features twitch grotesquely and from time to time the ungainly frame is racked by convulsions.[1]

As illustrating an intermediate type we may take those cases, usually classed, without special reference to the definition of the Commission on the Feeble-Minded, as "imbeciles," which one meets with in such institutions as asylums. For these the world is a very small stage. The trivial round, the common task, furnish them with sufficient interests and about those few interests their feelings are as keen, if not as enduring, as those of the normal person. There is, in fact, little of that limitation in the affective sphere which is peculiarly characteristic of moral feeble-mindedness. Their want of experience makes them easily misled, but they have no

[1] The following description of idiots as Dr. Pariset saw them long ago is worth rescuing from the comparative obscurity of Séguin's *Traitement Moral, Hygiène et Éducation des Idiots*, published in 1846; "Quel spectacle! l'un s'agite en forcené, vocifère et crie; l'autre se tient accroupi dans le silence et l'immobilité d'un automate; le premier à qui vous adressez la parole se sauve en ricanant; le second vous envoie à profusion des salutations et des baise-mains; un troisième se couvre de signes de croix; un quatrième se couche à terre; un cinquième se mord les doigts en riant d'un rire insensé. Aux questions que vous leur faites, pas un ne fait une réponse intelligible, tant leur langue est embarrassée, tant leur voix est sourde, confuse et inarticulée. . . . Ils ont des yeux qui voient et qui ne regardent pas; des oreilles qui entendent et qui n'écoutent pas. S'ils ont des jambes inhabiles à la station, à l'équilibre, à la marche, au saut, à la course, leurs mains incertaines sont également inhabiles à toucher, à saisir, à mouvoir, à déplacer les corps."

inherent prejudice against virtue, and are quite willing to be as good as they know how to be. When their simple wants in the way of food and clothing are satisfied they are cheerful and contented and quite ready to devote themselves to the tasks assigned to them, until their small fund of energy is exhausted. They are apt to be impolite and uncouth, disdaining distinctions of rank, and recognising no order of precedence except that which gives them the first place; but their failings, unlike those of the morally feeble-minded, are almost entirely due to ignorance and are easily eradicated by suitable training. Indeed, they tend under tuition to go to extremes in the other directions: they will say "Good Morning" at whatever hour or however frequently one meets them, and the males will indulge in amusingly extravagant parodies of the salutes with which the attendants acknowledge the presence of superior officers, while the females may become great sticklers for the proprieties and may show themselves eager to display their familiarity with what they esteem to be the rules of etiquette. "Why do you stick your little finger out like that?" was asked of an imbecile girl who was lifting her teacup with much *empressement*. "That's manners!" was the reply, in a tone expressing surprise at the questioner's ignorance of correct social usage. Among the females, too, the love of finery is strongly pronounced, though the decorative effect achieved is sometimes a little bizarre. The incapacity for adapting means to ends, which is a prominent feature of imbecility, comes out, perhaps, in no more striking fashion than in the

playing of games. At football, for instance, the sole principle recognised is to kick the ball hard. Nothing in the way of combination occurs, and the ball will pass to and fro in the middle of the field throughout the whole of the game unless some enthusiast kicks it through his own goal; a proceeding, by the way, which earns for him loud applause from the rest of his side. Cricket is conducted on similar lines. Unless prevented by those in charge the spectators squat around the wicket, undeterred by the imminent probability of "wides" or of a batsman's vigorous swipes, resulting in the despatch among them of both ball and bat. The ball is chased by half the field; easy catches are muffed; wild shies are made in all directions; and, finally, unless the contingency has been guarded against, the result of the match may remain in doubt owing to the scorer's having placed all the runs for both teams to the credit of the first man whose name happens to have caught his eye.

A sense of humour, which is, after all, mainly a sense of proportion, is hardly to be expected among imbeciles, but obvious jokes and the antics of the knock-about comedian are rewarded with hearty laughter. Displays of primitive passion appeal to their sympathies, and the instinctive tendency to find gratification in the misfortunes of others is not kept in check. Naïve allusions to sexual matters may be made, and in view of the difficulties attending the subject, it is not surprising to find that quaint interpretations are put upon the teachings of religion.

The picture has, of course, its shadows; the more

so since the earlier years of an imbecile's life are often passed in circumstances which provide him with abundant experience of vice. Many imbeciles are mischievous and prone to outbreaks of temper which may lead to violence: they may fight with one another, or smash windows and table-ware: they may use obscene and abusive language, or indulge in sexually immoral conduct: they may steal food or anything else which excites their cupidity: they may set fire to the ward in which they live, or generally, they may give trouble in any of the score of ways which those in charge of them usually include under the generic term "playing-up."

ATELEIOTIC FORMS

It is a moot point whether feeble-mindedness is ever a purely quantitative and not a qualitative defect of mental capacity. Theoretically, there is no difficulty in supposing that the process of normal development may simply stop when a certain stage has been reached, leaving the individual concerned in a state of permanent infantilism or juvenility, but in practice it is rare to find a case which can be confidently accounted for in this way. Infantile characteristics are common enough among the feeble-minded, but they are almost always closely interwoven with signs which suggest that the current of growth has been deflected at some point from its proper course. We do, however, occasionally meet with what may be described as "minds in miniature," which may perhaps be associated with bodies of the same order. The sensory apparatus

is efficient but limited in the range of its utility. Memory is of the ordinary type, so far as it goes, there being neither the gross incapacity nor the one-sidedness which the "qualitatively" feeble-minded may exhibit. Ideas are associated in a normal way. Judgments, if few, are sound, and conclusions, if they are drawn at all, are logically deducible from their premises. Most important of all, presentations and representations have the affective colouring which is in harmony with the experience of the majority, and which must, therefore, be regarded as the natural one. The emotions are not, however, strongly pronounced, and they do not supply any very powerful incentives; thus the sexual instinct may remain in abeyance to a great extent. Speech may show the defects due to a lack of grasp of grammatical principles. Such unprofitable forms of industry as playing with dolls collecting the numbers of passing motor-cars, stringing used postage stamps into the semblance of a serpent, or other of the futile employments which children ordinarily grow out of, may occupy the years which should be devoted to more serious labours. There may be a disinclination to leave the mother's apron-strings. Irresolution, dependence, suggestibility, and want of tenacity of purpose, may make persons of this class a prey to the pernicious influence of some stronger mind, but the activities in which their thought expresses itself are never wilfully anti-social. On the physical side also there may be persistence of juvenile characteristics, *e.g.*, a childish voice; ill-developed sexual organs and want of union of epiphyses.

In another group of cases a condition of infantilism seems to be dependent on disease of some particular organ, *e.g.*, the pancreas, the liver, the adrenal, or the pituitary; or to be a sequel to some general disease, *e.g.*, congenital syphilis.

When the retardation of development is so marked as to be accepted as pathological, there may conveniently be used for it the term "Ateleiosis" (ἀτελής, not arriving at perfection), which seems to have been originally employed, with a somewhat narrower signification than is here given to it, by H. Gilford.[1]

A good example of "Ateleiosis" was recently brought before the Royal Society of Medicine by Dr. F. Parkes Weber.[2] This was the case of a man aged 42 years, whose development seemed to have ceased at about the age of 9 or 10 years, though in some respects the proper attributes of his age were recognisable.

THE MONGOLIAN, KALMUCK OR TARTAR TYPE

Custom has for so long sanctioned the application of the name "Mongolian" to the group of feeble-minded persons about to be described, that it is convenient to retain the designation, even though its meaning is vague and its suggestion of a resemblance to any of the Chinese types of physiognomy is largely fanciful. The physical pecu-

[1] H. Gilford, "Ateleiosis, a Disease characterised by Conspicuous Delay of Growth and Development," *Med.-Chir. Trans.*, 1902, p. 305.

[2] F. Parkes Weber, "Ateleiosis in a Man aged 42," *Proc. of the Royal Society of Medicine*, June, 1910.

liarities of Mongolism are nevertheless sufficiently distinctive, in most cases, and make up a clinical *ensemble* which renders diagnosis easy, although no one feature can be regarded as pathognomonic. A consideration of the various abnormalities which have been noted by different writers, shows how numerous are the morbid appearances which may be exhibited. Stated briefly, the signs of Mongolism may include any or all of the following conditions, which are arranged according to the requirements of clinical convenience and without reference to their relative significance, since that is decidedly obscure. (Fig. 13.)

Head small, with high cephalic index owing to the depression of the glabella and the want of prominence of the occipital region. The cephalic index has been recorded as having reached 100, *i.e.*, the antero-posterior and transverse diameters of the head were equal.

Eyes wide apart, with the palpebral fissures sloping upwards and outwards, the lids displaying the condition of epicanthus, and bearing few lashes; unilateral ptosis, and strabismus, nystagmus, and a speckled condition of the iris; chronic blepharitis going on to corneal opacity, ectropion, and epiphora.

Nose short, nostrils looking forward. Adenoids.

Ears small and rounded.

Tongue large and fissured, protruding from mouth if very large.

Skin of face red, of hands thick and wrinkled; chilblains.

Deformity of thorax, knock-knee, flat-foot. Hands and feet broad; digits thick and webbed; thumb

and little finger short, and the latter abnormally curved; second toe relatively too long.

Laxity of ligaments and hyperextensibility of joints.

Congenital, and other, forms of heart disease.

Abdomen large and tumid; umbilical hernia; constipation.

Of these signs the most characteristic are, perhaps, the redness and flatness of the face, the state of the tongue and the obliquity of the eyes; which last, though responsible for the name given to the type, is by no means invariably present. Epicanthus is an hereditary character not peculiar to Mongolism, since, as Ashby showed, it occurs among the relatives of Mongols as frequently as among the Mongols themselves, and it is also met with in families which show no trace of Mongolism. All the remaining morbid conditions may be encountered in cases of feeble-mindedness which do not in other respects conform to the Mongolian type.

It is not surprising that the considerable degree of abnormality which the head displays in Mongolism should obliterate the numerous, but individually unimportant, differences which serve to distinguish human beings of the same race, and that, consequently, well-marked cases of Mongolism should resemble each other so closely that they look like members of the same family. Taken together, the signs of Mongolism suggest that the condition is due to some definite, if unknown, disorder of nutrition, and the morbid process may be far-reaching in its effects or of but limited extent. The mental symptoms show, as might be anticipated, a certain

parallelism with the physical, and all grades of defect are found from simple weakness of mind to complete idiocy. There are, however, certain features of the mental state which may be noted. When sufficiently intelligent to be capable of such manifestations Mongols often show an imitativeness and an appreciation of rhythm which are rather striking. They are good tempered as a rule, though infants showing the condition may be subject to storms of passion, willing and submissive to authority. They show an interest in what is going on about them, and sometimes they are lively, talkative and restless. There is a marked immunity from epilepsy, but they may simulate epileptic fits if they are in wards which provide them with models to copy. It may be that the early death which overtakes most Mongols is in some measure accountable for the absence of epilepsy among them. Of the six cases referred to below, one, a woman of twenty-five, has had several apparently genuine epileptic fits in addition to the imitation ones with which she sometimes favours observers, while another had, at the age of twenty-three, a series of slight and transient convulsions affecting only the left side of the body. As with other diseases there is an inverse ratio between the severity of the symptoms and the duration of life. Dividing the cases according to their powers of taking care of themselves and of doing useful work, we find that the idiots die young, the imbeciles probably break down before reaching middle life, while the weak-minded, if suitably cared for, may attain a fairly advanced age. In the milder cases the state of puberty is duly arrived at though,

perhaps, a little late; thus in six female Mongols, of ages ranging from twenty to thirty-nine years, under the writer's care, menstruation is normal except in the case of the eldest one who suffers from menorrhagia.

The proportion of Mongols to the whole body of the feeble-minded at any age is difficult to ascertain accurately. Shuttleworth states that they constituted about 5% of 2900 admissions to the Royal Albert Asylum and that the condition is commoner in the north of England than in the south. Among 250 male feeble-minded children, between the ages of 5 and 16 years, the writer found 6 Mongols, and among a similar group of female children, 8, *i.e.*, taking the sexes together, nearly 3%; while among 600 females over the age of 16 there were 5 cases. Both the institutions from which the figures were obtained are in the south of England. According to H. Vogt, Mongolism is much less common in Germany than in England, supplying only 1% of the cases of feeble-mindedness.

As regards the causation of Mongolism there is little to be added to what has been said on the general subject of etiology in Chapter V. Several observers have tried, with some success, to connect the development of this form of feeble-mindedness, in the child, with a state of impaired nutrition, in the mother, during pregnancy. The children have certainly, in many cases, been the last members of large families so that the mothers at the time of conception were approaching the age of decline of the reproductive powers. That some other factor besides the age and exhaustion of the mother has

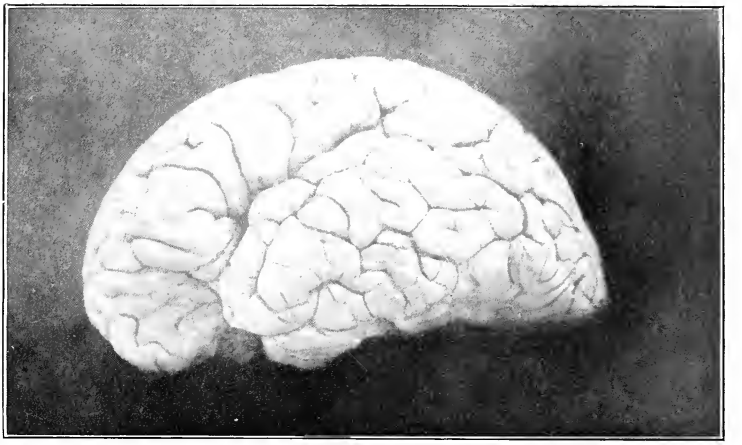


FIG. 14.—Lateral aspect of the left hemisphere of the brain of a Mongolian idiot.

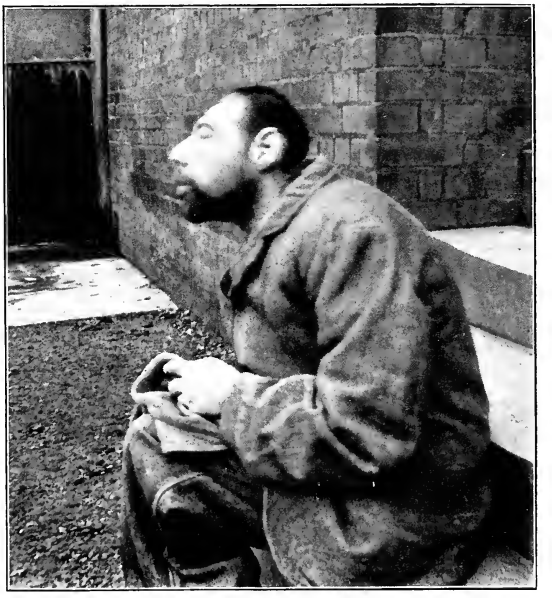


FIG. 15.—The microcephalic idiot whose brain is shown in Figs. 16, 17, 18.

[*Face page* 213.

to be taken into account is shown by the following table of the family history of twelve of the most recently reported cases. The first eleven are from the Proceedings of the Royal Society of Medicine for May 1909, the last from the Lancet for January 1st, 1910.

	Position of child in family	Age of mother at birth of child	Recorded by
1.	Only child	43	Dr. G. A. Sutherland
2.	2nd of 2	40	
3.	3rd of 3	—	
4.	Last but one of large family	40	Dr. F. J. Poynton
5.	2nd of 3	—	
6.	3rd of 3	—	
7.	Only child	26	Dr. F. Langmead
8.	10th of 11	39	
9.	1st of 2	40	Dr. H. M. Fletcher
10.	10th of 10	41	
11.	4th of 5	32	
12.	7th of 7	43	Dr. J. P. Cullen

Mongolism being a comparatively rare condition the number of cases in which an examination of the brain after death has been made is small. Fig. 14, which is a photograph of the brain of a Mongolian idiot, aged about 6 years, shows no very striking peculiarities except the smallness of the superior temporal convolution. The roundness and shortness of the hemisphere and the concavity of the orbital surface are to be correlated with the shape of the skull, though which is to be regarded as cause and which as effect is open to discussion. The right hemisphere weighed $15\frac{3}{4}$ ozs. and the left 15 ozs., while the cerebellum, pons, and medulla together weighed $3\frac{1}{2}$ ozs., the cerebrum thus constituting 89·78% of the whole encephalon. The ratio of the several parts of the brain undergoes change during growth, and in the absence of statistics

relating to normal brains of males at the age of this case, it is impossible to say to what extent this particular brain is exceptional, but if Huschke's figures giving the weight of the cerebrum as 93% of the total brain weight at birth and 87% at maturity be correct there is little indication here of the abnormal smallness of the cerebellum which has been described as a feature of the Mongolian brain.[1]

On the whole it seems most satisfactory to regard Mongolism as a distinct pathological entity referable, as, for example, cretinism is, to a disturbance of the function of some glandular structure of which the physiology is as yet but imperfectly known. Bufe[2] found that Mongols excrete lime salts to only a slight extent in the urine, but that a much larger amount than in normal children of the same age is excreted in the fæces. The disease has thus some points of contact with osteomalacia and he suggests that its occurrence depends on an abnormal trophic action of the sexual glands.

MICROCEPHALIC TYPE

The cases of feeble-mindedness which fall into this category form a less natural grouping than those just described since the establishment of the class is conditioned by the arbitrary selection of one particular anatomical feature instead of having reference, as in Mongolism, to a number of such characters. Opinions differ so much as to what

[1] Paul Biach, "Zur Kenntnis des Zentralnervensystems beim Mongolismus," *Deutsche Zeitschr. f. Nervenheilk*, Bd. 37, H. 1–2, p. 7.

[2] E. Bufe, *Die mongoloide Form der Idiotie. Zeitschr. f. ärztl. Praxis*, No. 3.

constitutes a small head that it becomes necessary to agree upon a standard of measurement. Ireland includes all cases having crania with a maximum circumference of 17 inches or less, and his ruling is generally followed in this country. In Germany, Schwalbe's plan of fixing the maximum circumference at 45 cm. or the maximum brain weight at 900 grms. is more usually adopted. Something, of course, depends on the age of the patient. According to Ashby and Wright [1] the average circumference of the normal head is 18 in. at 1 year, 20 in. at 2 years, 21 in. at 4 years, and 21½ at 10 years. They state the position thus :

"If a child's head is 3 in. under the average circumference for its age the child will be an imbecile. If 2 in. under the average the child will probably be feeble-minded in more or less degree. Thus a child from seven to ten years with a head measurement of 19 in. or under, and at the same time fairly well-grown for his age, is almost certain to be of weak intellect."

Berkhan [2] gives the following as the average measurements, for males, of the circumference of the skull at the ages mentioned :

Age	Measurement
6 months	40 cm.
1 year	45·5 cm.
2 years	47·5 cm.
5 years	50 cm.
10 years	52 cm.
15 years	54 cm.
20 years	55 to 55·5 cm.

in the case of females the measurements are, for

[1] H. Ashby and G. A. Wright, *The Diseases of Children*, 1905, p. 584.

[2] O. Berkhan, *Über den angeborenen oder früh sich zeigenden Wasserkopf &c. Die Kinderfehler. 7 Jahrgang*, p. 49.

children, 0·5 to 1 cm., and, for adults, 2 to 2·5 cm., less.

Apart from the small size of the head there is clinically so little which is distinctive about microcephaly that the interest of the condition is mainly pathological. The well-marked abnormality which, as a rule, the microcephalic brain exhibits has opened up a fertile field for theorists, although the total number of brains studied is as yet so small that definite conclusions as to the fundamental causes of the defect can hardly be arrived at. Biassed in their judgment by the study of particular instances which have fallen into their hands, different writers have propounded hypotheses which, as a wider survey shows, are individually inadequate. Speculation upon the genesis of pathological states of the nervous system takes three principal directions. The abnormality may be due to causes, such as mechanical interference or infection, which produce gross lesions of the growing organ; it may represent a return to an earlier stage in the development of the organism, *i.e.*, it may be reversionary; or thirdly, it may be explicable as a more or less irregular curtailment of those vital activities which result in growth. Explanations of microcephaly on all three of these lines have been advanced from time to time. With the first hypothesis the name of Virchow is particularly associated; with the second that of K. Vogt; with the third that of Aeby.

The notion, ascribed to Virchow and to Baillarger, that a small brain was to be accounted for by premature synostosis of the bones of the skull, received some support from the occasional occurrence among

microcephalic idiots of hypertrophied scalps which seemed to be intended to cover larger skulls than actually bore them. It led to operative procedures which, however useless they may have been in other respects, served to dispel confidence in a seductive, but entirely unwarranted assumption. Traumatism, obstruction of blood-vessels, and inflammatory processes may, however, be responsible for a maiming of the brain which may prevent its reaching the normal size and weight.

In 1867, when Vogt published his paper, biologists were engaged in a lively discussion of the evolutionary theory which Darwin had promulgated a few years before, and an intemperate zeal led the adherents of the new school of thought to conclude, somewhat rashly, that microcephalic idiots represented a return to the simian stage in the genealogy of human beings—a view which Darwin himself seems to have accepted. Although it soon became apparent that this explanation was not particularly well founded, there can be little doubt that developmental errors play their part in the production of the small brains of microcephalic idiots, though to what extent those errors are due to a process of reversion remains open to question. In a case which he investigated with great thoroughness, G. Mingazzini[1] found what he regarded as evidence of two distinct series of anomalies, one due to arrested growth, the other to "true atavistic retrogression." Cunningham and Telford-Smith[2] ex-

[1] G. Mingazzini, *Beitrag zum klinisch-anatomischen Studium der Mikrocephalie. Monatssch. f. Psychiat. u. Neurol.* Bd. 7, 1900, p. 429.

[2] D. J. Cunningham and T. Telford-Smith, "The Brain of the Microcephalic Idiot," *Trans. of the Roy. Dublin Soc.*, vol. 5, 1895.

amined in much detail the brains of two microcephalics, "Fred" and "Joe," and their report shows a distinct leaning towards the "atavistic" hypothesis. In regard to the brain of "Fred" they say :—"We do not think that it is possible to avoid the conclusion that we are dealing with a case of partial atavism or a case in which the brain, so far as its convolutionary condition is concerned, has reverted wholly or partially to a condition in which it existed in an early stem-form." They consider that the brain of "Joe" also displayed "simian features."

That no simple solution of the problems of microcephaly is likely to be found becomes in the highest degree probable when the wide differences in type which small brains may display is clearly recognised. A comparison of several brains which have passed through the writer's hands will demonstrate this, and since there are still but few records of such brains, a brief description of each will not be superfluous.

H. H :—male, aged at death 28 years. (See Figs. 15 to 18.)

Weight of right cerebral hemisphere	$5\frac{3}{4}$ ozs.	
„ „ left „ „	6 ozs.	$11\frac{3}{4}$ ozs.
„ „ cerebellum, pons, and medulla ...	$3\frac{1}{4}$ ozs.	15 ozs.

These weights were taken after stripping and after the brain had been preserved in ten per cent. formalin for several months. In such circumstances brains are said to gain ten per cent. in weight, so that the weight in the fresh state would be less than 14 ozs. The convolutions are reduced in number rather than in size, and there are considerable differences between the two sides. At the right side

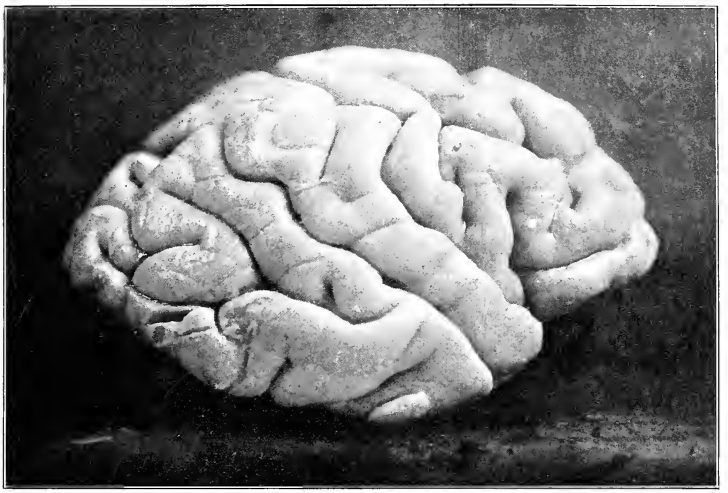


FIG. 16.—Lateral aspect of the right hemisphere of a microcephalic brain.

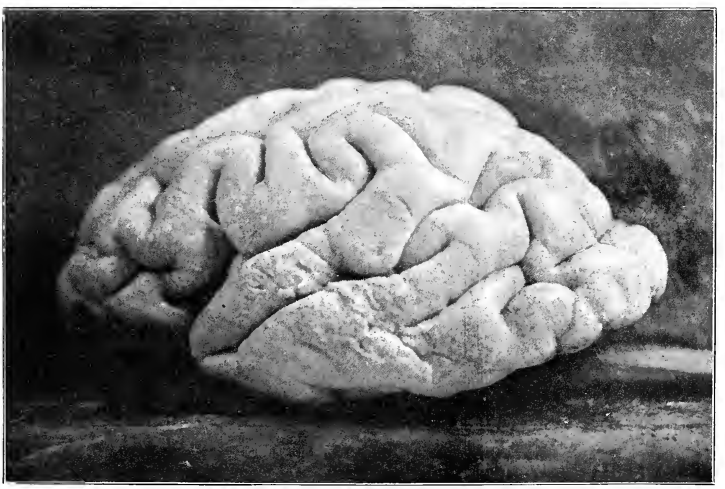


FIG. 17.—Lateral aspect of the left hemisphere of a microcephalic brain.

[*Face page* 218.

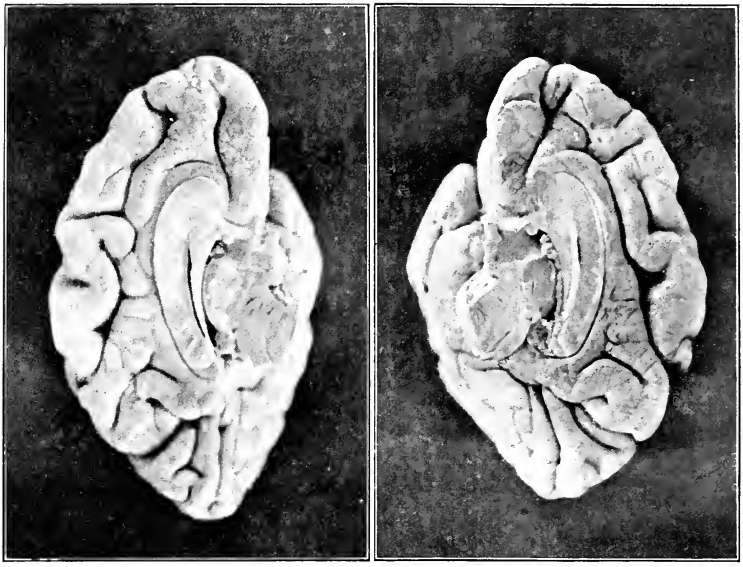


FIG. 18.—Mesial aspect of the hemispheres shown in Figs. 16 and 17.

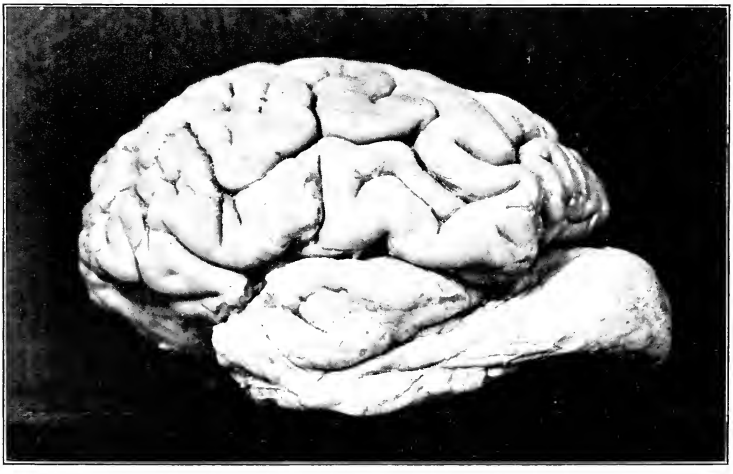


FIG. 19.—Lateral aspect of the left cerebral hemisphere of a microcephalic idiot. The parieto-occipital region is represented by a sac of which the cavity is continuous with that of the lateral ventricle.

[*Face page* 219.

the fissures of Sylvius and Rolando are directly continuous with each other, forming a single furrow running from the dorsal to the ventral aspect, while the parallel sulcus is separated by a narrow gyrus from the intra-parietal which, in its hinder part, forms the boundary of an operculum overlapping the occipital convolutions. At the left side the Sylvian fissure is slightly more normal in its arrangement, and, while the parallel sulcus is carried far back, there is no definite operculum. In both hemispheres the parieto-occipital fissure runs well out over the outer face of the hemisphere and joins the intra-parietal.

E. G. :—male: died at age of 26 years. (See Fig. 19.)

Weight of right cerebral hemisphere	$9\frac{3}{4}$ ozs.	$22\frac{1}{2}$	$29\frac{1}{2}$ ozs.
„ „ left „ „	$12\frac{3}{4}$ ozs.		
„ „ cerebellum, pons, and medulla ...	7 ozs.		

In the right hemisphere the mid-frontal convolution only extends half-way to the apex of the lobe; the ascending parietal convolution is divided about the middle by a gap which contained an arachnoid cyst one inch in diameter; behind the post-central sulcus a single convolution represents the only normal portion of the parietal lobe: the parallel sulcus runs up into the Sylvian fissure; the calloso-marginal sulcus is continuous with the post-central and from the junction a groove runs across the ventral aspect of the hemisphere to the middle temporal sulcus. At the left side the fissure of Rolando joins the end of the Sylvian; there are no normal convolutions behind the ascending frontal; the calloso-marginal ends blindly and a sulcus

parallel to its hinder part runs across the ventral aspect as on the right side.

In each hemisphere the parietal and occipital regions are represented by a sac with walls about $\frac{1}{8}$ in. in thickness which show an indefinite arrangement of grey and white matter.

This case exhibited in a marked degree the hypertrophy of the scalp above alluded to, a series of antero-posterior ridges and furrows suggesting the arrangement of the ranks of bristles in a brush.

F.W. :—female : died at age of 32 years. (See Fig. 20.)

Weight of right cerebral hemisphere	$6\frac{3}{4}$ ozs.	
„ „ left „ „	7 ozs.	$13\frac{3}{4}$ / $18\frac{1}{4}$ ozs
„ „ cerebellum, pons and medulla ...	$4\frac{1}{2}$ ozs.	

As will be seen from the photograph this case is marked by a deficiency in the size rather than in the number of the convolutions, considerable areas of the cortex showing only the slightest differentiation into folds. In the left hemisphere the frontal and occipital regions are comparatively normal in appearance except for the small size of the convolutions, but the parietal and the hinder portion of the temporal region present the aspect of an irregularly tuberculated surface with some trace of mis-shapen radiating convolutions in the upper part. The whole motor area, with the fissure of Rolando, is reduced to a shrivelled sclerosed plate, the central lobe being exposed. On the mesial aspect the marginal convolution is very narrow, and the callosomarginal fissure terminates opposite the middle of the corpus callosum. The parieto-occipital fissure,

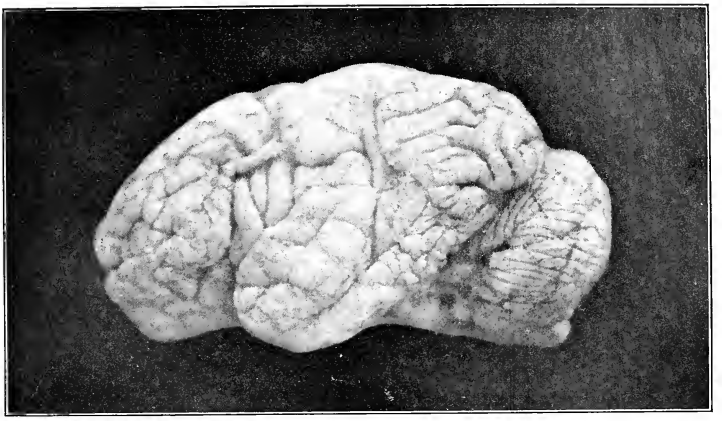


FIG. 20.—Left lateral aspect of the brain of a female microcephalic idiot.

FIG. 21.—An epileptic idiot with well-marked adenoma sebaceum.

[*Face page* 220.

which extends for a long distance over the outer surface of the hemisphere, is separated from a double calcarine fissure by a small gyrus. At the right side normally convoluted regions occur in the anterior part of the frontal lobe, the posterior part of the occipital, and the middle part of the parietal, the intervening areas, together with the middle temporal convolution, being poorly developed and showing the tuberculated appearance already mentioned. The central lobe is even more completely exposed on this side than on the other, owing to the small size of the various opercula which ordinarily overlie it. Mesially the condition is much like that at the left side, except that the doubling of the calcarine fissure is less obvious. Comparison of the type of deformity which the brain exhibits with that shown by the case of porencephaly figured in the photographs 9 and 10 suggests a mode of origin common to both, and the brain under notice did in fact show traces of hollowing in connection with a cyst of the pia-arachnoid in the posterior part of the frontal region at the right side.

Accepting Schwalbe's standard of 900 grms. (roughly 2 lbs.) as denoting the weight which constitutes the upper limit of microcephaly, the porencephalic brain just mentioned, which weighed 31 ozs., must be regarded as an example of the condition. There were also, in addition to that of H. H., two brains below 32 ozs. in weight among the 100 cases referred to in an earlier chapter as series A. Of these one, which weighed $31\frac{1}{4}$ ozs., presented no very striking features beyond opacity of the pia-arachnoid and excess of cerebro-spinal

fluid, while the other, which weighed only 28½ ozs., is shown in Fig. 5. Its abnormality is expressed mainly in the want of development of the right hemisphere, which weighed only 6¾ ozs., the weight of the left being 17¾ ozs.

In view of the anatomical differences which the brains of microcephalics exhibit, it is not surprising that the mental symptoms show little indication of belonging to a distinctive type. As with most of the other groups of the feeble-minded, a high degree of abnormality in the brain connotes a low degree of intelligence. All the cases with heads measuring less than 17 inches in circumference have been, in the writer's experience, such as would be classed as idiots, but many small-headed persons are to be found in the ranks of the imbeciles and the weak-minded.

The patient H.H., whose skull was found at the post-mortem examination to have a maximum circumference of 15½ inches, was of faulty habits and of destructive disposition. He made attempts at speech but never said anything intelligible. He learnt to feed and dress himself after a fashion and on occasion would do a little work, *e.g.*, dusting or polishing in his ward.

E. G. was also faulty in habits and even more incapable of looking after himself than H. H. Thus he had to be fed since, even when supplied with a spoon and a basin of food, he did not seem to know what to do with them. Yet he would ask for food, saying, *e.g.*, "Teddy like milk" and would call attention to the fact that he had wet himself. He obviously had some notion of his own personality since he would come when called. It is worth

noting that, notwithstanding the condition of his occipital lobes, he was apparently not blind though his sight was doubtless very defective. He could find his way about the ward and airing-court, avoiding obstacles, and seemed to recognise those who had charge of him. It is recorded of him that he liked to stand facing the sun, which suggests that he could perceive light but that his retinæ were not very sensitive.

The female patient F. W. could make inarticulate noises but was unable to talk. Owing, in part at any rate, to deformity of the feet, she was unable to walk and she had to be dressed and undressed and fed, while she never acquired even the rudiments of the art of attending to her personal cleanliness.

In two cases of microcephaly brought before the Royal Society of Medicine, Carpenter[1] found changes in the fundus oculi which, though not specially characteristic of the condition, are worthy of notice. A female child aged $2\frac{1}{2}$ years, with a head 15 inches in circumference, showed in the central region of the left retina a large patch of choroidal atrophy believed to be due either to a coloboma or to syphilitic choroiditis; while another female child of five months, whose head measured 14 inches, showed a dense ring of black pigment round the right optic disc.

MACROCEPHALIC TYPE

Just as there are to be found among the feeble-minded a certain number whose heads are unduly

[1] G. Carpenter, "Two Cases of Microcephaly: Changes in the Fundus Oculi," *Proc. Roy. Soc. of Medicine*, Nov. 1908.

small, so it is possible to pick out others with heads exceeding, sometimes by a relatively large amount, the normal dimensions. The group of large-headed or, as they are often called, Macrocephalic cases is a distinctly artificial one, since no standard of maximum size for normal heads has been agreed upon. Moreover, whereas a small skull is clearly incompatible with a large brain, the converse of this statement is not necessarily true, for a large skull affords no evidence whatever of an accumulation of nervous tissue. As to the size which heads may attain, it is very rare for a circumference of 30 inches to be exceeded, though Séguin speaks of a girl, aged seventeen years, whose head measured thirty-seven inches and Millard[1] has recorded a case in which the circumference was ninety c.m., and the distance from ear to ear over the vertex, 75 c.m.

The feeble-minded, probably even more than the mentally sound, are liable to the diseases of skeletal structures known as rickets, acromegaly, leontiasis ossia, achondroplasia, osteitis deformans, and syphilitic osteitis; and still more frequently do they show enlargement of the skull due to its expansion under the pressure of contained fluid, as occurs in hydrocephalus. When all these conditions can be excluded, the presumption is that the large head contains a large brain, but even so the probabilities are all in favour of the view that only a small proportion of the encephalic mass is of functional value from the psychological standpoint.

A subdivision of the class of macrocephalics on

[1] K. Millard, "An Extraordinary Case of Hydrocephalus," *Journ. of American Med. Association*, vol. 51, No. 2, p. 128.

the anatomical lines just laid down will supply the most convenient arrangement of the cases. As in the case of microcephalics, it is not feasible to establish a classification on a purely psychological basis, but such distinctions as can be drawn in regard to the mental state will be duly noted. To each group the test of social capacity can be applied as with the other types, and groups of idiots, imbeciles, and the weak-minded established.

(1) Cases in which the large size of the head is referable to disease of the bone. The attendant mental defect is in these cases apparently a mere accident. Large and badly shaped heads are quite consistent with soundness of mind, but they occur among the feeble-minded with a relatively greater frequency than among ordinary individuals. Rickets seems to be the most prolific source of the abnormality. It results in the production of a skull irregularly thickened and perhaps asymmetrical, with bosses on the frontal and parietal bones. The cranial vault is flattened and the forehead bulgy, while the fontanelles may not be completely closed.

(2) Cases in which there is an excess of fluid within the cranial cavity. These are examples of the condition known as hydrocephalus. Not all hydrocephalics are large-headed, and therefore a certain number of cases in which hydrocephalus is associated with feeble-mindedness must, owing to the lack of distinctive clinical features, be relegated to the residuary group; but when the, as yet, not fully known conditions which give rise to accumulation of cerebro-spinal fluid act in early life, there takes place an expansion of the skull, affecting more

particularly the thinner and less firmly united bones of the vault, which in a well-marked case results in the production of a sub-globular cranium of characteristic shape. How rapidly the enlargement may take place is illustrated by a case recorded by E. Schneider,[1] in which the measurement of a child's head increased from 44 cm. to 71 cm. in less than 4 months.

Although there is no simple ratio between the dimensions of the skull and the degree of mental defect, the higher measurements are associated with considerable impairment on both the sensory and the motor sides. Apparently as the result of the stretching of the optic and auditory nerves, sight and hearing may be greatly interfered with. There is general muscular weakness, and this, taken in conjunction with the weight of the contained fluid, causes the patient to seek support for the head either on a pillow or on the back or arm of his chair. In the bed-ridden cases, partly from a disturbance of the cerebral functions and partly from want of exercise, atrophy of the muscles and contracture occur, though movement may be induced from time to time through the onset of epileptic seizures. It is perhaps the being, so to speak, tied down by the head which makes hydrocephalics lethargic and docile, at any rate they rarely indulge in the restlessness and ill-temper which some of the feeble-minded display.

About the pathology of hydrocephalus there is

[1] E. Schneider, *Ein Fall von aussergewöhnlicher Grösse eines kindlichen Wasserkopfes; v. Jahresbericht über die Leistungen und Fortschritte auf dem Gebiete der Neurologie und Psychiatrie*, 1909, p. 505.

little to be said, except by way of surmise. The accumulation of fluid usually takes place in the lateral ventricles of the cerebrum, causing a dilatation which flattens out the convolutions against the inner aspect of the skull and reduces the wall of the hemisphere to the thickness of a few millimetres. There is evidence of increased intra-cranial pressure so that some more potent force than that of simple transudation from blood-vessels is called into play, but it is not clear whether the choroid plexuses actively secrete the cerebro-spinal fluid against an increasing resistance, or whether the conditions are such, owing for instance to the presence in the ventricles of some soluble substance, that an abnormal osmotic flow from the blood-vessels is determined. When, as in cases of cerebellar tumour, there is obstruction of the veins of Galen, the state of affairs sufficiently resembles that found in some forms of ascites to render the pouring out of fluid from the congested choroid plexus intelligible, but this explanation is only rarely available. An inflammatory process set up, for instance, by the meningo-coccus or the tubercle bacillus can, it would seem, be held responsible in other cases. There remains, however, a large proportion of cases to account for which no adequate hypothesis has so far been advanced, for the proposal to lay the onus on congenital syphilis can hardly be accepted in view of the fact that in three (and those the best marked) of four cases of chronic hydrocephalus Knoepfelmacher and Lehndorff[1] obtained

[1] W. Knoepfelmacher und H. Lehndorff, *Hydrocephalus chronicus internus congenitus und Lues; v. Jahresbericht über die Leistungen, &c.*, 1909, p. 504.

a negative reaction when employing the method of Wassermann, while Dean[1] obtained a positive reaction in only four out of fourteen cases.

(3) Cases in which there is enlargement of the brain (megalencephaly). Several workers among the feeble-minded have attempted to differentiate from the rest of the large-headed cases a section presenting certain characteristic symptoms, to wit, general muscular weakness, headache and epileptic seizures. Whatever justification there may be for erecting a special clinical category, there is no doubt that at autopsies brains are sometimes found which considerably exceed the average in weight and which, since they have belonged to mentally defective persons, are presumably defective in some way. A definite overgrowth of neuroglia, in some instances accompanied by sclerosis, has been observed in connection with brains of this class, while in other cases, as, for example, in one recorded by v. Hansemann[2] where the brain weighed 1860 grams, no histological abnormality was discovered. Ashby and Wright[3] speak of having found a cerebral hypertrophy of the kind mentioned in association with rickets, and so lend some colour to the popular conception of rickets as a cause of feeble-mindedness; but the matter must, at present, be regarded as undecided.

[1] H. R. Dean, "An Examination of the Blood Serum of Idiots by the Wassermann Reaction," *Lancet*, July 23, 1910, p. 227.

[2] D. v. Hansemann, *Über echte Megalencephalie: Berliner klin Wochenschr.* 1908, No. 1, p. 7.

[3] H. Ashby and G. A. Wright, *The Diseases of Children*, 1905, p. 219.

CRETINISM.

One of the most striking features of feeble-mindedness, when considered from the historical standpoint, is the way in which Cretinism has gradually ceased to occupy its originally prominent position. On the Continent of Europe, to which the available literature chiefly relates, the distinctive peculiarities of cretins, and in some regions the large proportion of them among the inhabitants, caused cretinism to be regarded as constituting, to the exclusion of less conspicuous abnormalities, an essential characteristic of the more severe grades of mental defect.

Practically all the earliest institutions, *e.g.*, that founded by Guggenmoos at Salzburg in 1828; that of Haldenwang at Wildberg in 1835; and the still more famous one established by Guggenbühl on the Abendberg in 1841, were designed for cretins, with whom, no doubt, were included the "Mongolians" of that day. Griesinger's dictum that while every cretin is an idiot, every idiot is not a cretin, has now quite lost its application, for in this country, at any rate, the cretin is becoming a clinical curiosity, though there is no lack of idiots. Among the 500 feeble-minded children under 16 years of age, to whom reference has frequently been made, only three presented signs of cretinism, while of 600 females over 16, only one was an example of the condition. The introduction of the treatment by means of thyroid gland preparations has revolutionised the position, and, since every private practitioner is only too glad to gain the kudos

associated with the transformation of a youthful monstrosity into the fairer semblance of a normal child, the admission of a cretin into an institution for idiots is comparatively rare.[1]

Just as in the case of Mongolian idiocy, well-marked cretinism involves so many departures from the normal, that minor racial characteristics are obliterated and a certain uniformity of type, which has caused it to be said that "to see one is to see all," is created. This compendious statement must not, however, be accepted too confidently. In a typical case there are bodily and mental symptoms of a pronounced character. The stature is short and there may be deformity of the limb bones, which, taken in conjunction with the clumsy hands and feet, interferes with walking, or the pursuit of any manual employment. The skin is rough and thickened, with few and coarse hairs, and is cold and clammy to the touch; over the face its redundancy causes the obliteration of the ordinary folds and wrinkles, and lends a stolid aspect to the expression; the upper eyelids are thickened, the lower baggy; an enormous tongue protrudes between the swollen lips, which cover carious and irregular teeth; large collections of fat fill in the supra-clavicular fossæ, and

[1] In some parts of Europe, however, cretinism is, even at the present day, a social factor of the first importance. Thus, speaking of the cretins in the Valley of Aosta, F. Ferrero says "many roam freely in the villages and importune strangers, begging with the most obdurate insistence and forcing into evidence their horrid bodies": and again "the cretin still wanders aimlessly about emitting uncanny sounds from his distorted mouth, a clouded intelligence in a useless body—a horrible example of the miseries that flourish by the side of the divine glory of the great mountains."

The Valley of Aosta, 1910, pp. 49 and 51.

the pendent abdomen frequently shows a hernial bulging in the umbilical region: there may or may not be enlargement of the thyroid gland. In some cases the incidence of the disease seems to be chiefly upon the nervous system, a condition resembling that in cerebral diplegia resulting. Many of the cases are deaf and dumb, the deafness being apparently due, in some measure, to myxomatous thickening of the mucous membrane of the middle ear; and cutaneous sensibility is so much diminished that there is indifference to what would, ordinarily, be painful impressions.

Mentally there is marked apathy with sluggish reaction to stimuli. Cretins are generally timorous, shy, and retiring, but they resent interference and are liable to outbreaks of anger if not let alone. Their appetites, so far as these exist at all, are depraved, leading them to filth-eating and other offences against good manners, and the more active of them are prone to vagabondage and deeds of wanton mischief.

Considering the extent of the literature relating to cretinism, it is remarkable how little information of scientific value is available in regard to the condition. The following brief exposition, however, appears to summarise the present state of our knowledge of the subject.

For the maintenance of life there is necessary the harmonious co-operation of various systems of organs which are concerned with the acquisition, the absorption, and the assimilation of food materials, and the elimination of waste matter. The necessary control is exercised by the nervous system and might, conceivably, have its origin in some psychic agency

capable of effecting the desired co-ordination. But it is, in fact, so largely unconscious that a physical source for the provision of adequate determinants must be sought. Of such sources there appear to be several, though only one, the thyroid gland, is of immediate interest. An interference with the functions of the thyroid—expressing itself in deficiency of the thyroid secretion—gives rise to a series of pathological changes in the body generally, which vary with the age and with other less easily ascertained circumstances, but which mainly follow two directions, one being the accumulation of a mucoid substance and the other the disablement of nervous tissue. If the deficiency occurs in early life the processes of growth are seriously disorganised and cretinism results. It appears from the observations of Captain McCarrison[1] that in the Chitral and Gilgit Valleys of the Himalayas two types of cretinism, the "myxœdematous" and "the nervous," characterised by a predominance of one or the other group of symptoms, are clearly recognisable.

This comparatively simple proposition is, however, complicated by sundry factors which call for notice. In the first place, a deficiency of thyroid secretion may be associated with an apparent hypertrophy of the thyroid gland, and it is a familiar fact that cretinous individuals frequently exhibit a goitrous swelling of the neck. Thus among McCarrison's 203 cases of cretinism there were 88 in which a goitre was present.

Ireland, expressing the view which is generally

[1] R. McCarrison, "Observations on Endemic Cretinism in the Chitral and Gilgit Valleys," *Proc. Roy. Soc. of Med.*, Nov. 1908.

held and which on the face of it seems most plausible, speaks of the goitre as "being the beginning of the disease," but it appears from McCarrison's studies that the thyroid enlargement is not the cause of cretinism, since its occurrence is subsequent, and not prior, to the development of cretinic symptoms. Cretinism and goitre seem to have a common origin, which is, according to McCarrison, "defective thyroid function in the mother." He found that in 86 per cent. of his cases the mother was certainly goitrous and that in only 4 per cent. could goitre be definitely excluded, and he suggests that it is the consequent toxicity of the mother's blood which, by its action on the developing thyroid of the unborn child, determines cretinism. The hereditary element in the disease, which may perhaps follow Mendelian lines in transmission, is thus accounted for, but there is such overwhelming evidence that cretinism is to some extent dependent on topical conditions that its etiology cannot be said to be fully elucidated until an explanation of the influence of those conditions is forthcoming. So far we have failed to discover the mysterious agency which converts some regions of the earth's surface into hot-beds of the disease, and we can only picture it as a "miasm" which, as E. and H. Bircher claim to have shown, follows in its distribution certain sedimentary rocks (being apparently a decomposition product of organic matter), and is introduced into the body by means of drinking water. Professor Wilms[1] of Basle has brought forward evidence in

[1] M. Wilms, *Experimentelle Erzeugung und Ursache des Kropfes; Deutsche Medizinische Wochenschrift*, Mar. 31, 1910.

support of the view that the "miasm" is in reality a soluble toxin or ferment which cannot be filtered out, but which can be rendered innocuous by heating the water.

The fact that cases of cretinism occasionally appear in places far removed from the districts where the disease is rife has led to a distinction between "endemic" and "sporadic" forms which, while generally insisted upon by authors, appears to have little practical value, since clinically the two conditions are similar. The suggestion that the former type is distinguished by the presence, the latter by the absence, of a goitre, seems to be quite unsubstantiated. Tanzi[1] says of sporadic cretinism, "It is not even a family disease: the subject of sporadic cretinism always represents a solitary case of the disease in his family, and commonly has brothers and sisters who are perfectly normal." But this diagnostic character appears to be as untrustworthy as the one already mentioned, for Stevens[2] has recorded four cases of sporadic cretinism, all with enlarged thyroids, occurring in a family which did not live and had not lived in a district where cretinism is endemic.

It has been customary in the past to distinguish three grades of mental defect associated with cretinism and to describe these as the "cretin," the "semi-cretin," and the "cretinoid," according to the severity of the symptoms. Weygandt,[3] in a recent

[1] E. Tanzi, *A Text-book of Mental Diseases*, trans. by W. Ford Robertson and T. C. Mackenzie, 1909, p. 377.

[2] B. C. Stevens, "Four Cases of Sporadic Cretinism in One Family," *Lancet*, June 18, 1910, p. 1684.

[3] W. Weygandt: v. Art. "Kretinismus," in *Enzyklopädisches Handbuch der Heilpädagogik.*, 1909.

contribution to the literature of the subject, adversely criticises this arrangement. In harmony with the classification adopted in this work, it will be more convenient to subdivide the cases into three groups, to which the terms "idiotic," "imbecilic," and "weak-minded" may, respectively, be applied.

In practice it is often difficult to distinguish with certainty between the Mongolian and the cretinous type of the feeble-minded, and no test other than the administration of preparations of the thyroid gland is of much value for the purpose of differential diagnosis. Sometimes a partial recovery, which serves to bring into relief the previously obscured Mongolian elements of the picture, renders it probable that we have to do with a combination of the two disease processes. At other times, especially when the exhibition of the remedy has not been undertaken sufficiently early, obvious signs of cretinism remain in spite of treatment, being apparently too firmly fixed to be eradicated. Whether, as has been suggested, there is a distinct disease having some features common to both Mongolism and cretinism, is a question calling for further elucidation.

EPILOIAC TYPE.

In the scheme of classification, based on considerations of morbid anatomy, adopted by Bourneville, a place is assigned to cases exhibiting after death the condition which he has called "sclérose hypertrophique," and which is widely known to English speaking pathologists as

"tuberose" or "hypertrophic" sclerosis. Bourneville's first case, which was published in the *Archives de Neurologie* for 1880, showed, at the autopsy, striking changes in the brain and kidneys. In the former organ, there were, to quote his own words, "lésions consistant en îlots arrondis formant saillie, de volume variable, d'une coloration blanchâtre, opaque, d'une densité bien supérieure aux parties avoisinantes et faisant partie des circonvolutions. Il s'agit, en un mot, d'une sorte de sclérose hypertrophique de portions plus ou moins grandes des circonvolutions." The kidneys, he says, presented "masses blanchâtres, mamelonnées, dures, formant une saillie de 3 à 5 millimètres." Shortly afterwards Bourneville described, in conjunction with E. Brissard, a further case in which similar appearances had been observed. Both cases were subject during life to epileptiform convulsions.

This combination of pathological characters was met with at intervals in the practice of the Bicêtre Hospital and accounts of the cases were given by Bourneville in his annual reports. A summary of them appears in the "Compte-rendu du Service de Bicêtre" for 1898, where allusion is made to ten cases observed up to that time. In the same year, Sailer directed attention to an instance of what he called "hypertrophic nodular gliosis" occurring in a boy who died of exhaustion from epilepsy at the age of fifteen years. There were indurated areas in the cerebral cortex and nodules projecting into the lateral ventricles from the basal ganglia; the right kidney "contained a huge tumour-like mass" and there were smaller growths in the left. Sailer's

article makes allusion to thirty other cases, including five from Bourneville's clinic, but the descriptions given are not always complete enough to make the exact nature of the cases clear. The more recent literature, in English, contains reports by A. W. Campbell,[1] M. B. Dobson,[2] and Messrs. Fowler and Dickson,[3] while Ch. de Montet [4] has described a French case, and R. Bonfigli,[5] has added particulars of two Italian ones. In a lengthy paper published in 1908, H. Vogt [6] reviews thirty cases, including three of his own.

Campbell's paper contains a detailed account of the minute anatomy of the condition. He found in the affected regions of the brain a neuroglial proliferation ranging from a diminution of nerve cells and fibres with substitution of glia cells of peculiar character to the formation, at the centres of the indurated areas, of "a matrix composed of a dense network of indefinite structure, a tissue showing neither nuclei nor distinct fibres." Sub-ependymal growths of the lateral ventricles were composed of a "coarse fibrous tissue" and contained "an abundance of corpora arenacea." In connection with the cortical sclerosis he observed "giant" or "ganglion" nerve cells and curious

[1] A. W. Campbell, "Cerebral Sclerosis," *Brain*, Feb. 1906.

[2] M. B. Dobson, "A Case of Epileptic Idiocy associated with Tuberose Sclerosis of the Brain," *Lancet*, Dec. 8, 1906.

[3] J. S. Fowler and W. E. C. Dickson, "Tuberose Sclerosis," *Proc. Edin. Med.-Chir. Soc.* v. *Lancet*, May 14, 1910, p. 1351.

[4] Ch. de Montet, *Recherches sur la sclérose tubéreuse. L'Encéphale* 3 *Année*, No. 2, p. 97.

[5] R. Bonfigli, *Über tuberöse Sklerose; Monatssch. f. Psychiat. und Neurol.* Bd. 27, 1910, p. 395.

[6] H. Vogt, "Zur Pathologie und pathologischen Anatomie der verschiedenen Idiotieformen," *Monatssch. f. Psych. u. Neur.* Bd. 24, 1908, p. 106.

structures resembling tubular glands. Somewhat similar appearances are described by de Montet and the observations are supported by a study of the writer's own preparations, though as these were made from material which reached him in a badly preserved state, they do not afford very conclusive evidence. In a case described by Geitlin and quoted by Vogt, two of the tuberose masses in the occipital region contained small cysts, there was a condition of heterotopia, and the ventricular tumours contained embedded in them bodies described as "corpora amylacea" which apparently correspond to the "corpora arenacea" of Campbell. Geitlin noted also the presence of rounded concentrically arranged structures which he regarded as derived from blood-vessels and which perhaps have affinities with the "tubular glands" mentioned by Campbell. Vogt finds reason for thinking that the giant cells are of two kinds, some being related to ganglion cells and others to neuroglia elements.

The tumours in the kidneys are said by Geitlin to be allied to those which appear in the lateral ventricles; other writers detect in them a resemblance to adrenal gland tissue. They show, sometimes, a tendency to malignancy and may be the immediate cause of death. Occasionally there have been observed tumours in the heart muscle, usually at the right side and of the nature of a rhabdomyoma.[1] That such neoplasms are not described more frequently is attributed by Vogt to

[1] A. J. Abricossoff, "Ein Fall von multiplem Rhabdomyom des Herzens und gleichzeitiger herdförmiger kongenitaler Sklerose des Gehirns," *Beitr. zur pathol. Anat.*, Bd. 45, H. 3, p. 376.

the fact that they would be likely to cause early death so that the subjects of them would never come under the notice of alienists. Still more rarely new growths have been noted in the liver, the spleen, the thyroid, the thymus, the duodenum, or the skin.

As to the general pathology of the condition, Campbell's hypothesis is that the morbid processes giving rise to it originate in the vascular system of the affected parts. Vogt, however, makes out a case for regarding the widespread incidence of the disease as resulting from errors of development, a view taken also by Geitlin and de Montet.

It will be seen that there is nothing in the above descriptions to justify the separation of tuberose sclerosis as a clinical entity. Bourneville seems to have observed during the lifetime of his cases nothing which he regarded as pathognomonic. Writing in the *Twentieth Century Practice*, P. Sollier says that "while atrophic sclerosis may be diagnosed in a certain number of cases, the recognition of the hypertrophic form is absolutely impossible, in my opinion at least, not only because it has no characteristic symptom, but also because being such a rare condition we are seldom led to think of it at all."

Of late years, however, there has accumulated a considerable amount of evidence in favour of the view that some at any rate of the cases of tuberose sclerosis may be diagnosed during life, owing to the co-existence with the cerebral and renal conditions of the peculiar skin affection known as adenoma sebaceum. For a complete description of the state of the skin in adenoma sebaceum one of the larger

text-books of dermatology may be consulted; it will suffice here to give briefly the principal features. Over all parts of the body the skin may be found to exhibit small nodules or thickenings apparently of a fibrous character. On the face the nodules are generally, as shown in the accompanying figure, arranged fairly symmetrically across the nose and cheeks giving rise to one of the forms of "butterfly rash" and, owing to an association with the nodules of dilated blood-vessels, there is usually well-marked redness. Elsewhere the fibrotic change is much more irregular both in distribution and character, so that structures resembling raised scars and warty growths may be found anywhere on the trunk and limbs (Fig. 21).

In recording the results of the routine examination of his cases Bourneville makes mention of dermatological conditions to which he obviously attached no importance, though in the light of our present knowledge there can be little doubt that what he observed was the symptom referred to above. His first case showed what he calls "acné rosacée et pustuleuse de la face;—de plus, éruption vésiculo-papuleuse confluente du nez, des joues, du front; nombreux petits molluscums à la nuque et sur les parties du cou." Of another case he says "La peau du visage présente de nombreuses rides, avec une teint pâle; il existe quelques productions de nature verruqeuse sur les joues"; while a third displayed an "éruption érythémateuse à la base du nez; pointillé plus rouge sur la face, à la joue gauche en particulier; petites saillies offrant l'apparence de naevi." A similar association has

been noted on several occasions at the Darenth Asylum for feeble-minded persons: it is recorded in the papers by Campbell, Dobson, and H. Vogt to which allusion has already been made, and by Volland,[1] while Hornowski and Rudzki[2] seem to have met with it also.

It is difficult to believe that if a skin condition so distinctive as that in adenoma sebaceum had been present in all ten of the cases observed by Bourneville that keen pathologist would have failed to note the fact, and the remark is equally true of other skilled workers who make no mention of such a striking dermatological peculiarity. Bonfigli, indeed, states explicitly that it was absent from his cases.

Assuming the existence of an association between tuberose sclerosis and adenoma sebaceum to have been definitely established in certain instances no special importance attaches to the occurrence of the former condition without the latter. That some particular element of a clinical syndrome should be wanting in cases conforming otherwise to the type is no uncommon experience, and the cases in point are susceptible of various explanations. There may be, for example, more than one form of tuberose sclerosis, or the skin changes may appear only at a particular stage in the development of the disease.

Serious interference with the excretory functions of the kidneys may occur: thus in two of Vogt's

[1] Volland, "Weitere Beiträge zum Krankheitsbild der tuberösen Sklerose," *Zeitsch. f. die Erforsch. u. Behandl. d. jugendl. Schwachs.*, Bd. 3, H. 3, p. 245.

[2] Hornowski und Rudzki, *Sclérose tubéreuse* (*Bourneville*): cf. *Jahresbericht über die Leistungen und Fortschritte auf dem Gebiete der Neurologie und Psychiatrie*, 1910, p. 249.

cases death resulted from dropsy, while in one of those recorded by Bonfigli it was preceded by uræmic symptoms. Sometimes, also, the renal tumours have been large enough to be detected during life. Morbid states of the urine are not, in the writer's experience, especially connected with the presence of adenoma sebaceum. Except for a tendency to the formation of a deposit of triple phosphate crystals, which the urine from one case exhibited, the writer has not observed any abnormality discoverable by the ordinary tests in the samples which he has had an opportunity of examining. A colleague has, however, met with a trace of albumin.

In the great majority, if not in all, of the cases which, after death, have been found to exhibit a condition of tuberose sclerosis, there has been a history of epileptiform seizures. These may have been of the types met with in "major," "minor," or "Jacksonian" epilepsy, or they may have had affinities with syncopal attacks or uræmic convulsions.

It would appear, then, that in favourable circumstances it may be possible to differentiate clinically a group of cases of feeble-mindedness having the characters above dealt with, and, this being so, there arises a need for a name based on clinical rather than pathological considerations. Some years ago, the writer proposed as a convenient designation the term "Anoia." This word has, however, been applied by Jolly to cases of acute dementia, and by Herfort to an imperfectly defined form of congenital mental defect. The term "Epiloia," coined for the purpose, and having, the

writer believes, no existing connotation, is therefore suggested as being more suitable. It has, at any rate, some of the features which, according to Dr. Pye-Smith, characterise a good name: it is short, unmeaning, distinctive, and capable of forming an adjective.

The writer's earlier experience of "Epiloia," led him to regard the condition as one involving grave risk to life, mainly on account of the severity of the fits which occur. In twelve cases of the disease which have died in Darenth Asylum the apparent cause of death was as stated in the following table :—

No.	Sex.	Age at death.	Circumstances attending death.
1	M	27 years	Supervention of "pneumonia" while having 20 to 40 fits a day.
2	F	23 years	Status epilepticus for 2 days with temperature reaching 105 F.
3	F	13 years	Status epilepticus. The temperature reached 107.4 shortly before death.
4	F	15 years	Status epilepticus.
5	M	6 years	Vomiting and convulsive twitchings lasting for 3 days.
6	F	9 years	Status epilepticus lasting 3 days.
7	F	19 years	Status epilepticus ; death occurred after 46 fits.
8	F	14 years	Pneumonia.
9	M	9 years	Malignant disease of skin.
10	M	8 years	Died suddenly 20 minutes after an epileptic fit.
11	F	17 years	Status epilepticus.
12	M	6 years	Died in one of the "syncopal attacks" to which he was subject.

A more extended acquaintance with the disease, however, has taught him that while no known treatment produces any definite amelioration of the symptoms, the cases are not necessarily progressive. Nine cases are at present known to him, and although they have not been continuously under his care, he has been in touch with eight of them for

the past five years, and with the ninth for three years. A short account of these cases may not be devoid of interest.

1. H. C. This is the patient of whom a photograph is appended. She came under notice at the age of eight years, and is now eighteen. Adenoma sebaceum was observed on admission and has been getting worse pretty steadily since. There are many fibroid nodules in the skin of the trunk. In October 1904, she had a series of fits spreading over three days, which left her in an exhausted state, and fits have been of frequent occurrence since. Thus during the first six months of 1907 there were recorded :

1907	Jan.	Feb.	Mar.	Apr.	May	June
	70	62	40	6	21	19

During the corresponding period in 1910 the numbers were :

1910	Jan.	Feb.	Mar.	Apr.	May	June
	13	2	4	6	1	2

a diminution which has not, however, been accompanied by any improvement in the mental state. The girl is unable to walk without a good deal of assistance, is faulty in her habits, and has to be dressed and fed. Usually she sits quietly with her head hanging, but at times she rotates the head slowly. She appears to understand nothing of what is said to her, though occasionally when she is spoken to a faint smile seems to denote that she is not wholly impervious to auditory impressions.

2. P. F. A rash was noted on the face at the age of five years, but there is no evidence to show

how long it had been present at that time. It is now most marked over the malar bones and is slight over the bridge of the nose, and there is a small confluent area in the right frontal region. There are small fibrous nodules scattered over the arms and the upper part of the trunk, in addition to larger collections over the lower part of the abdomen and the inner surface of the right thigh. The first fit occurred in February 1900, when the boy was seven years old, and since then the fits have not averaged more than one a year, but the mental state has slowly deteriorated and the patient is now an idiot of faulty habits.

3. M. L. S. This girl has been subject to epileptic fits since the age of three years, but since 1890, when she was described as having them "nearly every week," they have been becoming less frequent and none has occurred for a long but rather uncertain period. The condition of adenoma sebaceum is not pronounced and the patient might be described as an imbecile, for her mental capacity has proved sufficient to enable her to become, under supervision, a useful laundry worker.

4. A. S. The facial eruption was first noticed in 1903, when the patient was ten years old, and has never been strongly marked. There are some fibrous nodules scattered over the trunk, back and front. In April 1899, this patient was recorded as having frequent attacks of petit mal with major fits, of no great severity, about once a week. The fits then became much rarer; thus there has been only one noted during the past two years, but the boy suffers from periodic attacks of vomiting.

5. E. B. There have been occasional severe fits but none of recent occurrence. The patient, who is now twenty-six years of age, exhibits fair intelligence. He can talk and give a sensible account of himself, and he is a good ward worker.

6. H. W. A boy of sixteen. The skin affection is not pronounced and does not appear to get worse. No definite epileptiform seizure, unless "fits when teething" are to be regarded as of this nature, has so far been recorded. Mentally, the condition is one of imbecility.

7. S. W. This boy came under observation, at the age of twelve years, in April 1905. In November of that year it was noted that he was having severe fits and occasionally series of fits. A further batch of fits was recorded in March 1906. During the early months of 1907, it was noted that the fits became entirely nocturnal in character and averaged three per month. The boy is fairly intelligent and does not appear to be getting more demented.

8. F. V. S. A girl eight years old. There is at present no history of epilepsy, and she appears to be fairly bright, but she is uncleanly in her habits.

9. A. D. Female, aged 24 years. There is on the face a symmetrical eruption which is confluent over the cheeks and the bridge of the nose, but discrete elsewhere. Fibro-vascular nodules are present over the upper part of the chest, and there are fibrous patches in the skin over the abdomen.

Cases like these supply a means of transition to the ones which remain within the province of the dermatologist, although these latter, as is now generally admitted, usually present some signs of

mental defect. So long ago as 1890, J. J. Pringle [1] noted that "the subjects of the disease (adenoma sebaceum) appear to be generally intellectually below par." H. Radcliffe Crocker [2] speaks of the majority of the cases as passing "unrecognised into the hands of the neurologists," and agrees that "all the marked cases show intellectual infirmity, a large proportion being chronic epileptics or imbeciles."

PLEGIC FORMS.

Some degree of paralysis is one of the commonest symptoms of the more severe grades of feeble-mindedness. A reference to the sections on pathology will provide illustrative figures. The type of paralysis, taken in conjunction with the history of its development, will serve as a basis for the isolation of a set of cases which may be collected into a clinical group marked off from the others, in the scheme of classification adopted in this work, by the fact that the special differentia of the other subdivisions are wanting. By assigning to the group conveniently elastic limits it may be made to comprise all those cases of feeble-mindedness in which a more or less extensive cerebral lesion gives rise to a deficient muscular activity; whether this involves many muscles or few, or whether the lesion is in the sensory or the motor part of the cerebral pathway which impulses traverse during their transition from the afferent to

[1] J. J. Pringle, "A Case of Congenital Adenoma Sebaceum," *Brit. Journ. of Dermatology*, Jan. 1890.

[2] H. Radcliffe Crocker, *Diseases of the Skin*, 1903, p. 922.

the efferent phase. We may, consequently, meet with monoplegia or diplegia; hemiplegia or paraplegia; ophthalmoplegia or laryngoplegia and so on; with visual, auditory, tactile, or other sensory anomalies which indirectly express themselves in muscular activities of various kinds; or with word-deafness, word-blindness, or other species of the genus "aphasia."

The lesions display as much variety in their mode of origin as in their mode of manifestation. They may be of that indeterminate character which we call "inherent" or they may be explicable on ordinary physical principles as the result of the action of disruptive or toxic agents.

A description of these pathological states has been given in Chap. IV. Affections of the cerebral or meningeal vessels are the chief source of trouble. There may be rupture, embolism, or thrombosis occurring at birth or later. There may be the inflammatory process in the cerebral grey matter, due to the conveyance thither by the blood vessels of toxic bodies, which is said to give rise to infantile hemiplegia. There may be sclerotic changes of the atrophic type which, from their distribution, appear to have a vascular origin even though the exact *modus operandi* is not clear. The somewhat indefinite clinical grouping of cases of paraplegia and diplegia dating back to birth or early infancy and known as Little's disease will be included here though it is worthy of note that many French writers accept a definition of Little's disease which would exclude it from this category. Thus Ballet[1] distinguishes a

[1] G. Ballet, *Traité de Pathologie Mentale*, 1903, p. 1217.

form of diplegia, to which he applies the name "maladie de Little," which is especially characterised by the absence of "troubles intellectuels graves," though there may be an "air d'imbécillité."

Hemiplegic forms of paralysis usually occur some little time after birth. They affect the whole of one side of the body, including the face, and pass through a phase of flaccidity followed, on the one hand, by some measure of functional restoration, on the other, by spasm and contracture and by atrophic processes which may involve not only the muscles but also the bony and other structures of the paralysed limb.

Among the diplegic forms there may be recognised, according to Freud (as quoted by Tanzi [1]), the varieties enumerated below :—

(1) General Rigidity.
(2) Paraplegic Rigidity.
(3) True Paraplegic Paralysis.
(4) Bilateral Hemiplegia.
(5) General Chorea.
(6) Double Athetosis.

Morbid states of the central nervous system more subtle in their nature—perhaps impossible of detection by ordinary histological methods and dependent on physical and chemical conditions, as yet beyond the range of analysis—may be at the bottom of the cases in which there is no definite paralysis, but in which the abnormalities of the muscular apparatus take the shape of localised wasting, hypo- or hyper-tonus, exaggerated or diminished reflexes,

[1] E. Tanzi, *op. cit.*, p. 463.

epileptiform or choreiform movements, tremors, inco-ordination, or the tics.

Of some interest is the reputed occurrence of cases of what has been called "psychical cerebroplegia" in which a gross cerebral anomaly is overlooked during the sufferer's lifetime owing to the absence or inconspicuousness of other than psychical defects. With our present views on the structure of the encephalon it is not difficult to imagine such a state of things as this, for we may suppose that only the "higher" cortical regions are affected, and how widely the brain may depart from the normal without serious interference with motor functions may be gathered from the case of an imbecile who suffered from frequent epileptic fits but whose physical condition was good, there being no paralysis or deformity such as might be expected from the cerebral condition. He died at the age of twenty-six years. At the post-mortem examination the right cerebral hemisphere, which showed much wasting and sclerotic change in the occipital lobe and the hinder portion of the parietal and temporal lobes, was found to weigh only 13 ozs., while the left weighed 24 ozs. and appeared to be of normal structure. The left side of the cerebellum was, as is customary in such cases, rather smaller than the right.

PROGRESSIVE FORMS.

In the clinical types so far dealt with, while the expectation of life has been low, there has not, except, perhaps, in some of the cases of tuberose sclerosis, been any evidence that the patient was

steadily tending to an early death. It is, however, possible to distinguish a group of cases in which a rapidly progressive deterioration as regards both mental and physical characters is the outstanding feature. The relationship of the members of the group is by no means clear and any scheme of subdivision which may be adopted is liable to adverse criticism, but one may differentiate with some degree of confidence the following forms :

(1) General Paralysis.

Of late years it has been recognised that children are subject to a form of progressive paralytic dementia resembling in its symptoms and course the disease which in adults is usually known as general paralysis of the insane. The "juvenile" type, like that of adults, seems to have its origin in syphilis but differs in that this disorder has not been acquired by direct infection but has been transmitted by one or both parents. The stage of growth at which the influence of the syphilitic taint becomes manifest, so far as the mental state is concerned, is variable ; thus the child may appear healthy up to the time of puberty or may exhibit mental defect from infancy. The propriety of including cases of the former kind under the description of feeble-mindedness may, in view of the definition given at the beginning of this chapter, be questioned, but it may be argued that the defect, though not at first apparent, is really congenital, and in any case it is convenient to consider together all the varieties of juvenile general paralysis which are met with. Definite symptoms of paralytic dementia have been noted as early as the eighth year, but such symptoms

are sometimes preceded by conditions of idiocy which in the light of the subsequent history may be regarded as prodromal.

A close parallelism between the symptoms of "juvenile" and "adult" general paralysis is hardly to be looked for, since in the child the field for the development of possible abnormalities is smaller; but the classical features of a progressive paralysis leading to atrophy and contracture of the muscles, convulsive seizures, and a steady diminution in mental capacity with loss of emotional control and an exaggerated *bien être* are present. Any or all of such signs as abnormal pupillary reactions; irregular knee-jerks; grinding of the teeth; lingual, labial, and facial tremors; inco-ordination; disordered speech; irregular pyrexia; a ravenous appetite; and trophic disturbances may occur. Of the different types of the disease that known as the "dementing" is the one with which the juvenile form has most in common, but expansive delusions may be met with, as in a case recorded by H. Vogt. The usual history is of a gradual physical and mental deterioration occurring at school age, whereby a perhaps bright and intelligent child becomes increasingly dull, stupid, and helpless, eventually losing control of the bladder and rectum and being confined to bed with contracted limbs, inability to converse or swallow food, and rapidly progressive emaciation, until some intercurrent disorder or simple inanition ends the scene.

Chronic meningo-encephalitis, which seems to be the basis of general paralysis whether it occurs in children or in adults, produces similar changes in

both classes though in both different cases exhibit considerable diversity in detail. The best account of the pathological anatomy of juvenile general paralysis is that of Watson,[1] who examined the brains of twelve cases finding in all evidence of a chronic degeneration of the nerve cells in the shape of chromatolysis, shrinking of the cells, displacement of nuclei, and breaking down of cytoplasm. In some of the cases there was also acute degeneration of at least two types :—

(*a*) Swelling of the cell and chromatolysis with sometimes vacuolation.

(*b*) Coagulative necrosis.

A further important contribution to the pathology of juvenile general paralysis is that of Rondoni.[2] In a patient formerly under the writer's care, who presented during life typical signs of the disease and died at the age of twenty years, the dura mater was found to be very thick and adherent in places to the pia-arachnoid, which was opaque and thickened irregularly. There was an excessive amount of cerebro-spinal fluid. The right cerebral hemisphere weighed 18 ozs. the left 16½ ozs. a decidedly low weight for the brain of a male originally of good physique and intelligence. The father of this patient, in regard to whom there was a definite history of syphilitic infection, had himself died of general paralysis. In another patient, a female who died at the age of nineteen years and in whom also

[1] G. A. Watson, "The Pathology and Morbid Histology of Juvenile General Paralysis," *Archives of Neurology*, vol. 2, 1903, p. 621.

[2] Pietro Rondoni, "Beiträge zum Studium der Entwickelungskrankheiten des Gehirns," *Archiv. f. Psychiatrie*, Bd. 45, H 3, p. 1004.

the condition during life had been such as to justify a confident diagnosis of general paralysis, the brain, as observed at the post-mortem examination, could not be regarded as displaying typical signs of that disease; indeed its most distinctive character was a patchy induration having some analogy with that of tuberose sclerosis. In this instance the family history afforded no evidence of the existence of syphilitic infection.

(2) Familial Forms.

We turn now to an ill-defined group of cases of progressive bodily and mental enfeeblement, of which the salient features are some or all of the following characters.

(*a*) An incidence, suggesting transmission of some parental defect, upon several members of the same generation of a family.

(*b*) Affections of vision.

(*c*) Peculiar anatomical changes in the central nervous system. Some few of the members of this group are so closely allied, as regards (1) etiology, (2) course, and (3) pathology, that they may be placed in a special class. The remainder are not sufficiently clearly outlined to admit of classification with the same precision and at present their relationships remain in doubt. There is some confusion as to terminology, but the most convenient arrangement seems to be to include all the cases under the designation "amaurotic family idiocy," which is now too widely employed to be ignored, and to differentiate two types of this disease.

A. Infantile type.

The chief characteristics of this disease, which is

known also by the names of the earliest students of it, Mr. Waren Tay and Dr. B. Sachs, may be briefly considered under the three heads just mentioned.

(1) Etiology.—As a rule the patients are of Jewish extraction. Whether the rule is absolute is a little uncertain. From time to time, one finds in the literature references to cases which are said to have occurred in Gentiles, but it is possible that these belong rather to the second of the classes here accepted. Syphilis, apparently, has nothing to do with the matter; the blood and the cerebro-spinal fluid have been found not to give Wassermann's reaction.[1]

(2) Course.—The disease begins at about the end of the third month. There is a rapidly increasing general muscular weakness, which may be associated at first with a well-nourished condition, and a rapidly diminishing acuity of vision. Wasting and rigidity, with blindness due to optic atrophy, result, and death takes place after an illness of about two years' duration.

(3) Pathology.—Until the later stages supervene there is recognisable, in addition to the signs above mentioned, a distinctive condition of the retina. In the region of each macula lutea, a whitish patch with the position of the fovea centralis marked as a cherry-red spot is observable. In some cases, at any rate, this appearance is "due to the chorio-capillaris showing through a thin, if not perforated retina." There is a consensus of opinion that the disease is primarily an affection of the nervous

[1] F. J. Poynton, "Amaurotic Family Idiocy," *Brit. Med. Journ.*, May 8, 1909, p. 1106.

elements. Poynton, Parsons, and Holmes[1] found in their detailed study of three cases that the cells in all parts of the central nervous system were swollen and showed eccentric nuclei, loss of "tigroid masses," vacuolated protoplasm, and breaking up of neuro-fibrils, together with loss of nerve fibres and a secondary increase of neuroglia. Mott[2] records similar changes in two cases and notes that the cells of the sympathetic ganglia are also affected. As the result of a chemical investigation, he found a diminution of nucleo-proteid and an increase of simple proteid which he correlates with the disappearance of Nissl substance and the increase of glia fibrils. Schaffer[3] also agrees with the conclusions of Poynton and his fellow-workers, and Sachs[4] expresses the view that "the morbid process in the disease affects primarily, or at least to a great extent, the entire grey matter of the brain and of the spinal cord." In cases examined by Sachs the cortical changes had given rise to such a degree of hardness, that "the knife grated as it passed through."

B. Juvenile type.

Sachs recognises a form of amaurotic family idiocy which is not restricted to Hebrews, and the duration

[1] F. J. Poynton, J. H. Parsons, and G. Holmes, "A Contribution to the Study of Amaurotic Family Idiocy," *Brain*, June, 1906.

[2] F. W. Mott, "Two Cases of Amaurotic Dementia (Idiocy) and a Correlation of the Microscopic Changes in the Central Nervous System, with the Results of a Chemical Analysis of the Brain," *Archives of Neurology*, vol. 3, 1907.

[3] K. Schaffer, "Über die Pathohistologie eines neueren Falles (viii) von Sachsscher familiär-amaurotischer Idiotie," *Journ. für Psychol. und Neurol.*, Bd. 10, 1907, p. 121.

[4] B. Sachs, "On Amaurotic Family Idiocy," *Journ. of Nerv. and Mental Dis.*, Jan., 1903.

of which extends over a number of years. H. Vogt[1] has described a "family" disease marked by mental defect, blindness, and paralysis with bulbar symptoms, which he regards as belonging to the same category. Several cases have now been recorded: thus Jansky[2] has given an account of a boy, healthy up to the fourth year of his age, who became the subject of a progressive dementia with blindness, general hyperæsthesia, spastic diplegia, increased knee-jerk, and hyperakusis, dying at the age of six. This boy was one of a family of eight, of whom three died with similar symptoms between the ages of four and six years. Brooks[3] has also described three cases of somewhat allied character occurring in a family of seven children, and Mayou[4] has given an account of a family containing seven members, of whom four have been affected in a similar way.

As yet cases of the familial form of idiocy are too few for a satisfactory determination of their taxonomic position to be made, and it is possible that with increasing knowledge the boundaries of the group may become less, rather than more, sharply delimited. Several years ago Sachs expressed the opinion that "there is a close anatomical relationship between amaurotic family idiocy and other cerebral

[1] H. Vogt, "Über familiäre amaurotische Idiotie und verwandte Krankheitsbilder," *Monatssch. f. Psychiat. u. Neur.*, Bd. 18.

[2] J. Jansky, "Über einen bisher nicht publizierten Fall von familiärer amaurotischer Idiotie &c." *v. Jahresbericht über die Leistungen &c.*, 1909, p. 1025.

[3] H. Brooks, "Amaurotic Family Idiocy," *Journ. of Nerv. and Ment. Dis.*, April 1910, p. 251.

[4] M. S. Mayou, *v.* papers in *Proc. Ophthalmological Society*, 1904, p. 142; and *Proc. Roy. Soc. of Medicine*, July 1908.

diseases of childhood, which are dependent on an arrest of, or at least a disturbance in, the normal development of the central nervous system," and recently Huismans[1] has published the following conclusions to which he has been led by his study of the subject.

(*a*) Amaurotic family idiocy of the kind described by Waren Tay and Sachs cannot be isolated as a definite morbid entity because all the clinical features, even the macular spot, may occur singly or together in other familial and hereditary as well as heterogeneous diseases of the central nervous system.

(*b*) Amaurotic family idiocy belongs to the great province of familial and hereditary diseases of the central nervous system, and is a variety of Little's disease or cerebral diplegia.

Residual Forms

While the types of mentally defective persons described in the preceding pages are, from the clinical and pathological standpoints, the most interesting cases which we have to consider, they constitute, taken together, quite a small proportion of the total number of the feeble-minded. Thus of the 500 cases alluded to as series D (*v.* p. 95) a large number could not be included under any of the above headings, and among the class of persons exhibiting the slighter forms of defect,

[1] L. Huismans, "Kurze Bemerkungen zur Tay-Sachsschen familiären amaurotischen Idiotie," *Journ. f. Psychol. u. Neurol.*, Bd. 10, 1908, p. 282.

such for instance as are not certified under the Idiots Act of 1886, or the Lunacy Act of 1890, but attend special schools, the percentage is still higher. We are left then with a large residual group requiring, for its complete subdivision, a more minute analysis than has so far been employed. Clinically the members of the group show all kinds of physical abnormalities, but these are of too moderate extent and too irregular distribution to help in the differentiation of distinct types of disease. For sociological purposes, however, it does not seem to be necessary to attempt any more elaborate classification than the one into cases of idiocy, imbecility, and weak-mindedness already utilised.

Epilepsy

It has been usual for writers on mental defect to distinguish as a group co-ordinate with other clinical groups those cases, or some of them, in which epileptic seizures occur. Such a distinction is essentially unsound, for convulsions which cannot be described otherwise than as epileptiform occur in diverse types of feeble-mindedness. It will be better, therefore, to consider this symptom in relation to the different forms of defect recognised in this chapter, without accepting it as in itself a criterion for purposes of clinical classification. We note then that in Mongolism there is a conspicuous freedom from epileptiform seizures, while, on the other hand, such seizures are one of the most striking and constant features of tuberose sclerosis. In the cases which have been included under the headings

microcephalic, macrocephalic, and plegic, the ratio of epileptics to non-epileptics is high. It is not, however, true that all paralysed idiots are epileptic. Thus in a series of 150 cases, half being epileptic, the following condition as regards paralysis was observed.

	All limbs	Rt. hemiplegia	Lt. hemiplegia	Paraplegia
Epileptics	6	4	10	9
Non-epileptics	1	1	1	9

These figures may be compared with those given by Bourneville. At the end of December 1904, he had under his care fifty-nine mentally defective patients suffering from hemiplegia. In thirty-two of these the affection was at the left side, in twenty-seven at the right. Of the former nineteen suffered from epilepsy, and of the latter twelve. As to the relationship of epilepsy and cretinism there is some doubt. McCarrison obtained a history of convulsive seizures in a few of his cases of the "nervous" type of cretinism, which has points of contact with cerebral diplegia, but such seizures appear to be rare in the myxœdematous type. On the other hand, Stern[1] has noted the rarity of epilepsy as a complication of Graves' disease and believes that there exists a certain antagonism between thyroidism and epilepsy. Thus he found that a slight enlargement of the thyroid was associated with improvement in the condition of two-thirds of the patients in a series kept under observation. The cases here grouped under the heading "progressive" differ as regards the occurrence of convulsive attacks, these

[1] R. Stern, "Zur Prognose der Epilepsie," *Jahrbücher für Psychiatrie und Neurologie*, Bd. 3, 1909, p. 1.

being a common symptom of juvenile general paralysis, but not of the familial forms. A considerable percentage of cases of epilepsy is found in the "residual" group.

Among 500 feeble-minded children under sixteen years of age (250 of each sex), examined in an asylum, there were 142 suffering from epilepsy, while, in another set of asylum cases, of 500 males and 600 females over sixteen there were, respectively, 128 and 196 epileptics, a total of 324. These figures give a grand total of 466 cases among 1,600 certified idiots and imbeciles, *i.e.*, approximately, 29%. Since epileptics call for closer supervision than non-epileptics the distinction between the two, though it may be clinically little, is, for asylum administration, of great importance. It is, doubtless, for this reason that the Commissioners in Lunacy have given prominence to epilepsy in the scheme of classification approved by them.

CHAPTER VII

THE HANDLING OF THE FEEBLE-MINDED

According to the estimate of the Royal Commission on the Care and Control of the Feeble-Minded there are, approximately, 150,000 "mentally defective" persons, apart from certified lunatics, in England and Wales. Of these some 66,000 are not suitably provided for either as regards their own well-being or that of the public generally. Clinically, some of these defectives would not be embraced even by the wide definition of feeble-mindedness accepted in this work, but this is of no importance from the sociological standpoint. The figures, too, may be, to some extent, inaccurate. An incomplete census, taken by investigators equipped with different standards of what constitutes "mental defect," will not, in the nature of things, give entirely trustworthy results. This also is not, for our present purpose, a matter of great consequence. The essential thing is that there are in the community, to use the Commissioners' own words, "numbers of mentally defective persons whose training is neglected, over whom no sufficient control is exercised, and whose wayward and irresponsible lives are productive of crime and misery; of much injury and mischief to themselves and to others; and of much continuous expenditure

wasteful to the community and to individual families"; and that there is urgent need of a satisfactory scheme for dealing with them.

Difficulties of two kinds are met with in attempting to satisfy this demand. Not only have we to select the scheme which is theoretically the best, but we have also to consider how it can be carried out. The interests of the feeble-minded and of society in general may be, and apparently are, in some measure conflicting, and the decision as to what is expedient will only inspire confidence in so far as it is founded on the widest possible survey of the position.

Our study of the subject will, then, begin appropriately with a consideration of the point of view from which we are to regard it.

A. The Point of View.

So long as there have been human beings on the face of the earth these beings have, we may assume, exhibited inequality as regards their mental status, some falling so far short of the work-a-day requirements of communal life as to be necessarily precluded from entering into the social organisation of their day on the ordinary footing. There are indications that the average man has, at all stages in history, looked at his abnormal contemporaries with mixed feelings. They have appealed now to his selfishness, now to his altruism; gusts of pity and repugnance; reverence and contempt; fear and amusement; have in turn passed over the surface of his abysmal ignorance: guiding the weaker vessels towards a haven of sympathy and forbearance, or

overwhelming them in storms of cruelty and oppression. Sometimes, doubtless, the cruelty has been well-intentioned and has been designed to exorcise the evil spirits which were thought to have taken possession of the sufferer, and the responsibility for the resulting inhumanity must rest on the shoulders of the priests and teachers of the community rather than upon the ordinary citizen. Even in these later days we are not far advanced in the matter of dealing with the feeble-minded in a philosophic spirit: we have learnt a little and are more tolerant, but we still fall short of Bacon's ideal of "employing the Divine gift of reason to the use and benefit of mankind."

It is idle to blink the fact that popular prejudice is one of the most potent of the forces which have to be reckoned with in any scheme of reform. The spirit of opposition to changes in accepted usage as regards the treatment of mental diseases, which one finds in civilised communities, does not differ in essence from that which the Indian native displays in the matter of plague.

Probably only those who are brought into direct contact with the feeble-minded appreciate the social force behind them. They are not isolated personalities to be considered on their merits. Nearly every one of them has such far-reaching ramifications of relationship penetrating the body politic that any shock applied to the individual may be transmitted in an ever widening wave which causes a vast social upheaval. Every British asylum medical officer has had experience of the stupidity, the unfairness, the suspicion, the untruthfulness, of the relatives of his

patients. In Germany things are no better; indeed, according to Dr. M. Fischer,[1] they are even worse than with us. Nor is it merely the illiterate who are guilty of such questionable conduct. An American work entitled "The Lunacy Law of the World," by J. A. Chaloner, Counsellor-at-Law, which is in the writer's possession, indulges in the wildest charges of corruption against asylum authorities, impugning even the good faith of our own Lunacy Commission and employing language of a character so extravagant as to be ludicrous to anyone having practical knowledge of lunacy law. Thus in regard to the Idiots Act of 1886 we are told:—

"All that is required to incarcerate a person upon the possibly false charge of idiocy or imbecility is the action of his parents or guardians or 'any person undertaking and performing towards him the duty of a parent or guardian' supported by a medical man upon whose bare allegation, unsupported by affidavit, the alleged idiot or imbecile may be imprisoned for life."

And it is not only the antagonism born of ignorance and superstition which the reformer has to meet. Behind this is a more subtle sentiment, which doubtless has its roots in the primitive struggle for existence, that of shirking responsibility; of leaving others to bear the brunt. No scheme yet devised by man for the amelioration of the conditions which result from the existence of feeble-minded persons fails to demand some immediate self-sacrifice on the part of individual members of society even though it offers them, in compensation, an ultimate advantage

[1] M. Fischer, *Laienwelt und Geisteskranke*, 1903.

much greater than that which they have foregone. It is not disputed by the vast majority of persons that the segregation of the feeble-minded, so far as it has been effected, has been of benefit to the community, but that segregation has involved some interference with social amenities in the places where the feeble-minded have been collected and has been bitterly complained of in consequence. Further, it is not disputed that by following such industries as are within the limited compass of their abilities the feeble-minded have lightened the burden of the community; yet workers not handicapped by mental infirmity, instead of turning their attention to the higher branches for which, presumably, their greater capacity fits them, resent the intrusion of the feeble-minded and place such obstacles as they can in the way of their employment. Equally indifferent to the duties of citizenship are those parents who, under the pretence of family affection, try to exploit, for their own private ends, the labours of the feeble-minded; and who utilise the privileges which society has conferred upon them in respect of their relationship in order to defeat the fundamental purpose of those concessions.

A conscientious desire to do one's best for the feeble-minded does not, however, remove one beyond the risk of falling into errors of judgment, as is shown by the existence of conflicting suggestions, all of which have been advanced in entire good faith.

Some persons with a smattering of biological knowledge are inclined to preach a war of extermination against the inefficient, believing that in so

doing they are conforming to the natural law of the survival of the fittest. Glib suggestions of the erection of lethal chambers are common enough, being, indeed, the ordinary sequel to the first introduction of the unthinking to cases of profound idiocy. Apart from the difficulty that the provision of lethal chambers is impracticable in the existing state of the law, the scope of the procedure is so restricted that it promises no more, as a set-off to outraged feelings of humanity than the saving of the relatively small sum which the housing and feeding of a few short-lived idiots costs society. Such cases as could alone be dealt with in this way are not the ones which breed feeble-mindedness, simply because they do not breed at all, and the removal of them would do practically nothing towards solving the chief problem which the mentally defective set: that of the persistence of the obnoxious stock.

For asexualisation by surgical means a more plausible case may, perhaps, be made out, but the conditions under which this method would be feasible are rare. It might be practised under suitable control in those cases where an ungoverned sexual instinct leads to crimes against the person. Here it would probably prove advantageous, not only to society at large but also to the offender as removing him from the sway of impulses and obsessions which, besides being dangerous to those about him, are sources of misery to himself.

At the other extreme of opinion are the persons who see in the feeble-minded only channels for the outpourings of a lively emotionalism. Their aspiration is the moulding of defective minds to the

conventional pattern of thought and conduct to which they themselves endeavour to conform. It involves, as a necessary corollary, that the greater the mental abnormality, the greater the effort which should be made to correct it. But our social resources are limited, and from the standpoint of the national interest it is desirable that they should be invested where they are most likely to produce some return.

That the matter of dealing with the feeble-minded has not, so far, been managed in a business-like way, seems to be due in great part to its having been so generally left in the hands of women. It was, of course, a perfectly natural development that the care of those who, in many respects, remain children, should rest with the customary guardians of childhood. There were also such considerations as the catholicity of feminine sympathies, feminine patience with unpleasant and discouraging conditions, and, perhaps, though to mention it savours of anti-climax, the cheapness of feminine labour. So long as the scholastic interest is predominant this state of things is likely to continue. Thus in his evidence before the Royal Commission Dr. J. J. Findlay,[1] Professor of Education in the University of Manchester, said: "It may be taken for granted that although men (physicians and teachers both) may do in the future as in the past much of the work of research and of organisation, the daily task of training defectives will fall to women teachers." The trouble is that men have hitherto done so little "of

[1] J. J. Findlay, *Rep. of Roy. Comm. on the Feeble-Minded*, vol. 5, p. 249.

the work of research and organisation," and have accepted women's services as trainers without considering what purpose the training should be adapted to forward.

Some enlightenment on this point may be derived from a consideration of the way in which education seems to have evolved. We may suppose that the newly-appeared human animal would instruct his offspring in the means of satisfying the primitive needs of his day. Information as to the ways of escaping danger and of obtaining food, with perhaps some guidance in sexual matters, would be first imparted. It would then be realised by the teacher that the energies of the taught need not be wholly absorbed in satisfying the wants of the latter and he would endeavour to direct some portion of those energies into channels profitable to himself. A reverence for authority would have to be inculcated to replace the feeling of dependence on parents which the developing mind of the child would tend to outgrow, and an appeal to supernatural sanctions would be an obvious expedient for compelling that deference for which, on purely mundane grounds, there would be little apparent justification. With the establishment of extraneous social relations new obligations for both teacher and taught would arise and the scheme of education would require modification accordingly. As political interests predominated over personal ones there would be initiated two tendencies, one in the direction of society's depriving the parent of the option of educating and the other towards dictating the form which education should take.

The State is, indeed, gradually assuming towards individual members of society a position similar to that which we have attributed to the parents of an earlier age. It endeavours to control education in the interests of the individual and in its own interests, and it does not scruple to claim, in order to justify its action, familiarity with the laws which govern the universe. As yet it is not strong enough to ignore completely individual predilections. In this country, at any rate, the sentiment of nationality is not so robust as to lead to the willing sacrifice of immediate personal interests, and the iniquity of taxation, the immorality of learning to bear arms, and the indecency of applying physiological knowledge, still afford themes for eloquent protest; while religious teachers of all denominations are aggrieved because their particular conceptions of the eternal verities are not at once recognised as the only legitimate ones.

If the body politic is not to be subjected to perpetual disruptive strains and stresses, it must be founded on an equivalence of demands and obligations. Society should know nothing of rights and duties in the abstract: it should admit the claims of any individual only in so far as these are counterbalanced by services rendered. This principle applies to feeble-minded persons as to others, but the matter is complicated in this special case by the difficulty in the way of placing the issue clearly before both parties to the bargain. As a set-off to the charges which the community must bear on his account the mentally defective offers his capacity for labour and for engendering those pleasing

emotions of righteousness, which, whether they originate in the maternal instinct or in that of self-assertion are sources of gratification to our souls. If in both these respects the capacity of the feeble-minded person is small, so are his needs few, and if the return which he makes by affording opportunities for the practice of altruism is inadequate, the balance must be adjusted by getting more profitable work out of him. There is no inhumanity in this, for the things in his repertory which he can do best are the things which, from the social standpoint, he ought to do. That this fact is only now being recognised is due to the darkening of counsel which has resulted from leaving a biological problem to be solved by pedagogues and particularly by female pedagogues.

The case of the feeble-minded who do not, on account of their defect, become directly or indirectly a charge upon the public purse presents special features which alter the position.

"It is not intended," say the Commissioners, in the Preamble to their Recommendations, "that the maintenance at public expense of the mentally defective or epileptics not mentally defective should be extended to those who, either at their own cost or at that of their relatives or friends, can be otherwise suitably and sufficiently provided for." Society's interest in this group of persons is simply to make it relatively as large as possible by increasing the facilities for obtaining suitable and sufficient provision at such cost as falls within the means of the particular person or his relatives or friends. If the relatives or friends accept nothing from Society they need not consult its wishes, and they are at

liberty to arrange the lives of their feeble-minded dependents on any lines which are not actually anti-social. Training in accordance with the ordinary scholastic ideals may in such cases be legitimate enough, though, if the ordinary scholastic methods are employed, it may be productive of but little result.

B. The Method.

When a dozen eminent Commissioners have devoted nearly four years of earnest study and discussion to a subject it may reasonably be regarded as having been thrashed out as thoroughly as is practicable, and no personal predilections would justify a rejection of the conclusions reached even if they did not, as the Recommendations of the Royal Commission do, carry conviction to the minds of the most prejudiced. What follows will be largely an exposition of the views of the Commissioners with such comments, amplifications, and minor criticisms, as the writer's experience seems to warrant.

Stated concisely, the principles which in the view of the Commissioners should guide attempts to adjust the relations of the feeble-minded to the rest of the community are that : —

1. Suitable special protection of the feeble-minded should be provided by the State.

2. Not the poverty or the crime but the mental incapacity of the feeble-minded should supply the motive for the interference of the State.

Corollaries of these are the considerations that since feeble-mindedness is a lifelong condition the

protection afforded should be of lifelong duration; that the persons to be protected must first be identified; and that the machinery of protection would be most satisfactorily controlled by a central authority.

Special protection can only be provided by the establishment of appropriate institutions and the Commissioners discuss in their report the various expedients available. They speak with approval of the system of "boarding out" or family guardianship, when practised under suitable conditions, and they advocate the introduction of large farm colonies on the lines of those which are to be found in the United States and Canada.

"Boarding out" has the great merit of cheapness, but there is always the risk that in aiming at cheapness economy may be sacrificed. Thus against the fact that cases are being maintained at a low rate must be set the probability that the earning capacity of those cases is not being utilised to the full. It is not easy also to find the necessary combination of a good house and a good householder. A working man of the better class, for example, does not want an idiot always about the house, especially if he has children of his own, and anything like adequate inspection is likely to be resented. The risks that the feeble-minded person may injure himself or another, or may give way to drunkenness or sexual malpractices, naturally vary inversely as the supervision exercised over him and a check is given to scientific investigation if only unskilled observers are ordinarily at hand. Moreover, under the existing lunacy law the need for

periodical re-certification has proved an obstacle in practice.

In England the scope of "boarding out" is likely to be restricted except it be combined in some such way as mentioned below with the opening of industrial colonies. All the indications point to these latter as the most hopeful agencies in remedying the social ills for which the feeble-minded are responsible, although our experience of such establishments is, as yet, so slight that any action taken in providing them would be to a large extent experimental. The Commissioners were of opinion that a "farm colony in England would be of the greatest service both directly and indirectly," and as some enterprising local authority may be desirous of putting the matter to the test a little space may be devoted to a consideration of what is feasible in this regard.

Although the term "farm colony" is used by the Commissioners, what they had in mind would be better designated an "industrial colony," since other industries besides farming would be followed. The cases for which accommodation is needed, being those not at present under supervision, are generally those showing the slighter degrees of mental defect, and since such cases, whatever else they may lack, are likely to have a fair capacity for work the ideal of a self-supporting institution may be approached. The mutual disabilities which sane and insane persons impose and experience are largely a matter of elbow room and therefore the colony should be as far from the hives of human activity as is consistent with economical working. A "model

village" of special type seems to be what should be aimed at. In Fig. 22 is shown a plan for such a village, though of course many alterations in detail might be rendered necessary by the conformation of the ground selected, and with the help of the ensuing description the reader may be able to envisage the place as it would be in working order.

A site of 200 acres is required. Anywhere within easy reach of London the land would probably cost £100 per acre, but elsewhere this amount would cover also the cost of draining. There should be a good supply of water; preferably of such a character that it could be used for power generation, in which case the problem of lighting would incidentally be solved. By road, rail, river, or canal there should be convenient access to some commercial centre. The soil should be fertile and of a kind suitable for cultivation by manual labour. Experience at Alt-Scherbitz and elsewhere has shown how superfluous is the costly wall which usually surrounds institutions for those of unsound mind, and with inmates of the class now under consideration there would be even less need than in the case of an ordinary asylum for mural enclosure. The precautions necessary to prevent the escape of patients and to protect the property of the institution from theft can be carried out by less cumbrous means than the erection of barricades.

Accommodation is designed for 2000 of the feeble-minded and for the staff, say 200, who would be required to control them. The number 2000 is selected as representing the total beyond which

economy in capital expenditure is counteracted by increased cost of administration,

Such a collection of buildings as that shown could, probably, be provided at the cost of £100 per bed if due care were devoted to the selection of the site and to the elimination of superfluous architectural features. The East Harling and Ackworth reformatories, described in the Report of the Royal Commission, are examples of how much can be done with £100 if it be judiciously expended. Economy can be effected by proceeding gradually with the work of providing accommodation, admitting first such persons as can learn to render assistance in further preparation. Thus, if, to begin with, provision were made for sane epileptics, a number of comparatively skilled workers could be got together and their labours could be turned to account with much profit to the institution.

Failing any special indications as to the class to be provided for we may assume that the total will include 1000 males and 1000 females, each group being subdivided into, say :—

500 Children.

400 Adults ; including 40 of the immoral or intemperate type requiring special supervision.

50 Infirmary Cases.

50 Sane Epileptics.

These would be housed in separate buildings, arranged, as shown in the plan, in convenient proximity to the workshops and the administrative departments. The buildings would differ in detail according to the requirements of the different groups into which it might be found necessary

to divide the inmates. Since the plan given is only intended to embody a general idea no attempt is made to indicate these minor features.

For the staff there would be required a certain number of houses for married men, and suitable staff blocks for women. Cottages for the employees of subordinate rank should be of sufficient size to enable the occupier to take in as a lodger some unmarried officer or, in special circumstances, a patient. It would be necessary also to assign rooms in the patients' blocks to some of the attendants.

The controlling authority which, if the recommendations of the Royal Commission are adopted, would be a Statutory Committee of the County Council with co-opted members, of whom at least one would be a woman, might also with advantage be entrusted with powers which would enable it to sell or let on lease to persons not in its employ, but attracted to the site by business or other considerations, such land as might be suitable for the purpose; and to enter into contracts with such persons for the boarding out of patients. Further, it might appropriately supply and control those products of civilisation, the post-office, the police station, and the public-house, without which no community can be expected to be happy.

As head of the establishment would be installed a resident Director, preferably a medical man; for medical men, as they have frequently shown, are capable administrators, inspiring respect in their subordinates by their professional status and supplementing their technical knowledge of mental disease

by broad views of human nature. Such a Director, having been appointed with due deliberation by the Statutory Committee, should be allowed to direct. Committees are apt to lose sight of the fact that they are concerned rather with results than with methods and that the man on the spot, especially when he brings to bear upon his duties the experience born of years of service, will probably be able to deal single-handed with administrative details. Farming operations, in particular, cannot be carried on satisfactorily if at every stage of the cultivation of the soil, the purchase of stock, and the disposal of produce, a specific authorisation has to be obtained from a committee meeting only once a fortnight and perhaps failing to constitute a quorum at critical moments. The Director would maintain discipline by means of suitable rewards and punishments and it would probably be advisable to confer upon him the powers of a Justice of the Peace.

In many respects the staffing of a colony of the kind here described would differ from that of an ordinary asylum. The bulk of the colonists would be actual or potential workers and the chief purpose of the colony would be the utilisation of their labour. Immediately subordinate to the Director there would be the following officers each in charge of a special department.

A Senior Assistant Medical Officer.

A Steward.

A Craftsmaster.

A Craftsmistress.

And in addition to these there would be an officer,

not necessarily resident, who would make arrangements for the provision of religious instruction. To the officers just mentioned would be assigned duties appropriate to their several positions, as thus :

The Senior Assistant Medical Officer. He would in the absence of the Director assume the functions of that officer. Ordinarily he would have control of the medical treatment, including the nursing of the colonists, and he would be looked to for the development of that scientific aspect of feeble-mindedness which has hitherto been so greatly neglected. He would be assisted by

A Junior AssistantMedical Officer.

A Superintendent Nurse, supervising Charge and Ordinary Nurses.

Mortuary Attendants.

The Steward. Stated briefly the duties of the Steward would be to keep all books and accounts and produce them for inspection or audit when required ; to submit estimates for, purchase, receive, examine, and issue, all goods ; to conduct correspondence and supply information to duly authorised persons ; to receive and pay out all moneys ; to arrange for the admission, transfer, discharge, and interment of the colonists ; and to protect from theft, wanton destruction, or improper use the property of the colony. The officers in his department would include

An Assistant Steward.

Clerks.

Male and Female Store-keepers.

Store, Hall, and General Porters.

A Fire Brigade.

The Craftsmaster. This officer would be responsible for the control of all the male colonists who could be usefully employed. He would have charge of them both while they were at work and while they were at leisure and would endeavour, generally, so to order their lives as to make them happy and useful members of the community. His lieutenants would be

A Chief Industrial Attendant (Male), at the head of a staff of industrial trainers and ordinary attendants.

An Engineer with his subordinates.

A Farm Bailiff with the necessary farm and garden labourers.

The Craftsmistress. Many of the duties usually attached to the post of a matron would fall to this officer, but as nursing would not be one of them she would not require to have had special training in that art. She would hold in relation to the female colonists a position similar to that of the craftsmaster and would have under her

A Chief Industrial Attendant (Female), with industrial and ordinary attendants.

A Cook, with her helpers in the kitchen.

A Laundress, with her staff.

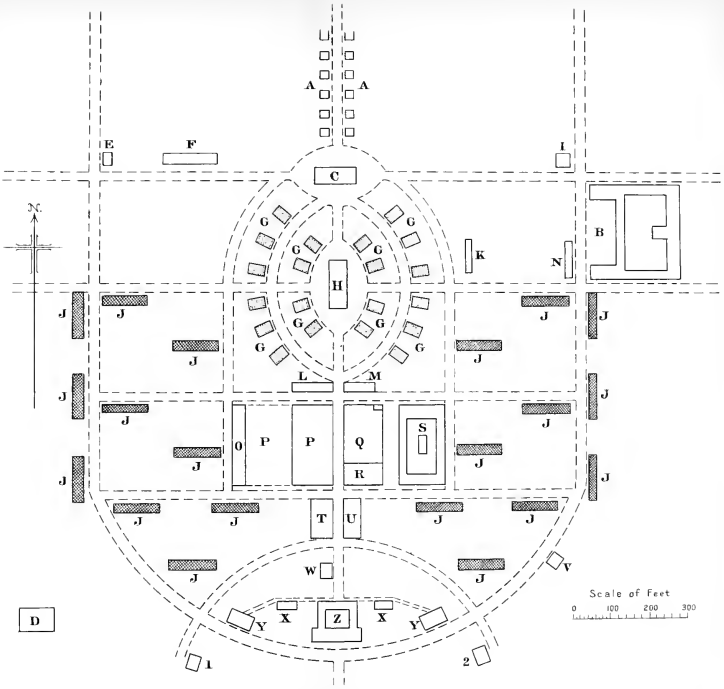
To enter in any detail into the question of the salaries which should be paid to the officers above mentioned is beyond the scope of this book, the more so since the matter is one which would be controlled to a large extent by local conditions. Taking the current rates of remuneration in poor law and asylum service as a guide the cash pay-

[Fig. 22.]

PLAN OF INDUSTRIAL COLONY FOR 2,000 PERSONS.

REFERENCE.

A. *Houses for Members of Subordinate Staff.*
B. *Farm Buildings.*
C. *Church.*
D. *Isolation Hospital.*
E. *House for Craftsmistress.*
F. *Female Staff Block.*
G. *Blocks for Children: each to accommodate 50.*
H. *Combined Training School and Recreation Hall.*
I. *House for Craftsmaster.*
J. *Blocks for Adult Patients. These might be planned on the lines of the blocks figured in the account of the Rev. H. W. Burden's Colony Scheme which appears in the Report of the Royal Comm. on the Feeble-Minded, vol. 5. Each block would hold 40 patients and cost approximately, £2,000.*
K. *Mortuary.*
L. *Fire Station.*
M. *Pumping Machinery.*
N. *Wood Shed.*
O. *Workshops for Women.*
P. *Laundry with Drying Ground.*
Q. *Engines; Boilers; Chimney Shaft; Water Tower.*
R. *Coal Store.*
S. *Workshops for Men.*
T. *Kitchen.*
U. *Steward's Stores.*
V. *Steward's House.*
W. *Nurses' House.*
X. *Receiving Wards.*
Y. *Blocks for Sane Epileptics.*
Z. *Administrative and Infirmary Block.*
1. *House for Senior Assistant Medical Officer.*
2. *House for Director.*



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ments to the principal officers might be somewhat as follows:

*Director	£600 per annum
*Senior Assistant Medical Officer .	350 „ „
Junior Assistant Medical Officer .	175 „ „
*Steward	250 „ „
*Craftsmaster . . .	250 „ „
Craftsmistress . . .	150 „ „

To which would be added various emoluments, *e.g.* unfurnished houses, with coals, light, and washing, in the case of those marked with an asterisk, who would probably be married, and furnished quarters with rations, etc., for the other two.

It will be noted that no provision in the way of school teachers of the ordinary type is made. Such elementary instruction in reading, writing, and arithmetic as would be required would be given by the attendants in charge of the colonists. To have the school life and the home life under separate control not only adds to the difficulties of administration, but introduces into the training a discontinuity which embarrasses the feeble-minded person.

The Obtaining of Control.

Adequate control and supervision are the urgent needs of the feeble-minded and in order that these may be supplied there must be some interference with the "liberty of the subject." When this is effected by private individuals in regard to those having a familiar relation to them, the public conscience is not touched and no difficulty arises, but it is otherwise when society at large takes action. This is in no way surprising because there is involved in it an antagonism between the stronger and more

primitive instincts of family life and the weaker secondary tendencies which bind separate families into a community. Private enterprise has provided sundry schools, homes, asylums, and kindred institutions for the feeble-minded and, under the existing law, these can be utilised by anybody who is prepared to pay for the privilege ; such legal sanction for detention as is found necessary being afforded by the Idiots Act of 1886.

When, however, there comes into the question the exercise of compulsion by the State, the matter assumes quite another aspect. Two categories of cases may be recognised, according as the intervention of the State does or does not involve pauperism on the part of the recipients of State aid.

(A) Taking the latter category first, we find that under the Elementary Education (Defective and Epileptic Children) Act, 1899, modified by the amending Act of 1903, education authorities *may* make a certain limited provision for the feeble-minded. The limitations are in part directly imposed by the Act and in part are due to practical difficulties in working it. Their effect may be thus summarised :—

1. The supervision is restricted to school hours, except in the few instances in which boarding houses have been established.

2. The Act applies only to such children as are between the ages of seven and sixteen years. Of the two classes named, the "defective" includes only those who " not being imbecile and not merely dull and backward are by reason of mental or physical defect incapable of receiving proper benefit from the instruction in the ordinary public elementary schools

but are not incapable by reason of such defect of receiving benefit from instruction in such special classes or schools as are in this Act mentioned"; while the "epileptic" comprises those who "not being idiots or imbeciles are unfit by reason of severe epilepsy to attend the ordinary public elementary schools."

3. The necessity of distinguishing the forms of mental disorder referred to in paragraph two opens up the way for disputes as to certification in which the medical officer of the education authority, unattached medical practitioners, the parents of the child, and the magistrate to whom appeal is eventually made, join. Messrs Garbutt and Crowley,[1] in their evidence before the Royal Commission, noted the objections raised by parents who think their child mentally sound, or who do not want it to attend the "Silly School," or who want it to go to work, or who are alarmed by the formalities of admission to the special school and by the number of persons present to carry them out.

4. Minor difficulties are the religious question, the distance of the special school from the homes of the children, and the supply of teachers.

(B) The machinery for dealing with feeble-minded persons of the pauper class is as intricate as it is ineffective. Guardians of the poor may, under certain conditions, utilise the provisions of the Idiots Act, 1886, in obtaining for such idiots and imbeciles as are "capable of deriving benefit from the treatment to be received" the necessary care and control, but it is questionable whether the detention authorised could be maintained in opposition to the wishes

[1] Garbutt and Crowley, *Rep. of Roy. Comm.*, vol. 2, p. 121.

of the parent, guardian, or other approved person who took the initiative in procuring it. The accommodation available is also too scanty and too expensive to meet the public needs.

When the degree of idiocy or imbecility is sufficiently marked to justify the institution of proceedings under Section 24 of the Lunacy Act, 1890, which relates to "lunatics in workhouses," there is, on theoretical grounds, no particular difficulty, but, in practice, the procedure is very cumbrous. The case may reach the workhouse either by transfer from an asylum under Sections 25 and 26 of the Act, or directly. A perusal of Section 24 will show that for permanent detention in the workhouse there is necessary,

> "an order under the hand of a justice having jurisdiction in the place where the workhouse is situate,"

which order

> "may be made upon the application of a relieving officer of the union to which the workhouse belongs supported by a medical certificate under the hand of a medical practitioner not being an officer of the workhouse and by the certificate under the hand of the medical officer of the workhouse hereinbefore mentioned."

Two medical certificates, respectively, in Forms 8 and 10 in the Schedule to the Act, are thus apparently required, but the number is really three, for Form 11, according to which the justice makes his order, winds up with the words

> "and, if the workhouse medical officer shall certify it to be necessary to detain the said A.B. as a patient in your workhouse,"

and the law officers of the Crown have given it as their opinion that

> "the certificate must be obtained before any detention against the will of the patient takes place."

The Commissioners in Lunacy do not regard the order in which the two medical certificates mentioned in Section 24 (4) are given as of any importance, but it may be noted that whereas the certificate given by the workhouse medical officer is alone sufficient authority for detaining the patient for not more than 14 days, that given by the outside practitioner has not the same effect. A correct chronological relation between the justice's order and the certificates and statement of particulars upon which it is based is however essential to the validity of the first-named document. The words "not being an officer of the workhouse" have given rise to a good many difficulties: thus the Commissioners in Lunacy have had occasion to decide that "a member of a board of guardians is not an officer of the workhouse within the meaning of Section 24 (4) of the Lunacy Act, 1890." It is curious that no fee is payable to the medical officer of the workhouse under this section though he is entitled to one if he certifies the patient as suitable for detention in an asylum.

In London the position is complicated by the fact that the institutions referred to in the Lunacy Act of 1890 as "workhouses" are of two distinct kinds. There are, on the one hand, the ordinary "work-

houses" maintained by the separate boards of guardians and, on the other, the "asylums" maintained by the Metropolitan Asylums Board. The latter establishments do not receive patients directly from the outer world, but only through the ordinary workhouses or occasionally through other asylums. A special set of formalities to control this transfer has been devised by the Local Government Board, but since these formalities do not replace the procedure for detention under the Lunacy Act, 1890, this has to be utilised just as in the case of the provincial workhouses. The imposing *dossier* which accompanies a feeble-minded person to one of the "asylums" which, under the Metropolitan Poor Act, 1867, the Metropolitan Asylums Board has provided, includes, then, the following documents.

1. Application by relieving officer to a justice having jurisdiction in the place where the workhouse is situate for an order for the detention of the case in the workhouse of the parish or union to which he is chargeable.

2. Statement of particulars by the relieving officer to accompany the application.

3. Certificate by the medical officer of the workhouse under Section 24 of the Lunacy Act, 1890.

4. Certificate by an outside medical practitioner under the same section.

5. The medical certificate referred to in Form 11 of the Schedule to the Lunacy Act, 1890.

6. Order for detention made by the justice under Section 24.

7. Order for the admission of the patient to one of the asylums of the Metropolitan Asylums Board,

signed by the clerk to the guardians of the parish or union from which the patient proceeds.

8. Certificate by a medical officer of the parish or union to which the patient is chargeable, to the effect that the patient is "a chronic and harmless lunatic, idiot, or imbecile" suitable, and physically fit for removal. This certificate differs in several respects from the certificate referred to in paragraph 3 *supra*, though its general purport is the same, and it is usually given by the same medical officer. The chief difference seems to be that it may include "facts communicated by others."

9. A report "signed by the chairman or vice-chairman of the board of guardians of the parish or union to which the pauper is chargeable or by some member of the visiting committee of such board of guardians."

10. A second medical certificate as to the patient's bodily condition is frequently necessary for the following reasons. The admission order mentioned in paragraph 7 *supra*, is, according to the Order of the Local Government Board of Feb. 10th, 1875, which regulates admissions to the asylums here considered, to be signed by the clerk by direction of the board of guardians and it is further laid down that "such direction shall not be given until the certificate and report above mentioned (cf. 8 and 9 *supra*) have been laid before the board of guardians." The medical certificate must, therefore, be anterior in date to the admission order, and, as this is available for seven days, it sometimes happens that the statement of the medical officer as to the patient's physical fitness for removal has been

made so long before the removal to the asylum actually takes place as to afford no satisfactory evidence about the patient's condition at that time. In the case of children admitted to "the Asylum for Children at Darenth" the admission order is available for fourteen days and the force of the objection just noted, to having the medical certificate as to fitness for removal given several days before such removal, is recognised by the Local Government Board, which, by an Order dated May 5th, 1890, requires that the certificate should be given on the day of the removal or on the day immediately preceding.

Since December, 1907, the Metropolitan Asylums Board has been able to admit into its asylums patients at any age above 3 years. Such cases as do not appear to require certification under Section 24 of the Lunacy Act, 1890, are received into certain homes and schools which are under the control of the Board, but in which detention is not authorised. These last mentioned cases, if received before reaching the age of 16 years, remain until they are 21. Detention is, however, of the essence of control and it may be of interest to note briefly what authority outside the purview of the Lunacy Act, 1890, is available for the purpose. The detention of a lunatic is said to be justifiable at common law if necessary for his safety and the safety of others. For the rest, feeble-minded persons are on the same footing as ordinary persons. Guardians of the poor have limited powers under :—

(1) The Children Act, 1908. (8 Edw. 7, c. 67.) Parts 2, 4, and 5. This Act repeals much of the Prevention of Cruelty to Children Act, 1904.

(2) The Pauper Inmates Discharge and Regulation Act, 1871. (34 and 35 Vict. c. 108.)

(3) The Poor Law Act, 1899. (62 and 63 Vict. c. 37.)

(4) Art. 115 of the General Consolidated Order, July 24th, 1847.[1]

The sum total of these falls far short of the needs of the position.

In order to simplify the procedure, the Royal Commission on the Feeble-Minded have made a series of Recommendations which they, and others, hope to see embodied in an Act of Parliament. These Recommendations are set out at length in vol. 8 of their Report, but it will be convenient to give here the gist of such of them as apply to the question of detention. By eliminating the word "pauper" and replacing the word "lunatic" by the words "mentally defective person" in sundry sections of the Lunacy Act, 1890, the scope of that measure would be largely increased with a minimum of disturbance of the existing machinery: important results would be that Sections 24 to 27, which apply to "workhouses," would become unnecessary: Section 206, which refers to lunatics cared for without charge by their friends or in some charitable establishment, would become applicable to the feeble-minded: Sections 4 to 8, dealing with Reception Orders on Petition, might be utilised: and Sections 11 to 23, which lay down the procedure for obtaining Urgency and Summary Reception Orders, would become available. Similarly, it is proposed to extend the provisions of the Idiots Act, 1886, so as to

[1] *v.* Notes in Glen's *Poor Law Orders*, 1898, p. 312.

cover, without limit of age, seven of the nine classes into which the Commissioners divide "mentally defective" persons. These 7 classes are "Idiots"; "Imbeciles"; "the Feeble-Minded": "Moral Imbeciles"; and mentally defective persons who are "Epileptics," "Inebriates," or "Deaf and Dumb, or Blind," the remaining two classes, to be dealt with under the revised Lunacy Act of 1890, being "persons of unsound mind" and "persons mentally infirm." Mentally Defective and Epileptic children, as defined by the Elementary Education (Defective and Epileptic Children) Act, 1899, would no longer be affected by that statute, but ample powers for dealing with them would be assigned to the local authority. Finally, Recommendations are made as to the control of mentally defective criminals and inebriates and of epileptics not mentally defective.

The Procedure on Admission.

Having obtained control of the feeble-minded individual, we are confronted with the problem of deciding the use to which he shall be put, the ideal being, as already indicated, such employment as shall be congenial to him and profitable to society. To this end it is desirable that the individual concerned should be examined with some thoroughness, not with a view to bolstering up some obsolete theory of etiology, but in order to learn the nature and extent of his capabilities. This examination will appropriately embrace the customary two sets of conditions: those bearing on the person's

previous history and those relating to his present state.

The information respecting the former would be best contributed by the medical man who certified the case as suitable for admission. Being brought into immediate contact with the patient's environment, he is in a much better position to record such features of it as are noteworthy than is the medical officer at an asylum, perhaps miles away, whose sole means of eliciting facts is the questioning of untrustworthy relatives. This principle is acted upon in various parts of Germany, where the "Kreisarzt" furnishes, by means of a series of "Arztliches Gutachten," ample particulars of the cases he certifies. It is proposed by the Royal Commission that there should be appointed by each local authority a special advisory medical officer and a sufficient number of "certifying medical practitioners" so that the method suggested would be feasible. The record should be arranged in such a form that it can be filed without transcription into "case books," such transcription involving much clerical labour of an unprofitable sort which usually devolves upon the medical officers of the institution into which the case is received. It does not appear that anything is gained by having the enquiries made and the results of them recorded according to a set form : a wide discretion as to what is worth reporting may be given to the certifying practitioner. One of the points on which stress may, however, be laid, in view of the uncertainty surrounding it, is the family history in so far as this bears upon the presumed inheritance of the mental defect. As a

convenient means of registering facts in this connection the form shown in Figs. 23 and 24 is

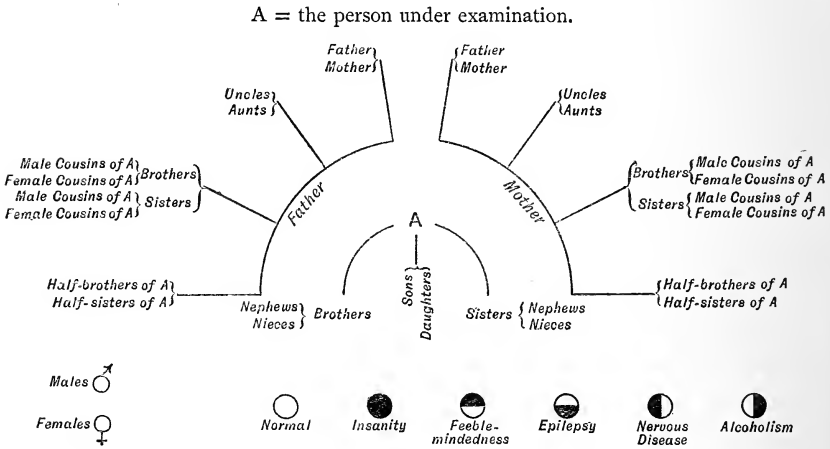


FIG. 23.

A numeral before the symbol, *e.g.* 3♀, indicates the number conforming to a particular type; in the example given, 3 epileptic females of the same degree of relationship to *A*.

Only those persons in regard to whom reliable information is obtainable are inserted.

The sign ⊕ indicates that reference should be made to a marginal note.

recommended. Fig. 23 is a key diagram showing the relationships which can be indicated and the

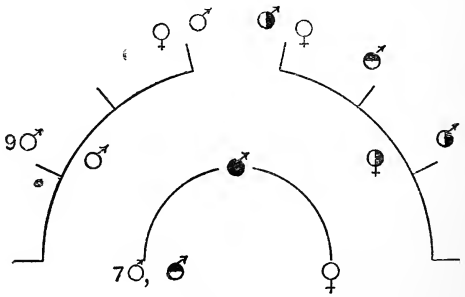


FIG. 24.

symbols which are employed, while Fig. 24 shows an actual family history recorded with the help of

the diagram. It is also desirable to ascertain, as the writer believes is done at Earlswood Asylum, whether the census return relating to the patient was properly filled up.

Ignoring for the moment the consideration that all the characters capable of investigation have, presumably, a physical basis, we may follow the usual convention which distinguishes between physical and mental attributes and divide the examination on admission into two parts, one dealing with the former group and the other with the latter.

1. *Examination of the physical condition.*

This serves several purposes, *e.g.*:

(*a*) It discloses any evidence of neglect or ill-treatment.

(*b*) It gives opportunity for the detection of any conditions, *e.g.*, infectious disease, which would make rejection necessary.

(*c*) It supplies data for subsequent identification in case of escape.

(*d*) It affords information as to the nature and amount of the work which may properly be demanded.

The examination may be conducted on the ordinary lines familiar to medical men. In order to save time and labour line diagrams of the various parts of the body may be employed freely, in conjunction with the customary abbreviations and signs. The notes may be conveniently made on the back of a card bearing a stereoscopic portrait of the case, the portraits being filed in accordance with one of the systems now in vogue.

(2) *Examination of the mental condition.*

Motives of economy are likely to prevent the provision in working colonies of an elaborate equipment for pursuing psycho-physiological methods in the examination of the residents. Moreover, in the present state of our knowledge, the results yielded by reaction time experiments; the exact determination of differences in visual, auditory, or tactile sensibility; or the measurement of emotional reactions; have no immediate applicability to social problems and the collection of them must be left in the hands of persons not primarily concerned with administrative details.

It is necessary, however, to obtain such a familiarity with the mental state of the defective person as will enable us to place him under the most favourable conditions for profitable development, and this is done by asking him questions and inviting him to perform sundry exercises. A certain discretion must be displayed in these procedures in order to obtain information of value. In the first place allowance must be made for the examinee's opportunities of acquiring knowledge. Thus a set of questions suitable for testing the intelligence of a country-bred child might give very misleading results if employed for one who had never previously left a London slum. Then it must be remembered that people whose mental gifts are up to, or above, the average may be unobservant or "absent-minded" and may consequently fail to answer correctly simple questions. It is a common practice to test the intelligence of a child by asking it to name the day of the month or describe what it had

for dinner on the previous day, questions which, on occasion, the examiner himself would probably fail to answer off-hand. It is advisable also to avoid questions which admit of only a limited choice of answers, since the less scope there is in this respect the greater is the chance that the right answer may be given by accident. If one tells a child to pick up one of two coloured beads lying before him he may easily select the right one even though colour-blind. In the performance of exercises, too, the opposing effects of practice and fatigue must be duly set off against each other.

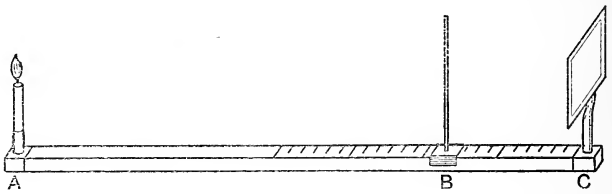
The following scheme is designed to elicit such general information as to the capabilities of a feeble-minded person as will enable the examiner to classify him with sufficient accuracy for the purposes of an industrial colony. Many of the questions and exercises could doubtless be replaced by others equally serviceable, but it is desirable to stick as far as possible to one system in order to facilitate comparison and the compiling of the necessary statistics. Further, since mind must be regarded not as a fixed conglomerate of the elements which, in the first chapter, we believed ourselves to have discovered in it, but rather as a flowing stream of ever-varying constitution, we cannot, in fact, cut it up into the various sections enumerated below, although it is convenient to gather together the data obtained under the different headings there mentioned.

(A) Sensitiveness to stimulation.

The various senses may be tested thus.—

(1) Sight.

(*a*) Light perception:— Bring up gradually behind a screen of ground glass, or of ordinary glass covered with translucent paper, lighted from behind, some object of simple outline, *e. g.* a pencil, and note the distance between object and screen at which the shadow is detected. An apparatus consisting of a graduated rod along which the object can slide between the fixed screen and the source of light, as in Fig. 25, can be constructed at trifling cost.



A. Source of Light. *B.* Rod on sliding base. *C.* Screen.

FIG. 25.—APPARATUS FOR TESTING ACUITY OF PERCEPTION OF LIGHT.

(*b*) Distance of distinct vision. The ordinary test-types can be employed for children who know their letters; for others some familiar and attractive object, *e. g.* a piece of toffee or an orange, will be preferable.

(*c*) From a number of brightly coloured wooden beads let those of similar colour be sorted out.

(2) Hearing. Two tuning forks of different pitch are required. The person is asked if there is any difference between the sounds of them, and, one of them being sounded, he is to say when he ceases to hear it.

(3) Taste. Two powders one of starch mixed with a little saccharin and the other of starch with a little quinine sulphate are to be discriminated between.

(4) Smell. Fluids consisting the one of olive oil containing oil of cloves and the other of olive oil and oil of peppermint will serve.

(5) Cutaneous sensibility. Test reaction to temperature by tubes containing hot and cold water respectively; susceptibility to pain by pricking with a needle; touch by wooden blocks of different shapes, sizes, and degrees of superficial roughness; pressure by means of similar rubber balls, some empty, others solid or filled with a hard substance, *e.g.*, plaster.

(B) Attention.

The testing of the sense organs will have supplied much information in regard to this. Further evidence will be afforded by the subjoined exercises.

(1) Mix two packs of ordinary playing cards and note the time taken in sorting them out, (*a*) into two groups by the pattern on the back; (*b*) into suits; (*c*) into cards of the same denomination.

(2) Bourdon's Method. Hand to the person a piece of printed matter and tell him to underline or otherwise mark all the examples of a particular letter present. The letter "n" which is likely to be mistaken for "u" is perhaps the most suitable for the purpose. Note the number of mistakes and the time taken.

(3) Kraepelin's Method. Numerals printed in columns are added up in pairs, the time taken to complete a certain number being noted. Suitable sheets of figures are published by the Universitäts-Buchdruckerei von J. Hörning, of Heidelberg, and can be obtained at the cost of a few pence.

(C) Memory.

(1) Method of Ebbinghaus. A number, 6 to 12, of disconnected monosyllabic words is read by or to the person until it can be repeated without mistake. The number of readings necessary for learning will be a measure of the memory, as will also be the amount forgotten after an interval.

(2) Copying from memory Ziehen's 5-angled figure (v. Fig. 26).

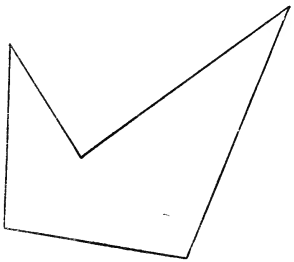


FIG. 26.—ZIEHEN'S 5-ANGLED FIGURE.

Note that the base-line is not horizontal, and that the sides and angles are all unequal. (From Ziehen's *Die Prinzipien und Methoden der Intelligenz-prüfung*, 1908.)

(3) Description from memory of the furniture in the room where the examination is taking place.

(4) Familiar articles are shown and questions are asked about their names and uses. For the lowest grades a spoon is suitable, while for patients of somewhat greater intelligence an article of clothing, a coin, a clock, a key, and a compass constitute a convenient ascending series.

(5) Questions are asked about matters of common knowledge, *e.g.*:

What is the day of the week, the month, the season, the year, the century?

What is the name of the King, your own country, some other country?

What things are used in washing, cooking, mending?

What is to be seen on a farm, in a street, at a railway station?

(D) Reasoning.

Such tests as the following may be employed.

(1) Untie a knot of simple design.

(2) Put on a coat of which the sleeves have been turned inside out.

(3) Explain purport of a picture post-card and fit together the portions of it when it has been cut up.

(4) Identify objects from drawings showing different degrees of detail. The simple figures designed by Heilbronner, one set of which is shown in the accompanying illustration (Fig. 27), will

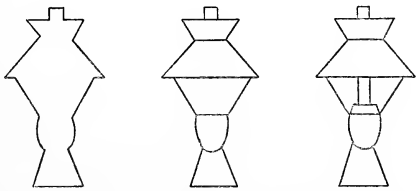


FIG. 27.—EXAMPLES OF HEILBRONNER'S FIGURES.

These particular ones are taken from Cimbal's *Taschenbuch*, but a variety of others on the same lines are given in Heilbronner's original paper, "Zur klinisch-psychologischen Untersuchungstechnik," in *Monatssch. f. Psych. u. Neur.*, Bd. 17, 1905.

serve for cases of low capacity; for more intelligent persons a series of photographs of some scene showing some feature with gradually increasing clearness is a convenient device.

(5) Supply a missing word. The cards designed

by Miss Mason for instruction in the art of reading may be utilised for the purpose.[1]

(6) Explain the purpose of some unfamiliar object.

(7) Describe common dangers and the way of avoiding them.

(E) Morals.

(1) Instances of virtuous and vicious practices are to be recognised and named.

(2) Inquiry is to be made as to the person's ideals.

Instinctive and emotional activities, habits, and powers of work cannot be thoroughly investigated at the first sitting. A note in regard to them may be made at the expiration of, say, one month from admission.

The Training to be Given.

"Education" says Professor J. Sully[2] "is an art and as such needs to have a clear idea of its end. We cannot begin to educate intelligently until we know what we are aiming at." The end is, however, "plainly something large and complex" and to define it we must have recourse to Ethics, Sociology, Logic, Æsthetics, and Psychology. Even when it is defined our approach to it can only be asymptotical, for it is undergoing an evolution which must render our pursuit of it interminable. So far as it is capable of exact statement our ideal is the "intelligent, refined and good person." Now for the

[1] Published at 56 Romola Road, Herne Hill, S.E.

[2] J. Sully, *The Teacher's Handbook of Psychology*, 1909, p. 11.

realisation of this ideal there is necessary at least a normal capacity for development, which, *ex hypothesi*, the feeble-minded individual has not. To some extent feeble-mindedness appears to be a reversion, though opinions differ as to the degree to which this is the case. The evolution of the individual follows that of the race sufficiently closely to lead us to expect that if a simple failure of development were the cause of idiocy we should find more marked resemblances than in fact exist between idiots on the one hand and savages or the lower animals on the other in respect of mental capacity. But the parallelism is close enough to suggest that the fields of activity—economic or moral—open to the feeble-minded will correspond to those of living beings at the various stages to which retrogression has occurred and that it is consequently idle to attempt to reach the standard set by Professor Sully. Obviously, then, as we must cut our coat according to our cloth, a more modest conception of the end in view must be accepted. Our aim must be to provide the feeble-minded person, in so far as he is capable of receiving them, with a fund of ideas of such a character that the exercise of his limited capacity for associating them will result in the production of activities as little detrimental to the interests of society as is possible.

Two distinct ideals, which may be designated, respectively, the ornamental and the useful, are met with, and the former is the one which in the past teachers have usually kept before them and have set their course by. The preliminary steps in training will, however, be the same whichever line is to be

ultimately followed. They may be thus summarised.

(1) Procedures for attracting and retaining the attention of the pupil. Without these no progress is possible, and failure at this stage denotes that the case is unimprovable. It seems probable that the mentally defective, like normal persons, belong to different ideational types—visual, auditory, kinæsthetic, etc., and the best results are therefore likely to be obtained by stimulating that part of the sensory apparatus which is of chief importance for the initiation of mental processes.

(2) Exercise of the sense-organs and of the mechanism of memory. It is a moot point whether, strictly speaking, any development of the senses or of the memory can take place as a result of such exercise. Acuteness of sensibility and the capacity for reproducing ideas are probably dependent on innate, or as Dr. Archdall Reid would have it, nutritional conditions of the germ-plasm which are only modifiable by use in so far as use affords a field for their expression. Thus a person may learn to distinguish between sights or sounds which at first were alike to him not because his visual or auditory acuity has increased but because of an alteration in the circumstances attending the perception of them; and he may acquire a larger store of facts not because his memory has improved but because the facts have been presented in such a way as to link up with the ideas already present in his mind and so come within the scope of the laws governing the association of ideas. The procedure for improving sensation is, in the main, an application of the

principle of contrast, while in the case of the memory rhythm is largely utilised.

(3) Exercise of muscles. Voluntary control with co-ordination may be encouraged in three ways—by passive movement, by imitation, and by play. It should, as soon as practicable, be rendered purposive, *i.e.* the pupil should be taught to walk and to minister to his own wants. Incidentally, a check should be placed on bad habits by the acquisition of good ones. Various devices have been employed for teaching suitable movements, and apparatus on the lines of that used by Fränkel in cases of tabes has been suggested, but such measures call for a degree of intelligent co-operation on the part of the pupil which usually puts them out of court. Even the familiar walking-frame is condemned by Heller[1] who mentions a case in which a child walked with the aid of one for three years without learning to walk alone. For tuition in walking he advises that one person should lead the child by the hands while another places the feet in the proper positions from behind. The movements of conveying food to the mouth and of dressing and undressing are among the most important which a child has to learn, but the list can be indefinitely extended by the teacher in accordance with the necessities and the possibilities of each individual case.

(4) Object lessons. This generic term will include all the methods by which the pupil is taught to associate names and properties with things as a preliminary to using those things. It comprises the

[1] T. Heller, *Grundriss der Heilpädagogik*, 1904, p. 225.

distinguishing of objects as observed in nature, as figured in models, and as represented in pictures; the distinction of the properties of objects, *i.e.* their form, colour, size, material, and so on; the development of the concepts of time and space; and the use of signs as representing things.

(5) The development of speech by exercises in articulation, reading, and writing; and of the concept of number by exercises in arithmetic. This brings us to the parting of the ways and it becomes necessary to decide whether education is to proceed on conventional lines or whether utilitarian ideals are to prevail.

The arts popularly known as the "three Rs" require from their practitioners quite a high degree of intelligence and they are completely beyond the range of many feeble minds though teachers are slow to admit the fact. By employing devices for memorising it is possible to invest the mentally defective person with a pretence of erudition which may deceive the inexperienced observer but which will not bear a moment's critical investigation. Thus with the help of a rhythmic arrangement of the letters it is possible for an idiot child, after prolonged tuition, to repeat the alphabet. When prompted to display this accomplishment the child may recite in a sing-song manner :—

a′ b c′ d e′ f g′
h′ i j′ k l′ m–n–o p′
l′ m–n–o p′ q r′ s t′
u′ v w′ x y′ z′

but he will probably be unable to say what letter comes before or after another taken at random, or

what is the last letter, without running through the whole series. It may, perhaps, be questioned whether committing the alphabet to memory is the best preliminary to learning to read even in the case of normal children, but to regard the process as an end in itself is obviously futile. Taught in this way the idiot merely accepts the alphabet as a finished piece of mentation, not as a collection of tools by means of which new products of the mind are to be fashioned, and, since it has no application to the circumstances of his daily routine, he speedily forgets it. In a similar way an idiot who has learned to count up to ten with the aid of his fingers may be unable to say how many toes he has. He may be able to quote large sections of the multiplication table and yet not know how many beans there will be in five groups of five each, or be able to do the simplest problems in addition or subtraction.

It is not either a wise or a kind thing to deprive the developing mind of such mental nutriment as it can assimilate, but it is still less wise and kind to persist for years in a policy of stuffing indigestible data into a mind incapable of dealing with them. Quite a short time will suffice to make clear in any particular case the intellectual limitations which make progress on the ordinary scholastic lines impossible, and the attempt to make a silk purse out of a sow's ear should be promptly given up so that no time may be lost in discovering such aptitudes as may happen to exist.

The immediate purpose in teaching a child to read and write is to open up channels for conveying

instruction. Attempts on these lines proving unsuccessful one must employ the channels provided by the child's primitive impulses to imitate or to play, and correct ideas of conduct may be imparted by supplying correct models of behaviour for imitation and by suitably directing the movements of play. The case of the feeble-minded person is sufficiently similar to make these methods applicable to it also. Imitation, in particular, affords a means of supplying ideas of a useful kind. A mentally defective child sent out with a party engaged in picking up stones, or chopping wood, or dusting furniture, will readily join in the work and, being successively tried with duties involving more and more skill, will soon find a niche to suit him. Placed there patient and repeated demonstrations on the part of a sympathetic instructor may gradually convert him into a craftsman of quite surprising dexterity in the art of brush-making, basket-weaving, or cobbling.

In general the feeble-minded are willing workers, and if their work is so arranged as not to impose too prolonged a strain on their attention their industry leaves little to be desired. Many of them are open to the stimulus of emulation and many, too, take so great a pride in what they turn out that any evidence of its being appreciated supplies a strong inducement to continued efforts at improvement.

Almost all forms of manual labour are available for the feeble-minded, who, it must not be forgotten, embrace a great variety of mental types. The occupations usually followed are, for the males, farm-work, wood-chopping, the mending of boots,

chair-caning, basket-making, brush-making, mat-making, tailoring, painting, carpentry, book-binding, and printing; for the females needlework, laundry-work, and the making of the lighter kinds of mats, baskets, and brushes. For both sexes toy-making offers a field as yet practically unexploited in this country.

If for any reason, as in the case of children who are not and are not likely to become a charge on the community, it is deemed advisable to try to mould the feeble mind to the orthodox scholastic pattern a prolonged course of tuition in the rudiments of grammar, arithmetic, and social observances may be undertaken with a view to hiding, as completely as may be, the state of intellectual emptiness. Since society's demands in this respect are not high it may be possible to make a person with only a moderate degree of mental defect pass muster if expense is no object. In such cases the procedure will follow the same general lines as are adapted for normal children, advantage being taken of modern developments in the way of kindergarten methods. Every case must be treated on its merits, so that it is impossible to lay down a course of study of universal application. One element is, however, essential. It is the possession by the teacher of a strong but sympathetic disposition, so that the interest of the pupil may be aroused, his attention held, and his tendency to take up an attitude of opposition overborne. As evidence of technical skill on the part of the teacher such certificates as those of the National Froebel Union would be acceptable.

So far we have considered only the economic side

of the activities of the feeble-minded, but the moral aspect is of no less importance though one approaches it with fear and trembling. Religious training is universally regarded as an integral portion of the education of the feeble-minded, but little attempt is made to adapt it to the special circumstances. Feeble-minded persons include all grades up to the normal in intelligence, and it would seem then that a corresponding graduation of ethical teaching is called for. If we consider the diversity exhibited by persons reputed to be of sound mind as regards their manifestations of the religious sentiment, we find an inverse ratio between the development of the reasoning powers and the demonstrativeness of the form of religion which appeals. The appetite for signs and wonders diminishes as the mental horizon broadens: fervour no longer demands confirmatory miracles nor is conviction intensified by the banging of a big drum or the singing of a hymn out of tune. It seems a legitimate deduction from this line of argument that a progressive crudity should mark the ministrations provided for the mentally defective as one proceeds from the slighter degrees of imbecility into the deeps of idiocy.

Looking at the matter from the ethical standpoint McDougall[1] recognises four levels of conduct, which may be thus described:—

(1) Instinctive behaviour modified only by the influence of the pains and pleasures that are incidentally experienced.

(2) Operation of the instinctive impulses modified by the influence of rewards and punishments ad-

[1] W. McDougall, *An Introduction to Social Psychology.*

ministered more or less systematically by the social environment.

(3) Control in the main by the anticipation of social praise and blame.

(4) Regulation by an ideal of conduct which prompts to act as seems right, regardless of the praise or blame of the immediate social environment.

This highest plane is one which the feeble-minded cannot be expected to reach, and the religious teaching provided for them must be of a kind not appealing to non-existent powers of reasoning, but offering a scheme in which the relation of rewards to virtuous acts and of punishments to misdeeds is as direct as possible. At an early stage of development the promise of a dainty is the most potent influence for good, and the prospect of receiving a rap across the knuckles will have a greater deterrent effect than will the fear of incurring the wrath of the Almighty. Since sectarianism belongs to the fourth level it can have no place in the instruction of the feeble-minded, and there can consequently be no need to provide a whole set of teachers armed with different dogmas as part of the equipment of an industrial colony. The formal presentation of a feeble-minded person for reception into any church is a proceeding reflecting discredit both on the church and on the priest who adopts this reprehensible way of serving it.

The practice of assembling the feeble-minded for public worship has its merits. As Dr. Needham[1] has expressed it, "the absolute self-control which is requisite to be maintained by these people during

[1] *Rep. of Roy. Comm. on the Feeble-Minded*, vol. 2, Q. 15463.

an entertainment and during the chapel services is very important discipline in their treatment." Moreover, the people like to attend divine service since it provides a break in the monotony of their daily lives. There is here no question of religious enthusiasm, for the services are welcomed as heartily by the nominal opponents of the doctrines taught as by the professed supporters of them. Indeed, care has constantly to be exercised in an institution for the mentally defective to see that patients do not attend the services of some denomination other than that to which they are accredited, their tolerance in such matters not being shared by relatives and pastors. Much of the utility of the services is lost if they are made the occasion for disquisitions on abstruse tenets; they should rather be enlivened by music and pictures and confined to the exposition of those practical distinctions between right and wrong which are at the root of the social scheme and which are accepted by all denominations. Even in the use of pictures care must be exercised, for, as Heller[1] points out, the apparently innocent picture books of children may suggest undesirable ideas. Thus he thinks that the adventures of the naughty Frederick, as recorded in the familiar Struwelpeter chronicle, are calculated to excite sympathy with, rather than aversion from, mis-doing, since it is only towards the end of his immoral career that retribution overtakes the hero.

[1] T. Heller, *op. cit.*, p. 250.

Medical and Surgical Treatment.

Except in those comparatively rare cases, *e.g.*, cretinism and some traumatic conditions, in which the causation of mental defect is obvious and amenable to simple medical or surgical procedures, we are too much in the dark in regard to the etiology of feeble-mindedness to be able to attempt with any hope of success the repair of the damaged brain. Such indications for treatment as seem to be present have so far, owing to our limited knowledge, proved more misleading than helpful. Thus the operations of craniectomy in cases of microcephaly and of paracentesis in cases of hydrocephaly have proved valueless since the root of the trouble lies deeper than they can reach. Similarly in the case of drugs the indications for treatment are almost always too obscure to be intelligible. We have hitherto failed to interpret them correctly and the shots we have made have been wide of the mark. In view of the diversity which abnormalities of the brain exhibit it seems unreasonable to expect to discover any single remedial agent which shall be of universal application. On the other hand we need not take up the pessimistic attitude of some writers and accept it as a settled fact that we never shall be able to influence cerebral development favourably, even though the results achieved so far have been in the highest degree discouraging.

But although the cure of feeble-mindedness is, in the vast majority of cases, beyond our power, we can do a good deal in the way of patching up the

defective machinery so that its efficiency may be increased. On the surgical side the profitable field is chiefly that in which work the orthopædic surgeons. Paralysed limbs may have their deformities corrected and some degree of mobility imparted to them by means of tenotomy, transplantation of tendons, excisions of joints, nerve transference, and the like. In special cases operations of considerable magnitude, *e.g.*, Fœrster's excision of portions of the lumbar and sacral posterior nerve roots in cerebral diplegia, may be undertaken with advantage to the patient. The correction of optical and auditory defects, the removal of adenoids, attention to the teeth, and circumcision are other procedures which may be indicated. It must, however, be borne in mind that feeble-minded persons are not able to give the surgeon that assistance without which many otherwise desirable operations become inadmissible, and regard must be paid not only to the need for operation but also to the possibility of providing adequate after-care.

The scope of medical, as distinct from surgical, treatment is also restricted. Suitable feeding, the proper working of the excretory organs, the checking of outbursts of excitement, the combating of sleeplessness, all require attention. Many idiots have not wit enough to feed themselves and for this reason, or on account of the presence of palatal deformities or paralytic conditions of the muscles of the throat, have to be fed by an attendant. Others eat too fast or too indiscriminately if left to themselves, or involve themselves in strife by snatching food from their fellows. Want of con-

trol over the bowel and the bladder is a common trouble with them, and is met to a limited extent by education in habits of cleanliness, but more particularly by frequent changes of garments and the protection of the beds by means of waterproof sheeting. In large wards noisiness may be a source of great annoyance to other patients and may call for isolation of the case as far as is practicable. Some idiots scream or cry almost continuously, no doubt on account of suffering some discomfort which they are not able to explain. Before medicinal agents are resorted to in such cases it is well to try the effect of greater warmth and additional food. Undue restlessness and want of sleep will need to be treated by hypnotics. In the way of sedative drugs the best is paraldehyde in doses of m. xxx to ʒ j. Rarely is a larger dose called for, and it is always worth while to begin with the small one since that may prove quite sufficient. Paraldehyde is nasty, but this does not seem to trouble idiots very much; indeed some of them appear to like the drug.

Of special importance is the treatment of epilepsy. Perhaps because in many cases the seizures which occur among the feeble-minded have their origin in gross cerebral defect they are peculiarly insusceptible to medical treatment. A routine employment of bromide of potassium is not always advisable, indeed sulphate of magnesium will often prove more to the purpose. On occasion a powerful purgative such as croton oil is needed, and, though its effects are apt to be unpleasantly drastic, patients will sometimes ask for it owing to the relief it affords them from

states of acute irritability. In the status epilepticus, too, better results are likely to be obtained by keeping the bowels open and administering, by nasal tube if necessary, a liberal supply of nourishing liquid food than by poisoning the patient with large doses of chloral hydrate or opium. Constant supervision by night as well as by day is the first requirement in the care of epileptics. Fanciful procedures, such as the use of pillows stuffed with hay to prevent suffocation in case the subject turns over in a fit, are a poor substitute for watchfulness on the part of nurses and attendants.

On account of the success which has followed the employment, in cases of cretinism, of preparations of the thyroid gland they have been tried in many other forms of feeble-mindedness. The results obtained have not been particularly satisfactory. One meets even with old-standing cases of what is apparently cretinism which receive no obvious benefit from the drug. Some observers have described an amelioration in the condition of epileptics as due to the use of thyroid extract, but its efficacy in this respect is not universally admitted.

In the absence of conclusive data it is hard to say to what extent, if at all, the feeble-minded are more susceptible to infection than normal persons. Certainly diseases of an infectious character are rife among them when they are segregated, but this may be due not so much to a lack of natural immunity as to the difficulty of getting the cases to conform to sanitary laws. Apart from the state of the brain there is nothing particularly characteristic about the

forms of disease from which they suffer, but asylum dysentery and the chronic blepharitis which is so frequently associated with Mongolism are to some extent special to them. In tubercular disease of the lung the foci are apt to be more widely distributed through the organ than in the sane, thus adding to the difficulty of diagnosis, and tubercular ulceration of the small intestine is relatively common, apparently because the patients swallow their sputum instead of expectorating.

As on the surgical side the mental state places obstacles in the way both of examination and of treatment. The prognosis in ophthalmia, for example, cannot be regarded as good when the patient takes every opportunity of rubbing dirt into the eye, and it is of little use to prescribe a scanty liquid diet for an idiot suffering from enteric fever unless at the same time one takes measures to prevent his eating the bed-clothes.

There remains a factor of which the importance is apt to be overlooked. The wonders performed by medical and surgical art are rendered possible by the capacity for repair with which organisms are endowed. Like other manifestations of vitality, the processes of regeneration are under the influence of the nervous system, and while, in the normal person, the mode of operation of the *vis medicatrix naturæ* is obscure enough, the potentialities of a nervous apparatus which is out of gear are such as to baffle the ingenuity of the most acute mind.

INDEX

J

K

L

M

N

O

P

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