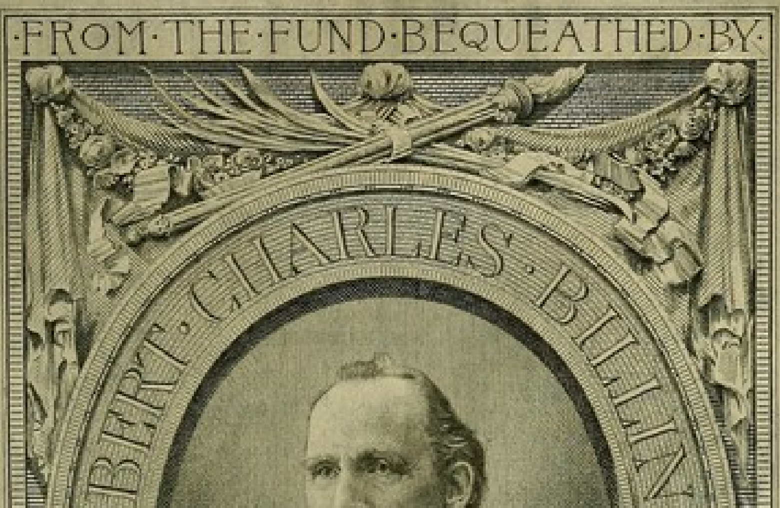

·FROM·THE·FUND·BEQUEATHED·BY·
1819·ROBERT·CHARLES·BILLINGS·1899
TO THE
·BOSTON·MEDICAL·LIBRARY·
Nº 8 THE FENWAY

DIFFERENCES

IN THE

NERVOUS ORGANISATION

OF

MAN AND WOMAN

DIFFERENCES

IN THE

NERVOUS ORGANISATION

OF

MAN AND WOMAN:

PHYSIOLOGICAL AND PATHOLOGICAL

BY

C

HARRY CAMPBELL

M.D., B.S. (LOND.)

MEMBER OF THE ROYAL COLLEGE OF PHYSICIANS; SENIOR ASSISTANT
PHYSICIAN AND PATHOLOGIST TO THE NORTH-WEST
LONDON HOSPITAL.

LONDON
H. K. LEWIS, 136 GOWER STREET
1891

PREFACE.

I HAVE attempted in this work to set forth the main differences—physiological and pathological—between the nervous organisations of man and woman. The pathological differences have been the chief subject of my inquiry, but to the better understanding of these it has been necessary to consider also the physiological differences, and this has led me somewhat far afield. I have had to go back to the very beginnings of organic evolution—to seek to discover how and why the sexes became separate, and to trace their subsequent deviation from one another; to examine, in short, into the whole question of the origin of sexual reproduction. And if it be objected that, following these lines, I have introduced much that is apparently foreign to my subject, I would urge that it is impossible to study any question from too many points of view, and that the wider our survey, the more thorough our knowledge and the deeper our insight are likely to be in the end.

The "Evolution of Sex" occupies Part I., and as this involved a critical exposition of Weismann's theory of Heredity, with particular reference to the inheritability of acquired characters, it is necessarily long. Apart, however, from the fact that a clear understanding on this head is essential to accurate conclusions as to the way in which man and woman came to differ in the past, and are likely to diverge still further from, or approach nearer to one another, in the future, the question of the inheritability of acquired characters is the most important pathological question of the day, and one that has not yet received from the pathologist the attention it demands. I have therefore felt justified in discussing it at some length, and I may here state that while I have regarded the question as still open, I yet, on the whole, decidedly incline to the view that characters acquired by the soma—the body—are not inherited.

Part II. is chiefly occupied with the pathological application of the conclusions arrived at in Part I., though a considerable space is devoted to the subject of the menstrual rhythm, which must ever remain one of absorbing interest to the physician.

Part III. treats of Psycho-physiology, some knowledge of which is necessary to the inquiry I have undertaken. The chief portion of this section is concerned with the will and its disorders, from the psycho-physiological point of view, a subject of much practical importance, inasmuch as the will plays a large part in the phenomena of disease. And at this point I feel I owe some apology to the professed psychologist for having ventured into those obscure regions which are peculiarly his own. Here, however, as elsewhere throughout the work, I have thought proper to advance my own views on doubtful questions. In dealing with matters of certainty a writer has only one course open to him—to state the ascertained facts; but where all or much is speculation, he should obtain sufficient mastery of the questions in dispute to be able to criticise the opinions of others regarding them, and to advance, it may be, views of his own; for even though these be wrong, they may stimulate thought and let in some unexpected light by which others may profit. In short, I conceive the duty of a writer on a subject such as the present is to be as little as possible a mere compiler, and as much as possible an independent thinker: to merely repeat, and blindly accept the opinions of others can do nothing to further knowledge, and is, moreover, a task dreary alike to author and to reader.

I have not considered the element of Race. Certain nervous differences between the sexes are probably more accentuated in some races than in others. While, for instance, women are, as a class, more emotional than men, it is possible that the men of primitive peoples are more emotional than the women of civilised communities. My remarks, in so far as they apply to people of the present age, must be taken to refer to those with whom I have been brought into personal contact, and these are chiefly the inhabitants of the British Isles.

But while race must modify the differences of the sexes as regards nervous organisation, its influence is confined chiefly, I believe, to superficial characters, the fundamental points of distinction obtaining all over the world. Every woman, of whatsoever colour or nationality, has probably a greater immunity than the man from gross lesions of the nervous system, and a greater tendency to recover from nervous diseases. Again, it is almost certain that all the world over, the woman is apt to suffer from certain nervous symptoms at the climacteric: and so, too, in regard to many other particulars.

I do not by any means claim to have exhausted my subject in this work. While writing I have found it broaden out in all directions—new lines of inquiry have continually suggested themselves, many of which have had to be abandoned owing to the bulk to which the work had already attained. My purpose has been rather to point the way—to indicate a method of investigating a subject than which there is nothing more interesting in all the wide field of medicine.

H. C.

LONDON, *July* 1891.

CONTENTS.

PART I.

THE EVOLUTION OF SEX.

PART II.

CHIEFLY CONCERNED WITH THE PATHOLOGICAL APPLICATION OF CONCLUSIONS ARRIVED AT IN PART I.

PART III.

PSYCHO-PHYSIOLOGICAL.

PART I.

THE EVOLUTION OF SEX.

CHAPTER I.

THE PHILOSOPHY OF SEXUAL REPRODUCTION.

General Remarks on Sexual Reproduction.—Among certain vegetable organisms almost every cell in the body is capable of reproducing the entire individual, and there are not wanting those who believe (*e.g.* Spencer, Nägeli) that in all multicellular organisms, animal as well as vegetable, every cell possesses this power in a greater or less degree. Be this as it may, in animal organisms only a limited number of cells is endowed with the *full* reproductive potentiality, certain cells being specially set apart for reproductive purposes. It occasionally happens that a single such cell is sufficient for reproduction (parthenogenesis), but, as a rule, two of them must co-operate: a cell derived from one organism unites with a cell derived from another, and from the blended mass the young embryo is developed. This is called "sexual" reproduction.

There are, as we shall presently see, good reasons for concluding that the main purpose of sexual reproduction (in the metazoa) is this union of cells derived from different organisms. Even in the case of hermaphrodites, where both the uniting reproductive cells are derived from the same organism, cross fertilisation seems to be the rule.

Sexual reproduction occurs among both (1) unicellular and (2) multicellular organisms. Among the latter the reproductive cells may be formed, *a*, independently of any specialised organ; or, *b*, from a tissue specialised for the purpose.

1. Sexual reproduction in unicellular organisms.—This may be dismissed with a word. Sexual reproduction is at any rate pre-shadowed by the occasional behaviour of unicellular organisms. Thus among the ciliated infusoria two individuals frequently unite, and such union, or 'conjugation,' has been shown by E. Maupas,[1] to be necessary to the continuation of the species. Without the occasional conjugation of individuals not closely related, reproduction, which for the most part takes place by simple division, comes to a standstill, the cells dwindle and degenerate, "until at last we get shapeless abortions incapable of living and reproducing themselves." But after conjugation there is renewed protoplasmic activity, and among many of the protozoa at least, the blended mass may be observed to break up into a number of new beings, reminding one of the segmentation of the ovum. In the one case the cells resulting from the conjugation separate, and form independent individuals; in the other, they remain together, and form the component cells of a single individual. The multicellular organism doubtless originated from the unicellular organism, by the cells resulting from the conjugation of individuals of the latter class remaining together instead of separating. The multicellularity thus attained probably conferred some benefit upon the individual, and was fixed by natural selection. Even at the present day the link between protozoa and metazoa may be recognised in the form of loose colonies of cells.

2. Sexual reproduction in multicellular organisms.—*a.* The reproductive cells derived from non-specialised tissues. In the loose colonies of cells just alluded to as bridging over the gulf between the unicellular and the multicellular organism, there are indications of special reproductive cells, but they are manifestly not formed from any specialised tissue. We have the first indication of distinct tissues in the sponges, the body in these consisting of an outer, middle, and inner layer, and the reproductive cells

[1] *Comptes Rendus*, 1886, 1887. "Archives de Zoologie Expérimentale," 1888.

being formed from any portion of the middle layer indifferently: that is, there is no specialised reproductive organ. *b.* The reproductive cells derived from specialised tissues. In the common fresh-water hydra, and in practically all the higher organisms, the reproductive cells are similarly formed from the middle layer of the body. Here, however, for the first time as we ascend the scale, we find them no longer formed indifferently from any part of this layer, but from special reproductive organs, termed ovaries and testes, developed in it.

The Two Kinds of Sex Cells and their Evolution.—Among unicellular organisms the conjugating cells are, to all appearances, alike; but among the multicellular, they are dimorphic. One class of cells, called ova, are comparatively large, sluggish, and well nourished; the other are smaller and more active, and are called spermatozoa. A distinct difference between the two cells which unite sexually may be detected even in the most primitive multicellular organisms—*e.g.*, the sponges, and this difference increases as the scale is ascended.

FIG. I.

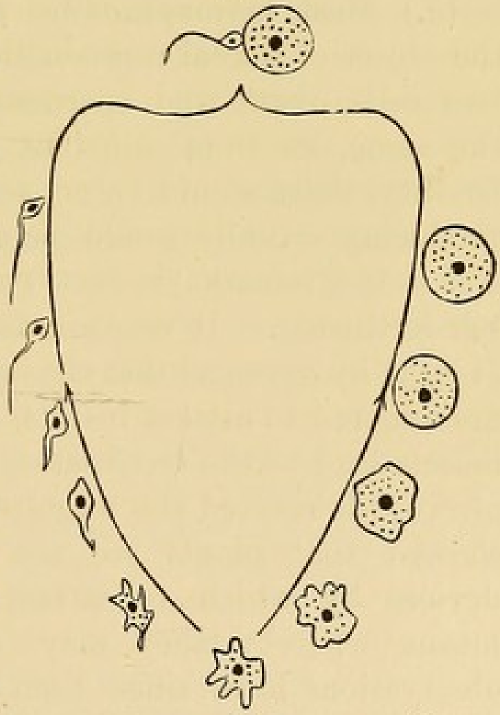


Diagram showing the divergence of ovum and spermatozoon from an undifferentiated amæboid type of cell. (Geddes and Thomson.)

The gradually increasing dimorphism of the reproductive cells is illustrated in the accompanying figure. Starting with the simple amæboid form, from which both sexual elements are derived, the two forms diverge —the one in the direction of increased passivity, the other in the direction of increased activity. Each cell, as thus differentiated, has (as Geddes and Thomson point out) its analogue among the protozoa: thus the spermatozoon is represented by the ciliated infusorium; the ovum, by the gregarines. In like manner the two cells have their analogue among the cells of multicellular organisms: the spermatozoa are represented by the familiar ciliated cells, by those lining the respiratory tract, for instance; and the ova, by such passive cells as fat cells.

The purpose of this dimorphism will be considered subsequently.

The Import of Sexual Reproduction.—The first important generalisation we may establish is the following:—1. One great purpose of sexual reproduction is the union of two cells, each of which is derived from a separate, and therefore unlike, organism. Three arguments may be advanced in favour of this proposition.

(*a.*) Most hermaphrodites require cross-fertilisation. If the object of sexual reproduction were merely the union of two cells, ovum and spermatozoon, whether derived from the same, or from different organisms, then, in all probability, there would be no separate sexes: all animals reproducing sexually would be self-fertilising hermaphrodites. Yet it is a remarkable fact that hermaphrodites are rarely self-fertilising. It was beautifully shown many years ago (1793) by Sprengel that the colours and structures of flowers are adapted to attract insects, and that the visits of these insects lead to the fertilisation of the flowers. Darwin long afterwards revived the forgotten discovery of Sprengel, and showed that plants are not only possessed of numerous devices by which to attract insects, but also of special means whereby they may avoid self-fertilisation. His observations have since been confirmed and extended by Müller and others, and though some biologists have recently contended that among plants self-fertilisation is not so rare as was supposed by Darwin, all are agreed that it seldom occurs among animals, in most of which it is indeed rendered impossible by the fact that the ova and spermatozoa mature at different times. Moreover, those animals in which it does occur are, with a few notable exceptions, sluggish or even fixed, as the land-snail and the flat worm; they do not, that is to say, show a high degree of vitality. Occasional self-fertilisation among animals need not surprise us, seeing that some ova are capable of developing, though unfertilised (parthenogenesis); nor should its occurrence in plants surprise us either, since in them the powers of asexual reproduction are great, and, for my own part, I cannot but regard the two forms of reproduction—*i.e.*, parthenogenesis and ordinary asexual reproduction, as closely allied.[1]

Although dichogamy in hermaphrodites—that is, the maturing of the two kinds of sex cells, ova and spermatozoa, at different times—is generally supposed to have for its purpose the prevention of self-fertilisation, yet it should here be observed that Geddes and Thomson deny this. They contend that such an explanation in terms of final advantage is not an explanation at all.[2] In their view dichogamy occurs through the inability of the same organism to produce at one and the same time cells so widely diverse as ova and spermatozoa. From which we are to conclude that if this disability did not exist there would be no such thing as cross-fertilisation. But if such be the case, why are plants provided—as they undoubtedly are—with special means to prevent self-fertilisation? Moreover the assump-

[1] All are agreed that parthenogenesis has degenerated from sexual reproduction. Is it possible that self-fertilising hermaphrodism has degenerated from a state of cross-fertilisation and is retrograding to a state of parthenogenesis? I do not, for a moment, suggest that all parthenogenesis has thus arisen, for in most cases of it the sexes are distinct; I say "in most" only, not in all, although it is always taught that parthenogenesis occurs exclusively among organisms in which the sexes are distinct. The eggs of purely female organisms alone are supposed to possess the power—has it been proved that the ova of hermaphrodites *always* require fertilisation?

[2] This objection is frequently raised in their very suggestive work on the "Evolution of Sex;" but surely if we have good reasons to conclude that a certain character capable of being evolved by natural selection is of advantage, is not the mere proof of its advantage indirectly an explanation?

tion that the same organism is incapable of producing the different types of cell at the same time does not seem to be supported by observed facts.

(*b.*) But there is a still more weighty argument in favour of our generalisation. Suppose that two individuals of the same species were exactly alike save for the fact that the one was male and the other female, then the sexual union of such individuals would practically be equivalent to the self-fertilisation of an hermaphrodite; and if there were not some fundamental physiological objection to self-fertilisation, the sexual union of two such individuals would be as favourable as that of two male individuals of the same species. But this is not the case. For the more alike one another the conjugating individuals are, the less successful are they in rearing healthy progeny, and *vice versâ.* Beyond all doubt, continued breeding in and in leads to degeneration, while an occasional cross with new blood leads to increased vigour in the offspring. "It is a great law of nature that all organic beings profit by an occasional cross with individuals *not closely* related to *them in blood,* and that, on the other hand, long-continued close interbreeding is injurious."[1]

The necessity for this unlikeness among sexually uniting organisms obtains even among the unicellular. Thus the infusoria do not conjugate with near relatives. Maupas isolated an infusorium and watched its division. By the time 215 generations had been produced the asexual division came to a standstill. Conjugation did not occur among any of the related infusoria, but by removing one of the organisms before division among them had ceased, and placing it in company with an unrelated infusorium of the same species, conjugation at once took place.

(*c.*) That one of the objects of sexual reproduction is the union of cells derived from separate and therefore unlike organisms, is further suggested by the fact that such union is a potent cause (and if Weismann's view of heredity be

[1] Charles Darwin. "Variations under Domestication," vol. ii. p. 94, second edition, revised.

correct, practically the sole cause) of natural variations without which there could be no organic evolution. To this subject we shall presently return.

(2.) A second point has now to be established. What purpose, it may be asked, is served by this union of cells derived from unlike organisms? Here we are brought face to face with the true mystery, the essential import, of sexual reproduction.

There can be little doubt that the conjugation of unicellular organisms is a foreshadowing of sexual reproduction. Rolph[1] has supposed that conjugation is a special form of nutrition, a mutual digestion of the conjugating cells. Geddes and Thomson,[2] following Rolph, maintain that, historically, "fertilisation is comparable to mutual digestion, and has originated from a nutritive want." Cienkowski[3] similarly regards conjugation as a form of assimilation; but to this Hensen has wisely objected, that in order that the conjugation should issue in increased assimilation, one of the organisms would have to be actually devoured by the other—*i.e.*, reduced to the liquid form. Weismann, while acknowledging the force of the objection, nevertheless thinks that the effect of conjugation "must be in one respect similar to that of nutrition and growth; the mass of the body and the quantity of forces contained in it undergo simultaneous increase."[4] All these writers however, lose sight of the fact that conjugation does not take place among closely related forms of unicellular organisms. If mere 'increase of the quantity of forces' be the purpose of conjugation, why should it not? I pass by the opinion of Van Beneden and Hensen, that conjugation (as well as fertilisation) is a rejuvenescence, since this is no explanation at all—it is mere word-juggling—and refer the reader to the views of Darwin and Spencer, who, many years ago, pointed out that the mystery of sexual repro-

1 "Biologische Probleme." Leipzig, 1882.
2 "The Evolution of Sex," p. 162.
"Arch. f. Mikros. Anat." ix. 3, 47, 1873.
Essays upon Heredity," p. 286.

duction was linked with the necessity which protoplasm is under of occasionally uniting with unlike protoplasm,[1] the object being to break the tendency to equilibrium manifested by all material aggregates.

Weismann contends that fertilisation in higher organisms has lost its original meaning—whatever that was—and that its present purpose is the production of natural variations on which natural selection may operate. The union of unlike organisms gives rise, as is well known, to new characters, for the offspring are not like either of the parents, but some sort of a mean between them. Weismann, believing, as he does, that acquired characters cannot be inherited, naturally lays great stress upon sexual reproduction as a cause of inheritable variations, and though variations may also arise from environmental influences operating upon the germinal matter, he does not, as we shall presently see, believe that these variations take any share in evolution. There can be little doubt that sexual reproduction plays an important part in organic evolution by furnishing the necessary variations for selection, and that this point had been somewhat overlooked before Weismann; but it is difficult to believe, with him, that the original significance of sexual reproduction has been lost, for in that case the union of closely related individuals among the higher forms should have only one disadvantage—namely, the non-production of natural variations, whereas it distinctly causes degeneration; and, contrariwise, the union of unlike organisms should only be of advantage in causing natural variations, whereas, as a matter of fact, it distinctly leads to increased vigour.

I have spent some little time in considering the import of sexual reproduction, because the necessity for the union of two reproductive cells, each derived from different organisms, has led to the separation of the sexes, and has thus left a deep mark upon the animal kingdom.

[1] "Variations under Domestication," p. 355. "Principles of Biology," vol. i. § 92.

The Nucleus the Essential Part of all Cells.—Fertilisation essentially the Union of Sperm Nucleus with Germ Nucleus.—The Differences in the Body of the Ovum and Spermatozoon Secondary, subserving only Secondary ends.— The dimorphism of ova and spermatozoa which, as we have seen, increases as the animal scale is ascended, has for its object certain functions. The first requisite of sexual reproduction is the bringing together of the two kinds of cells, and after they have been brought together, it is further necessary that the embryo resulting from their union shall be provided with a fit environment; for it is not to be supposed that the primitive embryo of a complex being, endowed as it is with such vast potentialities, is capable of growing and developing in a homogeneous environment; it requires one that is highly specialised. The parent organisms help towards the above ends, more especially in the higher forms of animal life; nevertheless, even among these the reproductive elements themselves take an important, and among the lower forms almost the sole, share in providing the requisites. Theoretically, each cell might take an equal part in furnishing the necessary environment for the new being, but evolution, which always works on lines of practical utility, has determined otherwise. What we find is that one cell, the spermatozoon, is modified with a view to movement; the other, the ovum, for the purpose of providing nutriment.

Before we proceed to describe the morphological characters answering to these two functions, it is to be noted that the nuclei of the reproductive cells contain the true reproductive substance. Practically all biologists, botanists and zoologists alike, now agree that the union of nucleus with nucleus constitutes the essential act of fertilisation, the nuclei containing the parental peculiarities which, in mutual conjunction, shape the structure of the new being to which they give origin. There are, however, those who, while admitting that the union of the nuclei constitutes the essential part of the process, are yet unwilling to deny to the body-plasm[1] of the ovum some share in transmitting hereditary tendencies. But the behaviour of the body-plasm after impregnation—a subject to be presently touched upon—as well as the fact that the structure and activities of the body are regulated in each cell by its nucleus, strongly suggests that it takes little or no part in shaping the destinies of the ovum.

It is not surprising that the nucleoplasm of ovum and spermatozoon contains the essential germinal material, seeing that the nucleus is now known to be the head or governing portion of the cell, capable of profoundly influencing the surrounding body-plasm. This view has been for some time held by Strasburger. He assumes that molecular stimuli proceed from the cell nucleus to the surrounding body-plasm, controlling its assimilation and mode of evolution; and that all cells, even the most unlike, differ in the first place merely in respect of their nuclei, the body-plasm being originally alike in all, and whatever specialisation it subsequently possesses being the outcome of nuclear activity. The important influence of the nucleus has been recently demonstrated by Gruber.[2] He has shown that, if the body-plasm of an infusorium be separated, it is incapable of regeneration, though still capable of living; but that, on the other hand, portions containing the nucleus always regenerate—a convincing proof, it would seem, that the nucleus is the head, the governing part of the cell.

Applying these principles to the reproductive cells, Weismann insists that the nucleoplasm of ovum and spermatozoon is made up of two different kinds of plasm—*a*, of the germ-plasm, which is "the bearer of hereditary tendencies;" and *b*, of the plasm, which causes the specialisations of the body-plasm (see Figs. 4 & 5)—that is, of 'ovogenetic' and 'spermogenetic' nucleoplasm respectively. His argument may be summed up thus: There are good

[1] It will be convenient to speak of the protoplasm of the nucleus as the nucleoplasm, and of the protoplasm of the rest of the cell as the body-plasm.

[2] A. Gruber, *Biologisches Centralblatt*, Bd. iv. No. 23, and v. No. 5.

grounds for believing that of every cell the nucleus is the essential part. This, taken in conjunction with the fact that fertilisation has been proved to be essentially the union of the sperm and germ nuclei, shows that these two contain the true germinal material. Inasmuch as the nucleus controls the destiny of the body-plasm, it must cause the specialisations in the body-plasm of the ovum and spermatozoon; but the nucleoplasm which does this cannot possibly be identical with the nucleoplasm which is the bearer of hereditary tendencies. Therefore there are two kinds of nucleoplasm—*a*, germ-plasm; *b*, ovogenetic (or spermogenetic) nucleoplasm. These *à priori* considerations are supported by the behaviour of the polar bodies.

The Relative Parts taken by the Sperm and Germ Nuclei in the Evolution of the New Being.—The sperm nucleus and the germ nucleus are, on an average, equal as bearers of hereditary tendencies. Not only does the nucleus contain the essential part of the reproductive cell, but each nucleus takes a more or less equal part in the evolution of the new being; in other words, the new being is a tolerably exact mean between the two parents. This is remarkable, seeing that, as Nägeli points out, the share taken by the father in providing material for the growing embryo is sometimes, as in the case of man, for instance, not more than about one hundred billionth part of that contributed by the mother.

This conclusion has been arrived at by a comparison of the offspring with the parents. It is found that, on the whole, the progeny do not take any more after one parent than the other. Some of the older writers considered that the ovum plays the more important part in development, the spermatozoon simply starting it, much as a spark explodes gunpowder, and this view would seem to be held by some even at the present day. Thus Claus[1] writes: "The ovum contains the material from which the new being rises;" the spermatozoon "contains the fertilising material

[1] "Textbook of Elementary Zoology," Lond. vol. i. p. 97.

. . . . and gives the *impulse to the development of the egg.*"[1]

The view more commonly held now, however, is that though each cell undoubtedly plays an important part in directing the formative processes of the embryo, yet the part played by each is different. Such is the view of Brooks.[2] He contends that the offspring of the stallion and the she-ass (hinny) differs from that of the he-ass and the mare (mule), in that the former is more like the horse, the latter like the ass; and he argues from this that the male parent plays the more important part in heredity. It certainly is a very noteworthy fact that the offspring is not in each case the same. Weismann attempts to minimise the importance of this fact by doubting if, in the above instance, the offspring *does* take more after the male parent. Whether it does or not, however, there seems little doubt that the hinny is different from the mule, and this certainly suggests that the two reproductive elements do not, on an average, transmit equally, but that there is something peculiar to each.[3]

Is there any Fundamental Distinction between Germ and Sperm?—The question as to the shares taken by the germ-plasm of the ovum and spermatozoon respectively in directing the formative processes of the new being to which they give origin, must be kept distinct from the further question: Are the two cells PHYSIOLOGICALLY equal? In Weismann's view, they *are*. According to him fertilisation is quantitative, not qualitative. "The physiological values of sperm and germ are equal. They are as 1 : 1." The need for fertilisation is merely the need for doubling the mass of the

[1] The writer may not have meant by this that the ovum alone is the bearer of hereditary tendencies, but the wording suggests this interpretation.

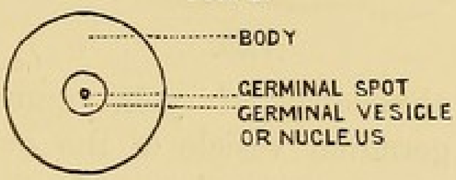
[2] W. K. Brooks. "The Law of Heredity: a Study of the Cause of Variation," &c., Baltimore, 1883.

[3] J. Hutchinson, like Weismann, maintains that the mule does not show any greater likeness to the horse than to the ass, and it would further appear that in America there is often a very great difficulty in distinguishing the mules from the hinnies. "Archives of Surgery," by Jonathan Hutchinson. April, 1890.

nucleus.[1] Rolph, Geddes, and others, however, contend that the sperm and germ cells have quite different physiological values, the differences involving not only the bodies of the cells, about which indeed there can be no dispute, but permeating the nuclei themselves, and therefore the essentially reproductive portions. In Geddes' view there are profound chemical and nutritive differences between the two, the one exercising a dynamical effect upon the other. At the same time Geddes does not deny to the male element a share in directing the formative processes of the embryo ; indeed, he would appear to incline to Brooks' view. I mention this fact because in perusing his book one is apt to think otherwise.

Nature and Specialisation of the Reproductive Cells.—A consideration of the structure of the ovum and spermatozoon bears out the view that the one cell is specialised with a view to the nourishment of the embryo, and the other for the purpose of effecting a union of the two cells. Throughout the entire animal kingdom each is formed on the same plan.

FIG. 2.



The ovum consists of a mass of naked protoplasm, containing in its centre the germinal vesicle, or nucleus, in the centre of which again is the germinal spot.

The spermatozoon (Fig. 3) is made up of a head and a tail. The former consists almost entirely of the nucleus, the protoplasm surrounding it being, in many cases, so diminutive that its very existence has been doubted.

[1] I think this view may be made clear by the following hypothetical case. If we suppose that the purpose of sexual reproduction is to secure the union of germ-plasms belonging to different organisms, and if we also suppose that each is equal, both physiologically and as a bearer of hereditary tendencies, then it would follow that the union of such portions of the germ-plasm of two ova or of two spermatozoa (belonging to different organisms) as in ordinary fertilisation share in the developmental process, would contain the potentialities of a new being. This appears to me a corollary of Weismann's hypothesis.

The body of the ovum is that part of it which has become modified with a view to nutrition, and the tail of the spermatozoon, which consists of a prolongation of the protoplasm surrounding the nucleus, is that part which has become modified with a view to motion. The body of the ovum contains the nutrient yolk granules (and in the case of some low forms of animal life—*e.g.*, hydra, chlorophyl granules also). The ovum has been well compared to a gland which does not expel its secretion. The quantity and distribution of the yolk granules vary in the ova of different animals. In birds the ovum, as is well known, attains enormous dimensions; in them the egg proper consists of the so-called yolk, the layer of albumen and the shell not belonging to the true egg, but being furnished by special secretory glands of the mother, and impregnation, should it occur, taking place before these layers are added. Now the great size of the "yolk" is due to the impregnation of the body of the ovum with a superabundance of yolk granules or nutrient material, the germinal vesicle of the ovum being, as in all ova, of very minute proportions. In the lowest forms of life, however, in which the early environment of the embryo is comparatively simple, and in which the young being can very soon shift for itself, as well as in those higher animals in which a relatively long time is spent in the maternal body (the nourishment for the embryo being derived directly from the mother's blood), the body of the ovum contains only a small quantity of yolk, and the entire cell is of microscopic proportions.

FIG. 3.

But while the ovum of different animals varies thus in size, the spermatozoon maintains in all cases the same, or very nearly the same, dimensions, the head being somewhat smaller than the germinal vesicle of the ovum. This is true of all animals which reproduce sexually; of such enormous organisms as the elephant and the whale as well as of the most primitive multicellular organisms.

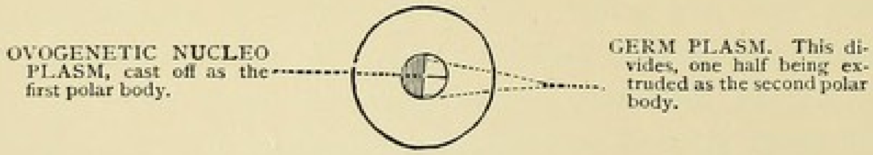
The specialisation of ovum and spermatozoon affords a good example of the division of labour; and it is just of the kind we might have expected. If the proposition were given us:—"Reproduction of complex organisms can only take place by the union of the cell-nucleus of one organism with that of another," some such specialisation as the above might, I believe, be *à priori* postulated.

CHAPTER II.

THE EVENTS IMMEDIATELY PRECEDING AND FOLLOWING UPON THE UNION OF THE SEX CELLS.—EXPLANATION OF HEREDITY.

Changes in the Germ and Sperm preparatory to Fertilisation.—Interpretation of the Polar Body Formation.—(*a*) The Germ. As the ovum approaches maturity the nucleus undergoes a profound internal change, and at the same time moves towards the periphery. It then divides, one half, together with some body-protoplasm, being extruded in the form of the first 'polar' body (Fig. 4). In this way, according to Weismann, the ovum gets rid of its superfluous

FIG. 4.



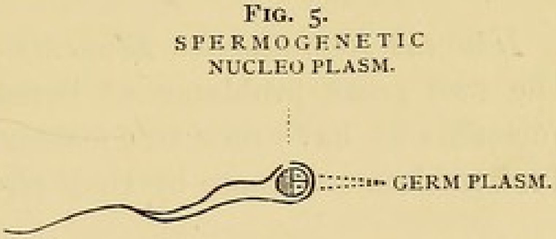
ovogenetic nucleoplasm. Thereupon the remaining half of the nucleus divides also, half of it being, as in the first division, cast off with some of the body-plasm, and forming the second polar body.

By this means room is made, Weismann holds, for the germ-plasm of the spermatozoon. Some such extrusion probably takes place in all ova, although it has not yet been demonstrated in those of reptiles and birds. Till now it was thought that parthenogenetic ova gave off no polar bodies, but Weismann has recently shown that this is not the case and that such ova extrude a single polar body. After the extrusion of the polar bodies the remaining part of the nucleus returns to the centre of the egg, constituting the 'female pronucleus.'

(*b*) The Sperm. It is now known that a process very similar to the expulsion of the polar bodies from the germ takes place, at all events in some cases, in the sperm (Fig. 5). Strasburger has lately demonstrated that this is very common in the male reproductive elements of plants. The above interpretation of the polar body formation holds good here also.

Mode in which Fertilisation Occurs.—Impregnation, which probably does not occur until after polar extrusion, is thus effected: the spermatozoon—one is sufficient in all cases—plunges into the ovum head-first; whereupon the tail disappears, the head, or rather its nucleus, constituting the 'male pronucleus.' This now approaches the female pronucleus, and the two unite to form the 'first segmentation nucleus.' This constitutes the essential act of fertilisation: the first segmentation nucleus contains the potentialities of the new being.

Fig. 5.



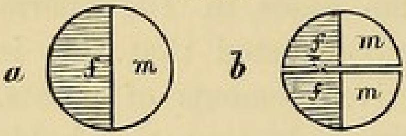
The Initial Stage of Development.—With each division of the impregnated ovum, the first segmentation nucleuf divides, and hence every cell of the embryo is derived from it. It is true that the body-protoplasm shares in the segmentation; but the fact that in many animals only a small part does so, the greater portion fulfilling the more or less mechanical function of providing nourishment for the new being, and the further fact that the more specialised a definite part of the body becomes towards this end the less is the tendency of that part to segment,[1] point to the con-

[1] When the yolk material is small in quantity, as in mammals, it is distributed equally throughout the entire body-plasm, and in such cases the ovum undergoes complete segmentation. When, however, the yolk is

clusion that the young embryo is essentially developed from the first segmentation nucleus.

It is important to note that the first segmentation nucleus divides in such wise that each half contains plasm derived from both parents. Thus Fig. 6 *a* represents a segmentation nucleus before, and Fig. 6 *b* after, its primary division. In *a* the shaded part, *f*, is that portion of the nucleus which is derived from the father; the unshaded part, *m*, that which is derived from the mother. In *b* the nucleus has so divided that each half is made up of a paternal and maternal portion, and each subsequent division takes place in a similar way. Every cell in the body may thus in a measure be regarded as a conjugated cell, and as, therefore, a mixture of differing tendencies.

FIG. 6.



How the Reproductive Elements come by their Structure.—The two great problems of heredity are involved in the questions we have now to consider: (1) How do the reproductive elements come by their structure? (2) How, possess-

accumulated in some parts more than in others, such parts show a diminished tendency to segment. Thus, in the eggs of birds (Fig. I.), the

FIG. I.

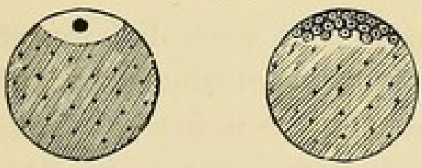
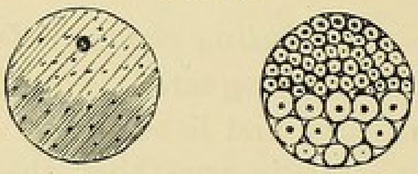
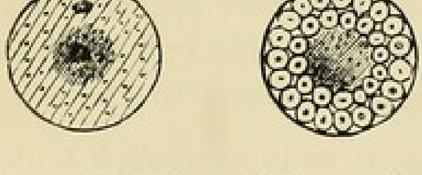


FIG. II.



bulk of the body-plasm is laden with yolk granules, only a small part round the nucleus being devoid of them, and it is this alone which shares in segmentation. When the yolk is diffused throughout the entire body, but accumulated more in one half than the other, as in the ovum of the frog (Fig. II.) then that half in which it is most densely packed undergoes least segmentation. When, as in the crustaceans and insects, the yolk is concentrated round the centre of the egg (Fig. III.), this part takes no share in segmentation, which is confined to the peripheral portions.

FIG. III.



ing such a structure, are they able to develop into the mean likeness of the parent organisms? (1) In regard to the former question there are two chief theories. The one assumes that the reproductive cells are formed from gemmules which are given off from all the different parts of the body, so that each part is individually represented in the reproductive cell. This is Darwin's doctrine of pangenesis, and has been variously modified since his time. The other is the theory of the continuity of germ-plasm, and its chief and most philosophical exponent is Weismann. This must now be considered.

Hitherto the assumption has been that the soma[1] possesses the power of generating the reproductive cells *de novo.* Weismann contends, however, that the reproductive cells (or more accurately the essentially reproductive portions of them) are derived—not from the soma, but from a portion of the original fertilised ovum which has remained undeveloped. He holds that only a part of the fertilised ovum develops into the new being or soma, the rest remaining *in statu quo,* and constituting so much 'germ-plasm' to form the essential material of future ova and spermatozoa. In each development a portion of the specific germ-plasm which the parental ovum contains, is not used up in the formation of the offspring, but is reserved unchanged to form the germ cells of the following generation. In some organisms the cells forming the reproductive organs are differentiated at the very beginning of segmentation, and there may then be said to be a direct continuity of reproductive cells; but in the vast majority of cases they are not set aside until a comparatively late period in development, sometimes not till the very end; and although in such cases a continuous chain of cells unites them with the original ovum-cell, yet there cannot strictly be said to be a continuity of reproductive cells, for each cell in the line of ancestry is not purely reproductive, since every time it divides it gives

[1] Soma = body, or the developed individual, as distinguished from the undeveloped reproductive material, or 'germ-plasm,' which, in Weismann's view, is handed on from generation to generation.

off a somatic cell also.[1] Weismann, therefore, prefers to speak of the continuity of germ-plasm rather than of germ-cells. Part of the formative plasm is transmitted in an undeveloped form along the chain of cells uniting the reproductive cells with the parent ovum-cell, each such cell bearing its little load of germ plasm, while the remainder spends its formative energies in building up the new being. In those organisms in which all, or nearly all, the cells of the soma are capable of reproducing the entire organism, Weismann assumes that the germ-plasm is present in all the cells so endowed, but in the higher organisms, in which only a limited number of cells subserve the reproductive function, the germ-plasm is confined to those.

One merit of this hypothesis is, in Weismann's view, that "heredity becomes a question of growth and assimilation—the most fundamental of all vital phenomena" (p. 168). The germ-plasm increases, that is to say, in the same manner as all other living matter: it assimilates and grows, so that he who can explain such assimilation and growth can explain the coming into being of the substance whence new organisms arise.

The explanation of the increase of germ-plasm by growth and assimilation is, however, somewhat misleading, as is also the use of the term 'germ-plasm' itself. They both suggest that this hypothetical plasm is more or less homogeneous in nature. Weismann, it is true, assumes that it possesses an infinitely complex composition, but, while postulating such complexity, he would appear to hold that, taking the entire mass, each portion of the whole has very much the same structure—that it is, for example, very much like sulphuric acid, which, while possessing a distinct molecular structure, is yet in mass homogeneous in a certain sense. The employment of the term 'germ-plasm,' and the statement that it increases by the ordinary laws of assimilation, suggest that (in the case of diœcious organisms) any portion of germ-plasm selected

[1] A cell, the offspring of which become partly somatic and partly germ-cells, cannot itself be a germ-cell pure and simple. (Weismann, *Ibid.* p. 197.)

indifferently from the male organism, united with any portion of germ-plasm similarly selected from the female organism, is competent to produce a new being, just as any portion of a mass of sulphuric acid united with any portion of a mass of calcium yields gypsum. The only proviso that Weismann makes is that the plasm shall be sufficient in bulk. My conception of the hypothetical germ-plasm is, however, very different from this. I contend that, if there be such a thing, it must consist of a number of independent units, each of which is complete in itself—*i.e.*, capable, when united with a similar unit derived from an individual of the opposite sex, of developing into a new being. In order to show that Weismann does not hold this view, I proceed to quote two or three passages from him. "Even a very minute trace of specific germ-plasm," he writes, "possesses the definite tendency to build up a certain organism" (p. 179). Again he observes that the germ-plasm contained in the reproductive cells "can only be present in minute quantity at first, but it must undergo considerable increase during the growth of the cell" (p. 213).[1] These passages seem to make it

[1] The following passage similarly tends to show that Weismann does not regard the germ-plasm as constituting so many individual units, complete —in a certain sense—in themselves. Speaking of parthenogenesis he remarks: "We know that force is always bound up with matter," and he maintains that cases in which the ovum only partially develops "are best explained by the supposition that *too small an amount of* [*germ-plasm*] *is present*" (p. 227). Again: "If we may assume that a certain amount of germ-plasm must be contained in the segmentation nucleus in order to complete the whole process of the ontogenetic differentiation of this substance; if we may further assume that the quantity of germ-plasm in the segmentation nucleus varies in different cases; then we should be able to understand why one egg can only develop after fertilisation, while another can begin its development without fertilisation but cannot finish it, and why a third is even able to complete its development. We should also understand why one egg only passes through the first stages of segmentation and is then arrested, while another reaches a few more stages in advance, and a third develops so far that the embryo is nearly completely formed. These differences would depend upon the extent to which the germ-plasm, originally present in the egg, was sufficient for the development of the latter; development will be arrested as soon

clear that Weismann regards the germ-plasm as homogeneous (in the limited sense indicated), and that its growth is a mere increase in bulk, a mere adding-to-itself of a substance of like kind, a process comparable to that which acetic acid undergoes in the 'continuous aëtherification process.' I venture to think, however, that whatever increase the germ-plasm undergoes in the reproductive cell must be due, not to mere growth, but to development—in short, to evolution, growth (increase in mass) being of course included.

Assuming—and any other assumption appears to me unwarranted—that the germ-plasm in the reproductive cell is an independent unit, a microcosm complete in itself, and essentially heterogeneous, *different in all its parts*, what we have to do is to explain its coming into being—the various phases of its evolution. Given such a microcosm, how is it able to produce another like itself? My answer is:—By the ordinary laws of cell multiplication; and the merit of Weismann's hypothesis is that it enables us to formulate this proposition. The answer, then, is to be found in the answer to the further question: How can a cell, or more accurately, a protoplasmic unit, reproduce itself? Let us consider only the most common method of reproduction, namely, 'simple' division, as it is called (though it is quite clear that the process is by no means

as the nucleo-plasm is no longer capable of producing the succeeding stage, and is thus unable to enter upon the following nuclear division" (pp. 227–228). This paragraph shows what great stress Weismann lays upon the quantity of germ-plasm as distinguished from the quality. He must therefore regard it as in a manner homogeneous, if only in the limited sense I have indicated in the text. Assuming that he is correct as to the significance of the first polar body formation in ordinary ova, does, it may be asked, the formation of the second polar body support Weismann's view that the ovum nucleus suffers thereby a mere diminution in bulk? I contend not. The nucleus divides, I suggest, into two more or less complete *units*, or microcosms. Our knowledge of unicellular organisms teaches us that conjugation takes place more readily after division, and we can well imagine that the *newly evolved* female pronucleus, like a nascent element, is in a favourable condition for union with the newly evolved male pronucleus. It is thus that I would explain the second polar body formation.

simple). Assuming the cell to be 'homogeneous,' a simple diagonal splitting would be sufficient. But inasmuch as all cells, and certainly all those which possess a nucleus, have a very definite and complex structure, such a simple splitting would be incompetent to produce two cells like the original one. As a matter of fact we now know that the division of a cell is no simple process, but, on the contrary, very complex, the elements of the nucleus arranging themselves round two opposite poles. The process by which a single complex unit can thus give rise to two similar complex units is very remarkable, and is at present absolutely unintelligible to us. To suppose that it is merely one of division is as absurd as to suppose that we can get two watches by the division of one. Imagine the complex play of forces necessary to enable a watch so to re-arrange its particles as to give rise to two watches! I contend—assuming Weismann's general conception of germ-plasm to be correct—that the problem of heredity is essentially locked up in this question of cell reproduction, for we have to explain the coming into being of the germ-plasm *units*. To suppose, as Weismann does, that a more or less homogeneous germ-plasm merely increases in mass by growth and assimilation, is, as I have endeavoured to show, unscientific. We must, therefore, suppose that the germ-plasm units reproduce themselves after the manner of ordinary cells. He who can explain the reproduction of ordinary cells by division or otherwise, can explain the reproduction of these units, can explain the first stage of ontogenetic evolution—*i.e.*, the first of the two great problems of heredity: What leads to the evolution of the essentially reproductive portion of the sex-cell?

Weismann's theory of the continuity of germ-plasm is, all must allow, a great advance upon Darwin's doctrine of pangenesis; but it is spoilt—so I think—by assuming that the germ-plasm is, in a manner of speaking, homogeneous, and that the multiplication of the individual germ-plasms of reproductive cells can be explained upon the laws of assimilation.

Evolution of the New Being from the Germ-Plasm.—This, the second great problem of heredity, has been ably dealt with by Nägeli and Weismann, among others, and I need not do more here than allude to it.[1]

[1] The first segmentation nucleus, formed by the union of the two germ-plasms, undoubtedly possesses a highly complex structure. *A priori* reasoning leads to this conclusion, and microscopic observation has already established it. I have elsewhere (*vide* "Causation of Disease," Part I.) stated that any other supposition would be absurd. A study of Herbert Spencer's "Principles of Sociology," in which he likens society to a living organism, has, however, suggested to me that we are not compelled to postulate a highly complex structure for the germ-plasm, and that, theoretically, a comparatively homogeneous protoplasm is capable of giving rise to a highly complex being. Consider, for example, a highly complex human society. Looked on as a living organism, it has a definite and complex structure and correspondingly complex functions. Now such a complex social organism is theoretically capable of developing from one practically structureless, for it might have originated from two individuals —a male and a female—and a society consisting of two can scarcely be said to have any structure. Nevertheless, such a structureless social organism, under certain conditions of climate, geographical position, and so forth (environment), is capable of evolving into a condition of great complexity, —into an organism as complex in comparison with its original structure as is the complex animal (or vegetable) organism in comparison with a hypothetically homogeneous (or practically homogeneous) germ-plasm. In each case the evolution starts by a multiplication of units. In the one there are individual human beings; in the other, individual cells, germ and sperm. In each a division of labour occurs; in this the specialised units arrange themselves into definite organs and tissues, in that into social groups. Now it may be stated positively that if two other individuals exactly like those two in whom our hypothetical social organism originated, were placed under exactly the same environmental conditions as the first two, and if, moreover, those conditions remained exactly the same during the entire evolution of this second social organism as during that of the original one, the second would in every respect be like the first. From which it follows that a social organism might give rise to an infinite number of similar social organisms, if (1) it were capable of retaining during its evolution, as part of itself, a number of individuals exactly like the primary two whence it originated; and (2) if the environmental conditions of the new social organisms were exactly like that of the parent social organism. Such an organism might be regarded as a self-fertilising hermaphrodite. Observe here the influence of the environment in development. The continual social development depends upon the continual development of new environmental conditions, each new environmental

change being the condition of a fresh evolutionary advance; in other words, the behaviour of the social unit is influenced by its environment. That a society thus evolves there can be no doubt, and the question therefore arises: May not the animal organism similarly evolve? May not, that is to say, each step in the evolution of the individual organism be the condition of the next step in advance, the evolution, in fact, being largely determined by peculiarities in the individual cell environments, just as the evolution of the social organism is, beyond all doubt, largely determined by the individual environments of men and women? Suppose a social community to start with two individuals, man and woman (who, we will suppose, differ only in regard to sexual particulars), and suppose, further, that in the course of its growth each individual is subjected to exactly the same conditions, being provided, let us say, without effort, with all the necessities and comforts of life; then it is quite certain that there will be no social evolution, the society will remain homogeneous; and similarly it may be argued of the individual cells of the organism.

Some interesting conclusions might be arrived at by pushing the above analogy further. By so doing, however, we should be led too wide of our subject. Obviously, too, the analogy in certain important respects fails. I cite it in order to draw attention to the important part the individual cell-environments may take in the development of the animal organism, but we must not, on the other hand, omit to give due weight to the peculiarities of the individual units themselves. It will be noticed that in the above hypothetical society, in which I suppose every individual to be provided with the same environment, I am careful to postulate an exact likeness on the part of the parents except in sexual particulars, for without such exact likeness the offspring would differ, and differing, would have different needs and seek to surround themselves with different environments. We must, therefore, take into account the parts which individual differences play in the evolution of both the social and the animal organisms. According to Weismann, the great purpose of sexual reproduction is to originate differences among individual organisms. But the question may be put: Does it take any part in causing differences among the individual cells of an organism? For we have seen that each cell in the soma is made up of both paternal and maternal germ-plasm, from which it follows that each cell is, in a sense, the result of conjugation.

CHAPTER III.

SEPARATION OF THE SEXES.

THERE is no doubt that the diœcious state, that is, the state of unisexuality, is in all cases derived from a state of primitive hermaphrodism. In other words, all organisms in which the sexes are separate are derived from hermaphrodite ancestors. This is rendered pretty evident by a study of their development.

There is no *à priori* reason why, in the initial stages of organic evolution, the production of spermatozoa should have been limited to one class of animals, and that of ova to another. The purpose of sexual reproduction might have been equally well fulfilled had each animal been both male and female—nay, perhaps even better, for then each would have been capable of acting as father and as mother, of fertilising and of being fertilised.

But as evolution proceeded, hermaphrodism became, first inconvenient, and before long, incompatible with the increasing complexity of embryonic development ; hence the sexes became separate. Let us briefly inquire how this was brought about.

The ovum, as we have seen, provides the young embryo with certain conditions necessary for its development, and as the organic scale is ascended, these conditions become increasingly complex. Hence, in the case of oviparous animals, a point is at length reached at which an elaborate ovum is needed, and for this purpose the ovum-producing organism must be provided with large and complicated glands for yielding yolk, albumen, and, it may be, shell. In the case of viviparous animals special and still more complicated organs are required for the housing and nourishment of the young embryo within the parent body for some time. Wherefore it follows that, as structural complexity increases, the female generative system becomes more and more complex. All this involves a great expenditure of energy, and we can clearly see how an ovum-producing organism would benefit by being spared the additional effort required for seeking out and impregnating another organism; and how, on the other hand, organisms whose main reproductive feature is simply the production of spermatozoa would be better fitted for the work of search and impregnation, if unhampered by a cumbersome female generative system. Hence the advantage of the sexes being separate.

It is not difficult to trace the steps by which the separation has been effected. Suppose that in the evolutionary career of a given species a stage has been reached at which, while the organism still remains hermaphroditic, the female generative system is fairly complex: then given an individual varying in such wise that the female generative system is better developed, and the male generative system not so well developed as in an average member of the class, such an individual will stand a better chance of leaving a numerous progeny than the average member. And, similarly, an organism possessing the male generative system more developed than the female will be at an advantage over others as regards its capacity for fertilising. According to the laws of heredity as limited by sex, their respective characters will tend to be transmitted respectively vergl.
to certain individuals among the offspring, some developing Weining
more of the female, others more of the male sexual characters.

It is further evident that those of the offspring in which the sexual disparity is greatest will stand the best chance of leaving a numerous progeny to inherit their sexual peculiarities; and thus it happens that with each generation the female element will become more pronounced in one set of individuals, the male in another, until one element in each organism being finally eliminated altogether, the sexes become quite distinct.

Nor is this a matter of mere speculation, for in certain classes of animals—*e.g.*, Vermes, the various intermediate stages between the hermaphroditic and diœcious states may be actually traced.

The laws of heredity as limited by sex were obviously intended by Darwin to refer to organisms in which the sexes are distinct, but some such laws must also apply to animals in the transition stage between hermaphrodism and the diœcious condition, for it is manifest that the separation of the sexes could never have occurred if the respective sexual peculiarities, as fast as they were accumulated during the hermaphroditic stage, had not been handed down separately to individuals among the offspring. Clearly, one set of the offspring must have inherited the peculiarities pertaining to the production of the ovum, and another set those pertaining to the generation of the spermatozoon; and it would happen that in those cases where the female generative system was strongly developed, there would be transmission of peculiarities tending to the development of the female sex, while in those where the male generative system was the stronger, the development would be towards the male.

By carefully studying heredity as limited by sex, Darwin formulated the following empirical laws, which, when the diœcious stage has been reached, would apply to the further evolution of the species:—

1. When a character is acquired by one sex at an early period of life it tends to be transmitted to both sexes equally, though it shows a greater tendency to be inherited by the same sex.

2. When acquired by one sex during the period of procreative life, it tends to be inherited by the same sex, and at the same period of life.

3. Among the mammalia characters acquired by one sex

during the procreative period are more apt to be equally inherited by both sexes than is the case with the other vertebrates.[1]

[1] Weismann would no doubt object to the word *acquired*, as employed in the above propositions, seeing that he does not believe in the inheritance of acquired characters; but he would probably accept the propositions themselves, provided the word *manifested* were substituted.

CHAPTER IV.

SECONDARY SEXUAL CHARACTERS.

SEPARATION of the sexes having been attained, each sex will of course differ from the other in respect of the generative organs, these differences constituting the so-called primary sexual characters.

It will also differ in other particulars—in particulars, namely, not directly relating to the act of reproduction. These were termed by John Hunter the secondary sexual characters, but though it is thus convenient to make a sharp distinction between the two kinds, they merge into one another. We shall, however, avoid all difficulty if we agree, with Darwin, to include under primary sexual characters the reproductive organs only, and regard all other sexual characters as constituting secondary sexual differences.

The genesis of these secondary sexual characters must now occupy our attention. So soon as one set of organisms takes upon itself the function of producing ova alone, and another set the task of generating spermatozoa only, secondary sexual differences necessarily follow. In the first place it is obvious, on the principle of correlation, that secondary sexual differences must succeed upon the primary; the presence of a complex generative system in the female involves secondary structural characters not present in the male; and, similarly, the generative system of the male induces structural peculiarities not present in the female. Then, again, the mode of life of each sex will differ, and this further increases the secondary sexual characters.

Into this we may inquire a little further. We have in the two special functions of the ovum and the spermatozoon a foreshadowing of the special functions of the two sexes. Inasmuch as the ovum is specially endowed with a view to provide the young embryo with the proper environment, we should expect, when the sexes became separate, to find the care of the embryo and the new-born offspring relegated to the mother, and, in like manner, we should expect the male to be provided with special means for finding and securing the female. And such is the case. The female not only possesses complicated organs for building up large ova, and, in the case of viviparous animals, for housing the embryo in her body for some time, but is further endowed with the necessary instincts for hatching the eggs, and looking after the young brood, or, when the young are born alive, for regulating their environment during the early period of their independent existence. The male, in a similar way, is endowed with a strong instinct for seeking out and fertilising the female—the almost universal law being that the male shall be the seeker—and, furthermore, he is equipped with many secondary sexual characters which shall enable him to secure her ; such as extra strength, and weapons of offence and defence for conquering rival males ; odoriferous glands, and external beauty, by which he may attract or charm her ; and, finally, special organs of prehension for securing her when caught.

It is in these ways that the sexes have come to differ, not only in respect of their generative systems pure and simple, but in many other particulars. The secondary sexual characters are usually more pronounced in the male, and this, as we shall presently see, is to be explained by the fact that the struggle is almost always among the males for the possession of the females. In many species, indeed, so unlike are the former to the latter, that on the ground of morphology alone it would be impossible to class opposite sexes of the same species under one and the same head.

Although the male almost always seeks the female, and the latter generally takes upon herself the sole responsibility of hatching the eggs and looking after the newly hatched or newly born offspring, yet it should be mentioned that both these rules have exceptions. Thus in some few cases the female seeks the male, as in certain species of birds ; among some fish (*e.g.*, stickleback) the male looks after the eggs ; and many cock-birds, as is well known, help to build the nest, hatch the eggs, and tend the young brood.

The evolution of secondary sexual characters will be specially dealt with in Chapter VI. Meanwhile it will be convenient to treat of the evolution of the sexual instinct.

CHAPTER V.

THE EVOLUTION OF THE SEXUAL INSTINCT.

By the term 'sexual instinct' I mean that instinct which leads to the union of the two sex-elements. Used in this broad sense it includes both the conscious instinct, which causes individuals of opposite sexes to unite in sexual congress, and the unconscious process by which the spermatozoon seeks out and penetrates the ovum.

We have seen that the task of effecting the union of the reproductive cells belongs chiefly to the male organism and male reproductive cells, both of which are specialised for this purpose ; the female organism and the ovum, on the other hand, being specialised with a view to provide a fit environment for the new being. Now, inasmuch as the essentially reproductive portions of the male and female sex-cells are probably of equal (or nearly equal) reproductive value, we may say that the male and female organisms differ essentially in the particulars referred to—that part of the sexual energy which in the female is directed to the nourishment and the care of the young, being in the male adapted to the search for, and impregnation of, the female organism. All the salient points wherein the male differs from the female have reference to these two grand differences—a fact which prepares us for the conclusion that the conscious sexual instinct, or sexual appetite, is stronger in the male than in the female.

In order to trace the evolution of this conscious sexual instinct, it is necessary to begin our study very low down in the animal kingdom, at a point, in fact, where anything worthy of the name of consciousness cannot be said to exist. We have seen that even among unicellular organisms true sexual reproduction is preshadowed : two cells unite, their union being followed by increased activity. We may suppose that in such cases each cell takes a more or less equal share in effecting the union, and although, undoubtedly, there must be agencies at work tending to bring it about, we can scarcely speak of a sexual instinct doing so. So soon, however, as a differentiation of sex-cells, of ova and spermatozoa, occurs—and this takes place, as we have seen, in the most primitive multicellular organisms—*unconscious* sexual instinct may be said to make its appearance: we may regard the active spermatozoon as being endowed with an unconscious instinct to seek out and fertilise the inert and heavily laden ovum.[1] It is true that we have here to deal with purely mechanical forces, similar to those which effect the conjugation of unicellular organisms, but, inasmuch as the spermatozoon is specially adapted for the purpose of seeking out the ovum, we may for convenience speak of it as being endowed with an unconscious sexual instinct.

At this early stage of evolution there is, be it noted, no seeking out of one *organism* (male or female) by another, the unconscious sexual instinct being confined to the male reproductive *cell.* To take an example: The ascidians, by some supposed to be our remote pre-vertebrate ancestors, are fixed hermaphrodites; the ova and spermatozoa, however, mature at different times, so that self-fertilisation is prevented. Now, these organisms being fixed, it is manifestly impossible for them to come together sexually. What happens is this: the reproductive elements are cast into the water, where the sexual union occurs—the spermatozoon playing the chief part in effecting this union.

In the case of hermaphrodites which are free to move,

[1] It is much easier for the male element to seek the female than for the reverse to occur ; such an arrangement, as Darwin observes, leads to a saving of force.

and in which actual contact of two organisms is necessary to fertilisation, some instinct, conscious or unconscious, is clearly necessary to bring it about. These cases I pass by, and come to that higher stage of sexual evolution at which the sexes are separate. Here also it is quite clear that some conscious instinct is required to bring organisms of opposite sex together. Actual contact is not always needful; thus, in the case of most fishes the female deposits her ova in the water, while the male follows in her wake, covering them with spermatozoa, being thus manifestly guided by some conscious instinct. In other cases individuals of opposite sexes have to be brought into direct contact, though this does not always imply an actual insertion of a male organ, for in some of these cases, as happens with many fishes and amphibia, the ova are fertilised in the water. But whether actual copulation takes place or not, it is obvious that some form of conscious instinct is necessary to bring about the sexual contact[1]; and in all these cases it is the male that seeks the female and takes the chief part in effecting the union of sex-cells.

The male sexual instinct evolves by selection: those males in which it is most perfectly developed having (other things being equal) the best chance of leaving a numerous progeny, the males of which will tend to inherit the like sexual adequacy. Thus from dim beginnings a sexual *desire* is eventually evolved; and at this stage the males begin to contend among themselves for its satisfaction. Naturally, the struggle for the possession of the females is fiercest among polygamous males, for in their case only a small proportion can succeed in leaving progeny. Success will doubtless be very largely due to superiority in physical endowments, but it is clear that such superiority must be backed up by an intense sexual passion, for nothing short of this would prompt an animal to risk its life in struggling for the female.

Thus through countless generations there has been a searching selection of the most eager males, and this—above

[1] Actual copulation takes place much lower in the scale than in the amphibia, as in insects and in many hermaphrodites.

all among polygamous animals, to which class man belongs—has culminated in the intensely powerful male sexual instinct which characterises the higher animals.

The female, on the other hand, plays a much more passive part in effecting sexual union; in some animals, as in the case of the fish whose ova are impregnated in the water, she cannot be said to take any. Nevertheless, in most cases in which actual copulation occurs, she must lend herself to the act, and this implies sexual instinct. This instinct has, in many cases, evolved to a high intensity, and the manner of its evolution is akin to that of the evolution of the male sexual appetite: those females distinctly averse to the sexual act would leave no progeny to inherit the deficiency; while those possessing the greatest desire would, other things being equal, stand the best chance of leaving the most numerous progeny to inherit the like strong instinct. Inasmuch, however, as the rivalry is (with a few notable exceptions) never among the females for the males, the selective process is not so actively at work among the former as among the latter, and consequently the sexual appetite has not evolved in them to the same strength. For all this, the desire of the female, though on an average below that of the male, may be very intense. Thus it is well known that during the period of rut the female may become very excited, though rarely to the same degree as the male. Writing upon the subject of insanity among the lower animals W. L. Lindsay observes: "While females are more impressionable than males, in connection with such functions or conditions as pregnancy and parturition, the males are more subject to the excitement of the rut; so that in them—in the stags or bucks, for instance of various deer, including the red, fallow, and roe deer—*erotomania* is most frequently developed."[1] And again, "Erotic forms of insanity—the erotomania of authors—is better known as it occurs among stags, stallions, and other male animals—to which sex, however, it is by no means confined. for *Nymphomania* is to be met with as well as

[1] "The Pathology of Mind in the Lower Animals," W. Lauder Lindsay, M.D., *Jour. Ment. Science*, vol. xxiii. p. 27.

Satyriasis. It is well known that stags in spring 'are transported with erotic fury.'"[1]

I have said that with most animals the female must lend herself to the sexual act, and that this cannot be done without sexual instinct. In the human race, however, the case is different. In the first place, the woman need not be a willing agent; among savages and semi-barbarous communities it often happens that she has no voice in the matter, and therefore among our primitive ancestors, sexual instinct in the woman has not been essential to the successful performance of the sexual act. It follows that the selective process as regards sexual desire in the female has not been as active in the remoter times of our race as among the females of the mammalia, and, such being the case, one would rather expect the sexual desire to be less in the one case than in the others.

Further, in civilised communities the woman, while voluntarily submitting to the sexual act, may have no desire whatever, being prompted in her behaviour by what she conceives to be her duty rather than by instinct. Here again what Weismann calls 'panmixia' is interfered with, and hence the sexual instinct in the civilised woman is, I believe, tending to atrophy. This subject will be considered in greater detail in a future chapter on the comparative sexual desire of man and woman.

[1] *Animal World*, July 1876, p. 98.

CHAPTER VI.

THE BEARING OF SEXUAL SELECTION ON THE EVOLUTION OF THE SECONDARY SEXUAL CHARACTERS.

WE will now proceed to discuss, in somewhat greater detail, the evolution of the secondary sexual characters, a subject already briefly treated of in Chapter IV.

In order to do this we must keep clearly before us the three methods by which species have evolved, viz., (1) by natural selection; (2) by sexual selection; (3) by the direct action of the environment, independently of selection. In the two former cases the organism is adapted to its environment by indirect means, and therefore Herbert Spencer speaks of the process as one of 'indirect equilibration;'[1] while in the latter case the adaptation is direct, and therefore he calls it 'direct equilibration.'

Natural selection relates to the advantages which one animal possesses over another, independently of the propagation of the species.

Sexual selection relates to the advantages which one animal possesses over another of the same kind and sex solely in respect of reproduction. In the language of Darwin, "Sexual selection depends on the success of certain individuals over others of the same sex in relation to the propagation of the species; whilst natural selection depends

[1] Spencer does not, I believe, make any specific mention of sexual selection, but manifestly he would couple it with natural selection under the head of 'indirect equilibration.'

upon the success of both sexes, at all ages, in relation to the general conditions of life" (the Environment).[1]

The influence of the environment in modifying a race, independently of selection, natural or sexual, has recently been questioned, the theory that there exists such an influence resting on the assumption that acquired characters are inheritable, for all peculiarities of structure impressed upon an organism by the environment are essentially acquired. The influence of natural and of sexual selection rests upon no such assumption, seeing that the selected characters are not acquired, but are essentially, so it is assumed, of germinal origin. The question of the inheritance of acquired characters is of such importance to our subject that I shall consider it at some length later.

The first two of the above methods have certainly, and the last has possibly, played a part in rendering the sexes innately unlike. I shall discuss each separately, beginning with sexual selection—in my view the most important in this connection. Before doing so, however, I would observe that very few secondary sexual characters have evolved by any one of the above methods alone. Many have resulted from the action of two of them; some, of all three. I cannot, therefore, classify secondary sexual differences as those due to natural selection, those due to sexual selection, and so forth; and when I wish to direct attention to the pathological importance of any one in particular, I can only choose such place as appears most convenient.

Sexual Selection.

Whatever increases an animal's chance of reproduction falls within the province of sexual selection, which, as we must carefully bear in mind, is quite distinct from natural selection. The latter relates to the struggle for existence, and an animal might be eminently fitted for this struggle though altogether incapable of producing offspring. The males possess many secondary sexual characters necessary to their

[1] "Descent of Man," 2nd ed. revised, p. 614.

success in the struggle for the females, but of no use to them in the struggle for existence; while the female, devoid of these characters, is just as successful in the life-struggle. Curiously enough, Darwin considers that the primary sexual organs and those for nourishing and protecting the young, come under the influence, not of sexual, but of natural selection—"for those individuals which generated or nourished their offspring best would leave, *cæteris paribus*, the greatest number to inherit their superiority; whilst those which generated or nourished their offspring badly, would leave but few to inherit their weaker powers."[1] Yet, just before making this statement, he tells us that sexual selection "depends on the advantage which certain individuals have over others of the same sex and species *solely in respect of reproduction*." Now the primary sexual organs and the sexual instinct have reference to reproduction solely, and an individual might fail in these respects and yet be perfectly adapted to his environment. Wherefore, if we hold by Darwin's definition of sexual selection (and it seems to me the only one we can adopt without involving ourselves in confusion), we must regard the sexual organs themselves (*i.e.*, the primary sexual characters) as having evolved through sexual selection alone, and with this, I think, my previous remarks coincide. No doubt natural selection frequently works with and aids sexual selection, the most vigorous and healthy generally succeeding best not only in the struggle for individual existence, but also in the propagation of their kind.

Sexual selection operates much more potently among the males than among the females. If the sexual system, or the sexual instincts, in the female be defective, no offspring will be born to inherit the like deficiency, while females with the best developed sexual systems and the most perfect sexual instincts will stand the best chance of leaving a numerous progeny. But while the male comes similarly under the influence of sexual selection, in his case it acts in a further manner. Owing to the greater eagerness of

[1] *Op. cit.* p. 209.

the males there is almost always a struggle among them for the females, and in order that the male may be successful in the struggle, he requires other characters than mere sexual instinct and properly constructed sexual organs. It is this sexual rivalry among the males which, resulting in the continued selection of such of them as possess characters giving them an advantage over others in winning the female, has played the chief part in the evolution of their secondary sexual characters.

In the struggle of the male for the female, success may be determined by the law of battle, and may thus depend upon (*a*) superior courage, vigour, and strength on the part of the male; (*b*) on his possession of special weapons—*e.g.* the horns of the stag, or the spurs of the cock; or it may possibly be determined by the choice of the female.[1]

Under the influence of the law of battle the male has become more courageous, powerful, and pugnacious than the female, and endowed in many instances with special weapons for conquering rivals. Thus, for instance, man's semi-human male ancestors acquired the great canine teeth, which, however, subsequently diminished in size as the power and cunning of the hand increased, and other and more potent means of offence and defence were obtained. So too, the male has in the struggle often acquired great beauty, success on his part depending largely, in many cases, upon the choice of the females, who are supposed to select the most beautiful mates. This is thought to be notably the case with birds.

Now the above sexual differences depend, be it noted,

[1] Some biologists, *e.g.*, Wallace and Geddes, do not believe that choice on the part of the female has played any part in modifying the male. Darwin, as is well known, attributed the more brilliant colouring and greater beauty of cock-birds to the continued selection of the most beautiful male birds by the females. Wallace accounts for the difference by the fact that brilliance of colour on the part of the female would have rendered her a conspicuous object while sitting, and looks upon her subdued colouring as acquired for protective purposes. Geddes, on the other hand, contends that the male is the more beautiful on account of a fundamentally distinct physiological habit. I shall return to this author's views later.

upon the rivalry among the males. One difficulty here presents itself. If, as Darwin at first supposed, the males were more numerous than the females, there would necessarily be sexual rivalry. But it appears that there is no such numerical disparity. Many males are, however, polygamists—*i.e.*, one male "pairs" with two or more females, and where this happens there must obviously be fierce rivalry among them, if the numerical proportion of the sexes be the same. But again, many animals are monogamous, and the numerical proportion being about equal, it would seem that in these cases there can be no sexual rivalry. This difficulty, however, Darwin satisfactorily explains,[1] and I therefore need do no more than refer to it here.

Since sexual selection acts most potently when sexual rivalry is greatest, the degree to which the so-called secondary sexual characters are developed in the male will be a more or less accurate measure of the extent to which sexual rivalry exists among the species to which he belongs. Hence we may lay it down as a tolerably safe rule that the pronounced development in the male of secondary sexual characters is evidence of severe sexual rivalry; and as extreme rivalry is most common among polygamous animals, their development becomes also an evidence of polygamous habits.

Thus among the terrestrial carnivora, the lion is the sole polygamist, "and he alone presents well-marked secondary sexual characters."[2] Similarly, the common cock, the peacock, and the pheasant are polygamous, and, as every one knows, they are much more beautiful than the corresponding hen-birds. On the other hand, the guinea-fowl and the partridge are monogamous, and hence the male birds present very slight secondary sexual differences. It has, however, to be admitted that many species of birds in which the sexes differ greatly from each other are monogamous.

Coming near to man and applying these reflections to his

[1] *Op. cit.* p. 213.

[2] *Ibid.* p. 218.

case, we find that both the gorilla and the baboon are polygamous, and there can be little doubt, I imagine, that the semi-human ancestors of man were so likewise. We should, therefore, rather expect man himself to be polygamous, and one naturally turns to savage tribes for evidence on this point. According to Sir John Lubbock, primitive tribes indulged in promiscuous intercourse, or as he terms it "communal marriage." Whether this is true or not, there can be little doubt that polygamy has prevailed among mankind to a large extent. It is certainly almost the universal custom among the chiefs of existing savage tribes, although it is equally certain that monogamy prevails among some of the lower races. Savages, like other polygamous animals, still fight for the possession of the females, and even at the present day we occasionally witness among civilised peoples a survival of the law of battle.

Apart from the consideration that the man is polygamous by virtue of his descent, we have further proof of his polygamous nature in his instincts as at present developed. No one will deny, I imagine, that the instinct for promiscuous intercourse is much stronger among men than women, and unquestionably the husband is much more frequently all in all to the wife than she to him. Another proof is to be found in his marked secondary sexual characters. Man is so much bigger, more powerful, more courageous, and more combative than woman, that it is quite certain there has been intense sexual rivalry among his male ancestors, for even those who do not believe in his polygamous nature—a point to which Darwin does not specifically allude—will not deny that this marked development of secondary sexual differences is the result of such rivalry, whether due to polygamous intercourse or other causes; and with the numerical equality of the sexes fairly established, the inference is at least in favour of his being essentially polygamous.

Bearing, then, in mind that man is derived from essentially polygamous ancestors, and that sexual selection acts very potently among the polygamous, we have a clue to several of the mental differences between man and woman. In the struggle between the males for possession of the female, victory, as Darwin points out, has depended upon strength, and upon various mental endowments, such as courage, determined energy, observation, and ingenuity ; for not only have the females had to be won, but also to be retained when won. The males have also had "to defend their females, as well as their young, from enemies of all kinds, and to hunt for their joint subsistence." The mental characters thus acquired by primitive man "will have been continually put to the test and selected during manhood ; they will moreover be strengthened by use during the same period of life. Consequently . . . . we might expect that they would at least tend to be transmitted chiefly to the male offspring at corresponding periods of manhood."[1]

The woman, on her part, has been similarly affected by sexual selection. Her chief mental characteristic, that round which her whole mental being centres, viz., the maternal instinct, has evolved through its action. The very existence of the children depends upon the mother's love, for, it being absent, they do not receive the care needed for their successful rearing.

Although the rivalry is almost always between the males for the females, yet, as already observed, matters are sometimes reversed, the female competing for the male. Notably is this the case with certain birds, and the instances are very interesting because affording convincing proof that the secondary sexual characters of the male are largely due to sexual selection, for with such 'polyandrous' birds we find that the female is endowed with all the secondary characters of the polygamous male : she is the more beautiful, the more courageous, the more pugnacious. We thus see that some of the most prominent secondary sexual characters are in a manner accidental—I mean that they are not absolutely and inevitably necessary : matters might have been otherwise. This is an important fact ; it shows that woman is not what she is, and man is not what he is, simply because the one

[1] *Op. cit.* p. 564.

has ovaries and a uterus, and the other testicles; and it at least strongly suggests that *all* the secondary sexual characters in man and woman might be transposed—that the strength, courage, and fire of the man might be transferred to the woman; the weakness and timidity of the woman, to the man. For my part I have little doubt that such a transposition might be brought about in respect of most of the nervous differences by a process of artificial sexual selection carried on through many generations. In this connection it should be remembered that secondary sexual characters are highly variable; whence arise abundant opportunities for the operation of selection. In evidence of such variability, we sometimes find men widely diverging from the average type of manliness, and displaying a marked effeminacy of nervous constitution: contrariwise, some women show a distinctly masculine bent.

The process of sexual selection as it obtained among our primitive ancestors is largely interfered with among civilised peoples. I do not propose to discuss this subject at length; it will be sufficient to observe that in modern civilised communities those men who are endowed with a high degree of mere animal strength and courage, are only in a small degree sexually selected; and this, I take it, in large measure explains the fact that with savages there is much greater equality among the men in nervous strength than is the case among civilised peoples. Many effeminate men nowadays survive and propagate their kind, who in an earlier age would have been rapidly exterminated. Ability to support a wife, rather than animal strength and courage, determines the selection. This distinction is, of course, not so true of the lower as of the upper classes, but I believe that the lower classes rear a proportionately smaller number of children. I say, be it noted, rear, not produce. The poorer classes are certainly highly prolific, but the mortality among their offspring is relatively very high, especially in large towns. Amongst the upper classes there can be little doubt that there is a distinct selection of particular mental types. One type of man does not marry for prudential reasons, being unable to support a wife. Many men, again, do not marry because the primordial polygamous instinct is strong in them ; nor do these leave a numerous progeny, for the mortality among illegitimate children is enormous: a very large number, as every physician knows, are let die—than which there is nothing easier. Others, again, do not marry because incapable of comporting themselves in a manner fitting the social position to which they are born. Such perhaps marry into a lower class of society, and their offspring probably come under the law of increased mortality for the children of the poor, a law doubly operative in their case, for such ill-assorted unions lead, in the majority of cases, to miserable homes and a peculiarly high child-mortality.

Another point worthy of mention here is that many women are chosen on account of their wealth, and this tends to modify the masculine mind thus : The bulk of women possessed of wealth inherit it from a father who has made that wealth, and they will be likely, according to the law of sexual heredity, to transmit to their sons the same capacity to amass wealth.

Where there is a struggle among the males for the females, the latter often, as we have seen, exercise a choice, and thus Darwin explains the evolution of the beautiful plumage of cock-birds. But in the case of the human race not only has the rivalry been among the men (as to some extent it still is), but choice also has been chiefly exercised by them, and inasmuch as all are strongly attracted by beauty, the females by a course of selection in the past have become more beautiful than the males—a process that is still going on. Wherefore, as Darwin observes, they attach value to their beauty, and delight in adorning themselves, decorating themselves indeed, by a curious reversal of matters, with those very plumes originally acquired by male birds to attract the females. All over the world it is the women who adorn themselves rather than the men. This is to be noticed, as Ploss[1] points out, even among savages: "the collections

[1] "Das Weib in der Natur- und Völkerkunde," Band i. s. 241.

in all ethnographical museums afford abundant proof of this." It is also very painfully shown in insanity. The women in asylums display an infinitely greater tendency to decorate themselves than the men—and the acts of the unhappy Ophelia illustrate the same truth.

CHAPTER VII.

THE BEARING OF NATURAL SELECTION ON THE EVOLUTION OF SECONDARY SEXUAL CHARACTERS.

WHILE sexual selection has been evolving characters enabling an animal to propagate its species, natural selection has been evolving characters that constitute fitness to survive.

The sex usually determines, in a large measure, the manner of life, and it has been the work of natural selection to adjust each sex to its own particular environment. Thus —and more especially among animals low down in the scale—each sex may be provided with structures not in any way needful for reproduction, but useful solely in adapting it to its special mode of life. These structures are sometimes modifications of characters useful in reproduction, but sometimes they have no connection with this function, and in some cases, as we have already noticed, the males are so different from the females that it would be impossible, on the ground of morphology alone, to refer them to the same species. As an example of structural modifications acquired for the purpose of adapting the sexes to different modes of life, it may be mentioned that "the females of certain flies are blood-suckers, whilst the males, living on flowers, have mouths destitute of mandibles."[1] The females are carnivorous, the males herbivorous! Such differences, and we

[1] Darwin, "Descent of Man," p. 208.

might multiply examples, have of course been wrought through natural selection.

Turning to the case of man, we find the man and the woman following different modes of life, and accordingly natural selection coming into play and helping to accentuate and intensify their unlikeness. The ancestors of civilised man fought for other motives than for the possession of women, and thus by natural selection their courage, strength, and cunning became intensified; for among primitive men victory and survival were to the strongest, bravest, and most skilful. Civilised warfare, on the other hand, leads to the survival, in some measure at least, of the weaker and less brave, though these are not altogether disqualified for the profession of arms.[1] And since the environment of men on the one hand, and of women on the other, maintains always a certain sameness, it is clear that natural selection is not only operating very differently, but also with a certain stability of method, on each, and thus it must be tending to increase the existing differences between the sexes.

Although more male infants are born than female, the female population after a time becomes larger than the male, owing to greater mortality among boys and men. This increased mortality among men is in great measure due to peculiarities of environment. Many deaths no doubt result from sheer accident, yet there is, on the whole, a survival of the fittest, and this will tend to the physical advantage of the men, for the greater the extent to which elimination goes on, the greater the fitness of the survivors. The conditions against which women have to contend being less rigorous, or, to put it in another way, their environment being *more easy*, there is a survival of many weak types which, if exposed to the rigour of the male environment, would be weeded out. True, men and women alike tend, under the influence of natural selection, to become perfectly

[1] "Such I hold to be the genuine use of gunpowder; tl.at it makes all men alike tall. Nay, if thou be cooler, cleverer than I, if thou have more mind, though all but no body whatever, then canst thou kill me first and art the taller."—CARLYLE, *Sartor Resartus*

adapted to the mode of environment which sex prescribes for each—the women to the average female environment, the men to the average male; nevertheless, this unequal action of natural selection cannot fail to render the male the more capable of the two to withstand the average quantity of nocuous environment—what may be termed the '*necessary-mal-environment*'—which falls to the lot of humanity.

We may now fitly consider some of the special ways in which natural selection has differentiated the woman from the man mentally.

The Intuition of Women.—Mr. Grant Allen attributes the intuition of women to the survival for ages past of those who were quickest to detect the signs of rising wrath in their husbands. Such, according to him, would escape the vengeful blow which dashed out the brains of the stupider woman. But I think that this, if it were a factor at all, can only have been one among others. It must not be forgotten that the man, equally with the woman, has had to be continually on the alert against danger, and the ability to rapidly detect its approach has therefore been quite as needful to him as to her. It is, however, worthy of note that woman's intuitions essentially pertain to human actions: she is peculiarly quick in learning character, and in divining her husband's varying moods, thereby soon getting, as is often remarked, to "understand all his little ways"; whereas, on the other hand, she is not so quick as he to detect the signs of excellence, or the reverse, in horses, dogs, and cattle. But this may be due entirely to the differences in their education.

The rapidity of the feminine perception will be alluded to again in the second part of this work. It is sufficient here to point out that it harmonises with the inferior intellectual power commonly attributed to her, rapidity of perception being a characteristic of the lower races of man.

Mental Adaptability.—Woman appears to adapt herself mentally to varying circumstances more readily than man, a fact which, as will be pointed out in due course, has practical application. This peculiarity may be attributable to the necessity which she has been under of adapting herself to man, always her superior in strength, and always, therefore, possessing the authority which strength confers; and it must have been educed upon the ordinary lines of evolution, but how far by natural selection, and how far by the direct action of the environment, I do not suggest.[1]

Since each sex constitutes part of the environment of the other, each must have played a part in modifying the other. The woman, being weaker than the man, has, during the long past, been repressed by him, and cannot fail to have been moulded accordingly. For *an environmental peculiarity lasting over many generations necessarily leads to a parallel structural peculiarity.* This much we may assert confidently, even though we may not be able to determine by what exact means the moulding has been effected: whether by selection, by the direct action of the environment independently of selection, or by both. I desire to direct the reader's attention especially to this proposition.

The mental adaptability of women to varying circumstances is of a twofold order. It displays itself (*a*) in Tact, or what Ruskin calls "the touch faculty." It is chiefly, I take it, this form of adaptability which may be referred to the moulding influence of the stronger sex, for the woman finding herself opposed to brute force, and being no match for her husband in this respect, has had to depend upon other resources, defensive and offensive. Lotze points out that the inferior strength of the woman is compensated for by the superior ease she displays in adapting herself to diverse circumstances,[2] though he does not attempt to explain how this adaptability has been acquired. It seems scarcely unreasonable to suppose that it may be directly traceable to her physical weakness. The ability to 'manage' their lords depends not only upon sympathetic tact, in the ordinary sense of the word, but also upon cunning, finesse, dissembling, —weapons ever more powerful than brute force. "Women,"

[1] According to Weismann and his school, the direct action of environment upon the individual plays no part in racial evolution.

[2] Mikrokosmus, &c., Band ii., Leipzig, 1869, s. 382.

it has been said, "are born actors." May not the cunning and dissimulation so frequently found in the hysteric state be in some measure attributable to an innate tendency in this direction, evolved in the manner indicated? But, be the mode of evolution what it may, it is quite certain that women have the power of managing men; and to do this they often act strictly upon the lines of the Baconian philosophy of 'ruling by obeying.' I presume there can be little doubt that women, on the whole, know better how to manage men than men women.

(*b*) The adaptability of woman further displays itself in the readiness with which she becomes at ease in entirely new surroundings. Thus it is noticed that a woman of humble rank more readily adapts herself to a higher social sphere than a man under like circumstances, and over and over again her power to make "home" out of the most unpromising conditions has been remarked. This facility of adaptation may perhaps be partly explained by woman's greater passivity and resignation.

Passivity, Resignation.—The greater pugnacity and activity of the man are chiefly due to sexual selection, but it is possible that natural selection may have helped to bring about the result, and in the following way. A tendency to pugnacity on the part of the woman would, in a primitive state of society, diminish her chance of survival, for any attempt to resist forcibly the pleasure of her lord would provoke his anger and put her life in danger; whereas the passive, resigned woman would run no such risk. Here at any rate we may have *one* of the reasons why women are more passive and more resigned than men. That they are the latter is unquestionable. A man is apt to angrily resent, or to defy misfortune: a woman ordinarily resigns herself to it. Of course in her case this is often in large measure due to religious conviction, which is usually much stronger, and certainly much commoner, among women than among men; but there seems to me little doubt that it is also to be traced to some such origin as I have indicated.

The great resignation of the woman is of interest to the physician, for it is this which enables her to bear with fortitude long and painful, and, it may be, incurable disorders. Nothing has surprised me more than the extraordinary resignation, almost it would seem apathy, with which many women endure physical suffering, and face impending death.

Dependence.—Another characteristic of woman, which with resignation, passivity, tact, and other qualities we may associate with her inferiority in point of strength, is her sense of dependence. Ages of subjection cannot fail to have generated this. She has so long looked to the man as protector, breadwinner, almost as owner, as the one to initiate, to lead, to control, that her capacities have been dwarfed in these directions; her powers of self-reliance, origination, invention, have found no outlet, and have in consequence remained quiescent, or, at least, have but feebly developed, her mental growth being rather in the direction of such qualities as are comprised under what has, in consequence, come to be called—perhaps somewhat vaguely—womanly sweetness, or more briefly, womanliness. Hence we find her leaning for moral support, shrinking from speculative enterprise, easily quelled by any opposing forces (so long as her affections or her conscience are not involved in maintaining her ground), and clinging to her home, with its sense of safety and familiarity, afraid to launch her barque on the untried waters of the outer world. To this feeling of dependence we may also in part attribute her desire for companionship, her self-depreciation, her love of approbation, her vanity (with the accompanying faculty for self-adornment), and, as already noticed, her tactfulness. Lastly, it is probably here that we find the origin of what may be termed her genius for religion. The sense of dependence upon a protector not always able, or even ready, to protect, has set her in search of something outside and beyond the known and fallible, and has prepared her to accept with eagerness any professed revelation of the Infallible Unknown.

If these conclusions are correct, subsequent ages must expect to see a new departure in the mental evolution of woman, and there are not wanting signs that the first step has already been taken. Over-population, and the conditions of modern society generally, are forcing women more and more to take active personal share in the battle of life, and as their dependence on their men-kind for subsistence and protection diminishes, we may look for a corresponding increase in those powers which that dependence has held in check. Already the altered conditions of life are observed to have made their impress on the American woman.

CHAPTER VIII.

INFLUENCE OF THE ENVIRONMENT ON STRUCTURE—ENVIRONMENTAL MOULDINGS.

FOLLOWING a natural sequence we should now discuss the part played by the environment, acting independently of selection, in rendering the sexes unlike; but, unfortunately, biologists are not yet agreed as to whether the direct action of the environment takes any part at all in organic evolution. This is beyond doubt the most important biological—and I may, I believe, add pathological—question of the day. I shall, therefore, consider it at some length. The subject falls under two heads: (*a*) The influence of the environment on structure; (*b*) The inheritability of the structural changes, or, as we may conveniently term them, *environmental mouldings,* thus wrought. The present chapter will be devoted to the consideration of the first of these two questions, and the following to the second. A brief space may first be devoted to the historical aspect of the subject.

Historical.—Only a few biologists of the present generation attach signal importance to the direct action of the environment as a factor in the evolution of species, but by the older biologists it was supposed to have played a prominent part.

The grand truth of organic evolution had been dawning on man's mind many centuries before Darwin, but, so far as biology is concerned, Buffon (1749) was the first to put the idea into definite shape. He, Erasmus Darwin (1794), and Lamarck (1801) sought to explain organic evolution by assuming an inherent tendency on the part of organisms to progress, acting in concert with the moulding influence of the environment, which was supposed to affect the organism chiefly by causing modifications in function; and as examples of the structural alterations induced by a new departure in function, the long necks of the giraffe and the swan were instanced. These were thought by Lamarck to be caused by the constant reaching for food up to the branches of tall trees, or down to the bottom of deep waters. In like manner, he supposed the web between the toes of swimming birds to be due to the continual attempt to oppose as large a surface as possible to the water.

When, later (1859), the doctrine of natural selection was propounded, it gained so strong a hold upon the younger biologists, that these two factors—the inherent progressive tendency and the influence of the environment—were for the time somewhat disregarded. Recently, however, they have again come to the front. Thus Nägeli, Mivart, Geddes, and Eimer appear to regard organisms as possessing an innate tendency to progress, and to attribute only a subsidiary influence to selection and the direct action of the environment—so returning in some measure to the views of the older biologists;[1] while others ascribe to this last the

[1] Herbert Spencer argues, and surely conclusively, that organic evolution cannot result from any inherent progressive tendency in living bodies (see "Principles of Biology," §§ 153–158). Weismann also has some forcible remarks upon this head. The supposition of an internal transforming force has, in his opinion, the greatest defect that any theory can have—"It does not explain the phenomena. . . . . It is the renunciation of all attempts at explanation" (*op. cit.* p. 263). Geddes, Nägeli, and their school found their argument upon the fact that evolution tends to proceed upon certain developmental lines. Naturally it does, for, as Weismann observes, "every species must have been directly continuous with the old one from which it arose, and this fact alone implies that the phyletic development (*i.e.*, the evolution of the species, as distinguished from that of the individual = ontogenesis) must necessarily follow certain lines. I can fully understand," continues this philosophical writer, "how it is that a botanist has more inclination than a zoologist to take refuge in internal de-

preponderating influence. Thus Herbert Spencer has for years upheld the importance of the environment in evolution. In no country, however, is that influence thought so much of at the present time as in America. Here a number of biologists have revived the views of Lamarck, and are known as the Neo-Lamarckian school.

Influence of the Environment on Structure.—I now proceed to make some general remarks on the influence of the environment on structure.

We shall do well to bear in mind that life consists in the "continuous adjustment of internal to external relations."[1] This adjustment may be expressed in another way by saying that every series of forces acting upon an organism from without must be met by a *corresponding* series of internal forces; the two, in order to proper life, must balance one another, and when an organism is thus able to adjust internal to external relations, it is said to be adapted to, or in correspondence with, its environment. Note the use of this word *correspondence*. It indicates that in healthful life there are two parallel sets of forces:—(*a*) those pertaining to the organism, and (*b*) those pertaining to its environment, and that there is a *correspondence* between them. Thus, when an animal flies its foe, or seeks its prey, it opposes, by a delicate and intricate combination of muscular actions, a complex series of internal forces to a *corresponding* series of external forces. Nay, in the mere act of locomotion, we have an instance of such complex adjustment, the internal forces having to be regulated or adjusted so as to balance those external forces which tend to overthrow the equilibrium.[2] The internal forces must change in 'correspondence'

velopmental forces. The relation of form to function, the adaptation of the organism to the internal and external conditions of life, is less prominent in plants than animals; and it is even true that a large amount of observation and ingenuity is often necessary in order to make out any adaptation at all" (*op. cit.* p. 259). The succeeding portions of Weismann's argument are equally forcible.

[1] "The Principles of Biology," § 30, Herbert Spencer.

[2] *Ibid.* § 28.

with the external. The whole purpose of organic structure is such an adjustment of internal to external relations; the more complex the environment, the more complex the structure; in short, structural and environmental complexity rise and fall together.

Thus as the organic scale is ascended, the structure increases in complexity, in order to meet the ever-growing complexity of the external forces acting upon it. Wherefore the *degree* or quantity of correspondence is continually increasing; and in proportion as it increases, in that proportion does the degree of life increase. Hence Spencer's formula: "The degree of life varies with the correspondence."[1] In unicellular organisms the degree of correspondence is small; a comparatively simple series of environmental forces is met by a correspondingly simple internal adjustment; while in man, at the top of the organic scale, the correspondence is proportionately great—he can adjust himself to an infinitely complex environment.

We may express the same idea by saying that the degree of life rises in proportion as the individual is capable of mastering his environment, of successfully battling with the manifold circumstances constantly tending to compass his dissolution; and it is needless to add that the chief means whereby this increase of capacity is effected, is by the evolution of mind.[2]

The capability of an organism to place itself in correspondence with its environment is at bottom chiefly dependent upon heredity. Here let us carefully distinguish between actual adaptation, and adaptability, or potential adaptation.

By heredity the organism is endowed with certain characters, such as lungs, teeth, and various instincts, which serve to adjust it to its environment. These are actual adaptations. But it is also endowed with many potentialities which are capable under certain conditions of becoming, but which may, or may not, become actualities. The organism is not,

[1] "The Principles of Biology," §§ 31–36.

[2] See on this subject Herbert Spencer's "Principles of Psychology," §§ 129–176.

i.e., compelled by heredity to develop after an absolutely fixed and rigid plan, but has, so to speak, a certain latitude allowed it in its development. For this reason it is not easy to determine how much of the peculiar structure of an organism is the pure outcome of heredity, and how much is traceable to external moulding influences. Theoretically, we may say that such structural peculiarities as would develop under the most negative environment compatible with life are the products of heredity, pure and simple; while all others result from the action of the environment, *i.e.*, are acquired. Among the higher organisms, and notably in the case of man, all those structural peculiarities which underlie knowledge are strictly acquired, resulting as they do from the moulding influence of the environment upon the nervous organisation; but leaving mental development out of consideration, let us briefly consider the influence of the environment upon the physical being.

The environment may so mould the structure of the organism as to adapt it better to itself; and, on the other hand, far from improving structure in relation to itself, it may cause structural deterioration, and in the end complete dissolution. Thus the continual using of the hands in rough work causes, among other changes, a thickening of the skin, notably of the epidermis; the hands become horny, and thereby improved in relation to their environment. Similarly, a muscle hypertrophies in response to increased exercise; it becomes better adapted to the conditions which lead to such increase. On the other hand, the continued inhalation of irritating particles leads, not to an improvement of structure (although possibly it may tend to its adaptation to this particular environment), but to structural deterioration, slowly but surely diminishing the capacity of the entire organism to place itself in correspondence with its environment, or, what comes to the same thing, lessening the degree of life.[1]

[1] It is probable that many injurious environments, though causing partial dissolution of structure, may nevertheless improve structure *in relation to themselves*. Thus it is possible, as above hinted, that the

Wherefore it follows that the changes wrought in an organism by its environment are of two kinds—adaptive and non-adaptive. Hence the two propositions—

1. The environment is capable of affecting structure;
2. The environment is capable of producing structural adaptation—

are not identical. The latter asserts something in addition to the former, not only, namely, that the environment is capable of modifying structure, but that it is able to modify it in such a way that *the mutual interaction of the two shall issue in health.* The capability of living organisms to become so moulded by their environments that their structure shall be improved in relation to them, is very remarkable. Did we not know that they possess such capability, we could only by a remote inference assume it. For aught we could tell, the structural change might be always non-adaptive, diminishing, instead of increasing, the degree of correspondence between the organism and its environment.[1] As it is, we may fittingly speak of a special "structural adaptability," a property which, as I have already said, we must not confound with structural adaptation. The latter is the actual, the former the potential. Now, is this structural adaptability a primary attribute of living organisms, or has it undergone a separate and special evolution? I am not sure that biologists have sufficiently

fibrosis of the lung resulting from the inhalation of irritating particles may help the lung to resist their evil effect; in which case it would happen that while the capacity of the organism to place itself in correspondence with the average environment was diminished—for the increasing fibrosis would sooner or later lead to ill effects all over the body—the lung might possibly be improved in relation to its own specific environment. These remarks apply to all injurious occupations. Most individuals become more or less adapted to enduring pathogenic environments, but sooner or later the general health suffers, the body maintaining a less perfect correspondence with the average, or general, environment.

[1] "It is quite conceivable that aggregates should be rendered more heterogeneous by changing incident forces, without having given to them that peculiar form of heterogeneity for carrying out the functions of life" ("The Epitome of the Synthetic Philosophy," by Howard Collins, p. 119, 1889).

considered this question. According to Herbert Spencer, "any fresh force brought to bear upon an aggregate in a state of moving equilibrium must do one of two things: it must either overthrow the moving equilibrium altogether, or it must alter without overthrowing it; and the alteration must aid in the establishment of a new moving equilibrium. Hence, in organisms, death, or the restoration of the physiological balance, is the only alternative."[1] This is an *à priori* conclusion. It does not, however, follow, although at first sight it may appear to do so, that the restoration of the physiological balance, or, in other words, the adaptation to the new order of things, requires no explanation. The knowledge that one of two things must happen does not explain the 'how' of their happening. The proposition, "A man must either die from a disease or recover," takes no account of the means whereby his death or recovery shall be effected.

The capability tc undergo adaptive structural change in response to alterations in the environment is essential to life, for without it any enduring change in the environment would lead to death—overthrow the moving equilibrium altogether. Now, since it is absolutely impossible, as every student of molecular physics will readily allow, for the most primitive organism, living in the most primitive environment, to be subjected to exactly the same external conditions throughout its lifetime, there must, with every prolonged change in the environment, be a corresponding change—of an adaptive kind—in the molecular structure of the organism; and the power of undergoing adaptive structural reactions, which many unicellular organisms possess, is greater than one might at first sight expect. By skilfully modifying their environment we may cause them to become profoundly changed in their nature; an organism capable of inducing a certain kind of fermentation may, for example, be so influenced by its environment that it shall lose this power, and acquire the power of inducing an altogether different kind of fermentation—

[1] See Collins' "Epitome of Herbert Spencer's Synthetic Philosophy," p. 119.

a result obviously the outcome of definite structural modification.

Structural adaptability being thus necessary to even the most primitive forms of life, we may regard it as a fundamental property of protoplasm, evolved, like all other vital properties, on the ordinary lines of organic evolution, whatever these may be. If, for instance, we may accept Weismann's view of evolution—*i.e.*, that it takes place, by natural selection alone—we must suppose that it has arisen through the most adaptable organisms being selected. But although it is, in a sense, a fundamental and primary attribute of living matter (for without it life is impossible), yet in another sense, as will at once be seen, it is secondary and derived, and granting that it is allowable to speak of it as a primary attribute of the simplest forms of life (of unicellular organisms, for instance), the case is far otherwise with the higher multicellular organisms. The structural adaptability which they manifest is a highly elaborated property, for they are able to adjust themselves structurally to a multiplicity of environments. Instance the alteration in bulk which a muscle undergoes according to the work it performs. Such adaptability to circumstances cannot, in any sense, be regarded as a primary attribute of muscle : it is rather a special physiological property which has needed a special evolution ; matters are so arranged that increased muscular exercise causes hypertrophy, but they might conceivably have been different, atrophy resulting instead. At all events, the mechanism of muscular hypertrophy is by no means simple. The two chief factors are—*a*, increase of the plasma environing the muscle-cells, the result of a nicely regulated vaso-motor activity ; *b*, increased functional activity, *i.e.*, increased contraction of the muscle. It is quite clear that the adaptability in this case is intricate in nature, and can only have been very gradually evolved.

Nägeli, while largely attributing organic evolution to an inherent progressive tendency in organisms, yet acknowledges that adaptive changes may be wrought in them through the environment. He does not, however, attempt to explain these 'purposeful reactions,' contenting himself with merely asserting their existence. Weismann also recognises them, but he contends, and rightly, that Nägeli has exaggerated their importance. The fact is, the latter biologist has confounded hereditary adaptation with individual adaptability, *or the capability of organisms to become structurally adapted* to the external forces to which they are exposed. Thus he makes the mistake of supposing that the thick hairy coat of Arctic mammals is the result of this adaptability, calling it a 'purposeful reaction'—whereas it is really an inherited adaptation, which has evolved through natural selection—a fact which Weismann is not slow to point out. Nevertheless, Nägeli is correct in attributing a very decided influence to the environment as a moulding agent —in recognising, *i.e.*, a considerable adaptability in organisms. And herein I venture to think Weismann is at fault, for, though admitting its existence, he evidently does not realise how wide is its range. "The reactions," he says, "are not usually purposeful."[1] He seems to forget how, in the case of man, every occupation has its peculiar environment, and how each such environment specifically moulds the organism, so that it is, on the whole, improved in relation to it.

All complex organisms are of course (as I have more than once observed) already hereditarily adapted to a complex environment, but, over and above this, they must possess the power of becoming adaptively moulded by alterations in that environment, because the chances are that it will constantly differ in many respects from the ancestral environments. Hence all complex organisms have evolved the power of being moulded adaptively in many different ways; and the greater this moulding capability—this plasticity, the greater the chance of survival. We know that some people are much more adaptable than others. Thus the white races are more adaptable than the coloured, and among the former none are apparently more so than the English, who

[1] "Essays upon Heredity," p. 302.

probably owe to this characteristic much of their remarkable success as colonists.

Whether men or women are physically the more adaptable, I am unable to say, but mentally, as we shall see later, women have the advantage in this respect.

Tendency to minimise the Influence of the Environment in modifying Structure.—The environment of an organism consists of the sum total of external forces acting upon it during its entire existence. Often these forces produce their effects in an indirect manner by causing a modification in the internal-cell-environment, and in such cases their influence as moulding agencies is apt to be overlooked. One of the chief ways in which the environment causes structural change is by leading to use and disuse of parts, and in all such instances, as I cannot too strongly insist, the result is achieved by means of a modification of the individual cell-environments of the part influenced. In order to illustrate this truth, let us consider the present condition of the wing- and leg-muscles of the domestic duck.

The environment of this bird is such that it is no longer compelled to use its wing-muscles to any notable extent; and the wings being used less, the legs are used more. Each muscle-fibre, like each and every cell in the body, is a more or less independent organism, having its own special environment, the environment in this case consisting of influences striking the cell (*a*) through the plasm bathing it, and (*b*) through the motor end-plates. When a muscle is made to contract, vaso-motor influences pass to its blood-vessels, causing them to dilate (probably through the medium of the vaso-dilator fibres), and, as a consequence, the cell is flushed with an abundance of plasm, a profound molecular disturbance being at the same time wrought in it by means of the efferent nervous influences. Wherefore, every time a muscle-cell contracts, its environment is altered; and inasmuch as such contraction has essentially for its end the meeting of some peculiarity in the external-body-environment—as when the bird pursues or is pursued—it is evident that the latter is capable of determining the individual cell-environment, and ultimately the structure of the muscle-cells: the conditions which lead to oft-repeated contraction so modify the muscle-cell environment as to induce increased growth; those which cause diminished contraction so alter it as to induce atrophy; while, whatever tends to prevent contraction tends to produce complete degeneration. We see, therefore, that the atrophy of the wing- and the hypertrophy of the leg-muscles in the domestic duck are ultimately dependent upon modifications in the external-body-environment; and, similarly, it may be shown that use and disuse of each and every structure of the body are essentially determined by the external environment, which is thus capable of working profound bodily changes.[1]

[1] Most biologists consider that the environment influences structure by first modifying function, the modification of function leading secondarily to modifications in structure. To me it seems that modifications in structure and function proceed *pari passu*, that the two are inseparable, the one being the morphological, the other the physiological side of a change wrought through the environment, and that it is impossible to sever the two. I would argue the matter thus. It will be allowed by all that the only way in which the function of a cell can be modified is by a modification of its environment. Now, directly its environment is modified, the cell necessarily undergoes some change in molecular structure, for the slightest conceivable modification in the forces acting upon plastic organic matter leads to some alteration in the arrangement of its atoms and molecules. Thus a structural change is wrought which is at first undiscoverable, but by the continued operation of the changed environment it is accentuated, and the undiscoverable change gradually becomes discoverable. Probably those authors who assume that modifications in structure occur secondarily to modifications in function use the word 'structure' in a more limited sense than I, structure to them meaning 'discoverable structure.' Professor Huxley has said of the lowest rhizopods that they exhibit life without organisation, from which Herbert Spencer argues that *function must be regarded as taking precedence of structure* ("Principles of Biology," § 55). Here the words 'organisation' and 'structure' obviously refer to what may be discovered by the senses, whether aided or not—an altogether too arbitrary use of the words, I conceive. I have elsewhere suggested the use of the terms 'discoverable' and 'undiscoverable' structure, and they explain themselves. No doubt function precedes discoverable structure; but Herbert Spencer would, I believe, be the first to allow that function and undiscoverable structure rise and fall together.

CHAPTER IX.

THE INHERITABILITY OF ENVIRONMENTAL MOULDINGS.

SEEING that the environment is capable of effecting structural changes in the living organism with a view to its adaptation, it is not surprising that many have attributed to it a considerable share in the process of organic evolution.

The continual operation of a specific environment upon several successive generations of a species would manifestly be competent to induce considerable structural modifications, provided such modifications were inheritable, for they would thus accumulate as the species was perpetuated. The question we have to answer, therefore, is : Are the environmental mouldings inheritable, or do they die with the individual ? If they are inheritable, then not only must we conclude that the environment has played a considerable part—I mean direct part—in organic evolution, but that it has also helped largely to increase sexual divergence, for inheritable characters peculiar to one sex show a tendency to be inherited chiefly or solely by that sex in the offspring.

The assumption until recently has been that changes thus impressed are inheritable, but Weismann denies this, and, if he is in the right, the ground is at once cut from under the feet of the Lamarckians, and it follows that—unless we assume that organisms are endowed with an inherent tendency to evolve in different ways—we must regard ' selection ' as the chief means by which organic evolution has proceeded.[1]

In this country Weismann's view, though at first eagerly hailed, has not obtained wide acceptance; few English biologists, except Ray Lankester and the translators of Weismann's essays, have adopted it, and at present there is rather a reaction against it. It deserves, however, our serious consideration, for until the point is settled one way or the other, any real progress in biological research is at a standstill. Upon it turns, in very large measure, the future of mankind. If acquired characters are inheritable, then may we hope to mould our race in a very definite manner. Herbert Spencer, assuming the point, has taught that the inherent tendency to morality in civilised man has evolved by the inculcation in him, from generation to generation, of moral principles; and if such be the case we may expect that the process will finally issue in the evolution of a perfect moral nature—a brilliant vision indeed! Nor does it end here; we may further look for a rapid improvement in his intellectual and æsthetic nature also—nay, in his entire mental being. But if Weismann's view be correct, such hopes are dashed to earth at once, for on his theory improvement in the inherent moral nature can only be achieved through natural selection; that is to say, through the continual weeding out of the most depraved by hanging, imprisonment, and the like; while other mental improvement can be compassed only by indirect means; the

[1] In a work in which I have attempted to apply the principles of evolution to disease, I have taken it for granted that acquired characters may be inherited; for though, when that work was written, the supposition was already disputed, I had not seen grounds to renounce the views I had, in common with most biologists, accepted. Owing to the recent development of this question, however, I have deemed it advisable to consider it here at some length; nor do I think the fitness of my procedure will be challenged, inasmuch as the importance of the subject from the pathological point of view cannot well be exaggerated. Not only does the question of the inheritability of disease turn upon it, but it is of the utmost importance to our present inquiry, for it is essential that we should have clear ideas as to the influence of the environment if we are to determine how far that environment has operated in causing sexual divergence.

inherent intellectual capacity, for instance, could in such case improve only through the survival of those whose wits were sharp enough to compete successfully in the world's struggle. That the intellect has thus very largely evolved there can be no doubt, and I would here express my belief that the growth of morality may similarly, to a very great extent, be traced to the action of natural selection, for the abjectly immoral stand little chance of propagating their kind. On the other hand, one cannot well see how the æsthetic instincts could thus have evolved.[1]

Somatogenetic and Blastogenetic Characters.—In considering the question of the heredity of acquired characters, it is necessary to make a sharp distinction between somatogenetic and blastogenetic characters. Somatogenetic characters are such as arise by the action of the environment upon the soma, *i.e.*, the body as distinguished from the reproductive elements. They are what one ordinarily understands by acquired characters.[2] Blastogenetic characters arise out of the reproductive elements. We distinguish two varieties of these, (*a*) those due to influences operating upon germ and

[1] Mr. Wallace does not believe, as the strict evolutionist must, that "man's entire nature and all his faculties, whether moral, intellectual, or spiritual, have been derived from their rudiments in the lower animals, in the same manner and by the action of the same general laws as his physical structure has been derived." We can only find an adequate cause for certain of man's intellectual and moral faculties "in the unseen universe of Spirit." (For some interesting remarks on this head see "Darwinism," by A. R. Wallace, pp. 461–478. Also Weismann's Essays, pp. 95–98.)

[2] The capacity to acquire a particular character is, of course, inherited. It is, as I have already remarked, by no means always easy to distinguish between what is purely hereditary and what is acquired, but it will be sufficient for our purpose to define a somatogenetic character as one which is induced by some specific environment, which does not, that is, develop unless the organism be subjected to that environment. A corn, for instance, is, as far as we know, purely somatogenetic, for it does not develop unless a certain part of the organism be subjected to pressure. If, however, a corn developed in an individual independently of pressure, it would be purely hereditary. The same argument applies to the drill-bone found in soldiers.

sperm before their union ; (*b*) those resulting from the union of germ and sperm having unlike hereditary tendencies. According to Weismann blastogenetic characters alone are inherited ;[1] and he further contends that of these the characters due to influences operating upon the delicate structure of germ and sperm (= *a*) are restricted in degree and kind, being simply the result, in fact, of their increased or diminished nutrition, and not, therefore, taking any part in evolution—in producing, *i.e.*, new characters on which natural selection may operate ; organic evolution, in his belief, resulting from the natural selection of those blastogenetic variations arising from the union of germ and sperm having unlike hereditary tendencies (= *b*) ; indeed, he maintains, as we have seen, that the chief purpose of sexual reproduction is the originating of inheritable variations for selection to operate upon. If he is right, it follows that organic evolution has essentially been an evolution of germ-plasm.[2] Reduced to its simplest expression, his theory is that the function of the soma has been to " provide the nutritive soil from which the germ-plasm may grow." The (hypothetical) germ-plasm which is handed on from generation to generation has never, be it noted, developed into a soma. Weismann holds that it has ever remained, and will ever remain, a mass of potentialities, for those portions of it which develop into somata are permanently used up in development, and are not handed on to future generations. Hence there must be two great organic kingdoms : that which may be fitly termed the kingdom of potentialities—the vast kingdom of undeveloped plasm, potentially constituting the visible organic world, and the evolution of which is essentially the evolution we have to explain ; and the kingdom of developed organisms—of

[1] Permanent hereditary variability results from the " direct change in the germ or sperm effected by external influences," or from " the mixture of the two individually distinct germ-plasms " (" Essays upon Heredity," p. 327).

[2] This Weismann appears to recognise in the following passage :— " Although natural selection appears to operate upon the qualities of the developed organism, it in truth works upon the peculiarities which lie hidden in the germ cells " (*Ibid.* p. 103).

somata, which are so many appendages of, or outgrowths from, the undying germ-plasm.

Inheritability of Somatogenetic Characters.—Having seen how new characters may arise, we may now consider the question of their inheritability.[1] And first as to somatogenetic characters. Assuming Weismann's view as to the continuity of the germ-plasm to be correct, it is manifest that no impress made upon the soma can be inherited, for the latter in no sense originates the continuous plasm. Weismann goes so far as to assert that he has failed to discover a single case offering unmistakable proof of the inheritance of somatogenetic characters, all supposed instances of such inheritance breaking down upon careful examination. So far as mutilations are concerned, this uninheritability seems to have been definitely proved, but many still believe that impressions wrought more gradually upon the soma, as, for instance, the structural effects caused by use and disuse, are transmitted. Weismann, however, contends that such apparently conclusive cases of inheritability may be explained in a different way. One of the most remarkable instances in point is afforded by the eyes of certain species living in darkness through a number of generations. Certain insects and reptiles inhabiting dark caves are not only quite blind, but their eyes are of a very rudimentary kind. Here is apparently a striking example of the inherited effects of disuse—*i.e.*, of the inheritance of a somatogenetic character. How otherwise can such extensive atrophy be brought

[1] Brook's theory of heredity may here be alluded to. It is a combination of Darwin's doctrine of Pangenesis and Weismann's theory of a continuous germ-plasm. It assumes that somatogenetic characters are transmitted to future generations by means of gemmules which attach themselves to the germ-plasm. The organism, so far as it is a pure product of heredity, is potentially contained in the germ-plasm of the ovum from which it developed, but such of its characters as are due to environmental moulding are transmitted by means of gemmules which are cast off by the altered tissue to form part of the germ-plasm. They are, he further assumes, transmitted chiefly, if not solely, by the male.

about? Hardly by natural selection, it may be argued, inasmuch as the possession of perfect eyes would not place the animal at a disadvantage. Weismann's explanation is as follows:—

(*a*) Natural selection does not cease to operate when an organism has become perfectly adapted to its environment; it continues in order to maintain it at its high level of perfection, for the undesirable variations which must ever and anon occur require to be eliminated. This process Weismann terms 'panmixia,' and he contends that on its ceasing to act upon the eyes of animals living in the dark, these organs slowly degenerate. While admitting that the cessation of panmixia has helped towards the general result, I do not attribute to it the importance that Weismann does. Panmixia has virtually ceased to operate upon the human eye in civilised countries; and although, as Weismann rightly insists, that organ is deteriorating in consequence, the cessation is scarcely likely to lead to any sensible degree of blindness. Indeed, this explanation, though at first sight ingenious, is, if anything, damaging to his case; for if the cessation of panmixia as regards the human eye is leading to any notable effect in it, it is above all leading to myopia—*i.e.*, to a larger and more prominent eye. A considerable degree of hypermetropia might exist in a savage race, but an individual with even slight myopia would be promptly exterminated, as he would be useless in the hunt and in the fight; and the same line of argument may be applied to the case of the lower animals.

(*b*) Weismann further argues that the excessive development (by natural selection) of other organs, such as organs of touch and hearing, of such delicacy as to compensate for the loss of so important a sense as eyesight, will indirectly lead to atrophy of the eyes, on the principle of organic economy; for the animals born with an extra-acute sense of touch and hearing will be less likely than others not thus endowed to excel in their sight organs, and by the natural selection of animals excelling in the former particulars, there will be a selection of individuals possessing imperfect eyes, and the eye will thus tend to deteriorate from generation to generation. I think all must admit that there is considerable force in this argument. Two further arguments which, however, Weismann does not employ, may also be advanced in explanation of the rudimentary eyes of animals inhabiting the dark.

(*c*) Professor Ray Lankester has ingeniously pointed out that animals with the best developed eyes are likely to be attracted by the light, and thus to find their way into the open.

(*d*) I venture to suggest that the possession of eyes, far from being, as Weismann assumes, of no disadvantage to the animals in question, is a very decided drawback. The human eye, though so cunningly protected, is liable, even in broad daylight, to considerable injury, and it would be still more so if human beings had to carry on their life-struggle in the dark. One can scarcely doubt, therefore, that the possession of well-developed eyes—and the eyes of the species in question are, under ordinary circumstances, distinctly prominent—exposes the animals to frequent injury of those organs, and all the ill-consequences ensuing therefrom, so that there tends to be an elimination of individuals having prominent eyes—a first step to their complete atrophy.

I have spent some time in considering this particular case because it shows that we must not too readily assume the inheritability of somatogenetic characters, even in the apparently most conclusive instances. One other example of the apparent transmission of effects wrought through use and disuse may be cited—that of the domestic duck already alluded to. Weismann thinks that the difference in size between the leg- and wing-muscles of this bird may be largely accounted for by the effects of use and disuse during a single lifetime only, and no one who has witnessed the enormous hypertrophy which certain muscles may undergo in infantile paralysis in compensation for the atrophy of others can deny some probability to this view. But whether use and disuse account entirely for the differences in the wing- and leg-muscles of the domesticated bird as compared with its wild congener is a different matter. To answer this question it would be necessary to compare the young of either variety immediately after hatching. There can be no question, however, that use and disuse are capable of producing very marked effects during a single lifetime; wherefore, even assuming that somatogenetic characters are not inheritable, we are able to refer very considerable structural effects to peculiarities of environment, and we shall be prepared to admit that the differences in the respective environments of man and woman are competent to increase very greatly those structural differences which are the pure outcome of heredity.

Whatever the truth concerning the inheritance of somatogenetic characters—and it seems to me at present impossible to decide absolutely one way or the other—I venture to think that the views respecting such inheritance will have to be very considerably modified, even if belief in it has not to be surrendered altogether. The question is one to be decided by experiment alone.[1]

[1] In order to show how difficult (if not impossible) it is to settle this point without direct recourse to experiment, I add to those above quoted the following two cases, which at first sight tend to prove that somatogenetic characters may be inherited. They occurred to me while seeking for arguments for and against Weismann's theory, but, as will be seen, they prove nothing.

The great toe in man normally tends to stand out in partial abduction from the other toes, a fact not lost upon sculptors. This tendency is particularly marked in new-born infants, and also, I believe, in those persons who have never worn shoes or boots. In the human fœtus, moreover, the great toe stands out very noticeably, thus recalling the condition obtaining among existing primates. It is well known, however, that in civilised man the big toe frequently bends towards the others, and that there is sometimes a distinct overlapping of the first, second, or even of the third toes. Now, this overlapping is, beyond all question, due to the wearing of shoes and boots; and if it could be shown that it, or a tendency to it, occurred among the children of civilised communities before they had worn anything on their feet, then the inheritance of somatogenetic characters would be proved beyond dispute. There could be no question here of the cessation of panmixia, or of an effect referable to organic economy. Unfortunately, I have not been able to observe children who for the first years of their lives

Inheritability of Blastogenetic Characters.—Of the two kinds of blastogenetic characters only one kind, viz., those due to the influence of the environment upon germ and sperm, need occupy our attention, since characters arising from the union of reproductive elements having unlike hereditary tendencies obviously cannot be said to result from the direct influence of the environment.

Weismann, as we have seen, does not think that the action of the environment on germ and sperm is competent to produce *marked* individual hereditary variations. He regards the germ-plasm as very stable ; how otherwise, he asks,

have gone barefoot ; therefore I cannot say whether a tendency to overlap ever occurs in their toes ; but I have noticed distinct overlapping in very young children whose parents have assured me that they have taken every care not to cramp the feet. Some of these cases I have carefully watched from birth. Thus in one boy, two years of age, the second toe overlapped the first, after the same fashion as in the mother's case. The mother, an intelligent, sensible woman, declared that she had always been careful to provide the child with shoes "too large, if anything." Only the wearer, however, can tell "where the shoe pinches," and it is quite possible, nay, even probable, that all these cases of deformity are strictly acquired, for I have noticed that when in such instances the naked feet are put naturally to the ground there is a more or less complete return of the toes to their normal position, all that is inherited seeming to be the *tendency* to overlap, namely, a peculiar condition of the toes which renders them, when compressed, very liable to displacement. It is clear that a child with long toes would more readily acquire the deformity than one with short, and, of course, *these* might be inherited from one of the parents. From cases like the above we cannot, therefore, conclude that somatogenetic characters are inheritable, although I venture to assert that the occurrence in a child so young as two years of a peculiar and unusual overlapping of the toes, added to the facts that the mother exhibited the same deformity, and that apparently every precaution had been taken to guard against it, would, by 99 out of 100, be at first sight attributed to inheritance.

The other apparent example of the inheritance of a somatogenetic character is afforded by baldness. That the tendency to baldness runs in families is indisputable. Now, it seems to be a well-established fact that baldness is, in large measure, caused by wearing hats, and the question therefore arises whether this practice leaves an inheritable impress on the scalp, so that the tendency to baldness increases from generation to generation. It is at present impossible to say, but it is not improbable that an individual may inherit baldness by inheriting a condition of scalp peculiarly susceptible to the ill-effects of a head covering.

can we account for the fact that certain animals, such as the crocodile, have not varied for thousands of years? But here he would appear to overlook a fact he was one of the first to point out, namely, that the operation of panmixia would be quite sufficient to maintain such structural fixity. For if the environment remains practically unchanged throughout a series of generations, it seems not unreasonable to suppose that a species perfectly adapted to that environment would remain unchanged also. There can be little doubt that all organic matter is highly impressionable, and in consequence capable of being profoundly modified in its structure by the incidence of external forces; and indeed Weismann himself admits that the germ-plasm can be influenced by the environment in such wise that the offspring shall be affected, citing the fact that when horses are introduced into the Falkland Islands the successive generations get smaller and smaller until they sink to a certain level. He also allows that a species may be modified favourably under circumstances favourable to nutrition, but he contends that all such structural changes are due to improved or diminished nutrition of the germ-plasm. We shall presently show that they cannot be merely referred to such an origin, inasmuch as they are very varied and definite.

But while Weismann admits that distinct inheritable effects may be induced by the operation of the environment upon the germ-plasm, he maintains that the changes thus wrought take no part in evolution, seeing that they are common to the entire number of animals occupying the same area; they are not *individual*, like the characters which result from the union of unlike plasms. Wherefore, there being no *individual types* upon which natural selection may operate, the influence of the environment upon the reproductive elements has played no part in evolution.

But even granting, which I am far from doing, that characters arising in this way have taken no part in evolution, one can scarcely doubt that distinct pathological conditions may be thus induced, and that the tendency to disease may thereby accumulate from generation to generation. Thus residence among the slums of a large city produces distinct physical deterioration, which increases with each generation until family extinction finally ensues; thus also the excessive indulgence in alcohol by two or three successive generations leads to the gradual development of a distinct neurotic taint. This cannot be explained on the supposition that the alcohol causes a diminished nutrition of germ-plasm. We might, perhaps, in this way explain the gradual deterioration and ultimate extinction of a town-dwelling family, but not the transmission of a neurosis induced by intemperance, as may be very simply shown. If the *mother* is habitually intemperate during the whole term of gestation, the fœtus may truly be said to be continually intoxicated; and the nervous tissues, upon which alcohol has a peculiarly injurious effect, being constantly soaked in alcohol during this important period of their evolution, it is no wonder that the child should have a highly neurotic nervous system. But it is a very remarkable fact that the erring parent in these cases of hereditary neurosis is more frequently the father, and consequently this explanation falls to the ground. We learn from Bevan Lewis[1] that intemperance is a potent cause of all the convulsive neuroses, that it is responsible for over two-thirds of the adolescent forms of insanity, and that *in 80 per cent. of these cases the father is at fault!* Now, adopting Weismann's theory of germ-plasm, we must assume that in the large majority of cases the paternal germ-plasm is very specifically influenced by the alcohol, its molecular structure being altered in such a way as to give a peculiar impress to the nervous system of the new being which it helps to form. (I am aware that in many cases of parental intemperance, the intemperance is itself a symptom of nervous temperament; neither do I lose sight of the fact that drunkenness is more common in men than in women; but while due account should be taken of these facts, it can scarcely be doubted that parental intemperance, especially if continued during several successive generations,

[1] "A Text-book of Mental Diseases," p. 204.

is capable of engendering a distinct neurotic diathesis.) I say, adopting Weismann's hypothesis in its broad features, we must conclude—contrary to him—that the germ-plasm may be affected by environmental influences in *a very definite manner*, and that in this way a disease-tendency may accumulate from generation to generation. We need not, in fact, abandon the belief, long held, that acquired disease may be inherited. We cannot, I repeat, if we hold by Weismann's theory, escape from the conclusion that the germ-plasm may be very definitely shaped. How otherwise, to take another example, can we account for the peculiar moulding which the inhabitants of certain parts of the United States are undergoing—how explain the spare frame, the high shoulders, the pigmented skin, the comparatively hairless face, the peculiar voice ? These and other characters must, according to his hypothesis, be due to the influence of the environment on germ-plasm during several generations. To say that they are due to nutritional differences of germ-plasm is scarcely an explanation, for on the same hypothesis there must be as many peculiar forms of germinal nutrition as there are peculiar forms of environment capable of producing inheritable effects. Instead of regarding these different forms of environment, as Weismann obviously does, as the cause of different nutritional modifications in the germ-plasm, I believe that they very definitely *mould* the reproductive units—the microcosms.

Inheritance of Blastogenetic Characters as Limited by Sex.—According to the already quoted law of heredity as limited by sex, characters manifested by one sex at a particular period of life tend to appear in the offspring at the same period. When Darwin formulated this law he was particularly referring, I imagine, to somatogenetic characters. Thus, according to it, the greater muscular activity of the man as compared with the woman would tend to increase in the offspring the differences in the muscular systems of the two sexes. The environments of the two are, in fact, different in many respects ; hence the somata are impressed differently, and this, according to Darwin, would in many ways lead to increased sexual divergence. But if somatogenetic characters are not inherited at all, it is obvious that they cannot be transmitted along one sexual line.

Blastogenetic characters, however, are, as we have seen, inheritable, and there remains the question how far Darwin's law applies to these. There can be no doubt that those characters due to the mixing of unlike germ-plasms come under it, but how about those which are due to the action of the environment upon the germ-plasm ? If, for instance, the female sex were exposed, during several successive generations, to a specific environment—let us say, to certain pathogenic conditions, such as long confinement indoors—would the effects thereby wrought on the maternal germ-plasm lead to hereditary results chiefly confined to the female offspring, or would they be equally distributed along both sexual lines ? Or, to take another example : suppose the deteriorated mares in the Falkland Islands were crossed with healthy stallions imported from this country, would the female progeny show a greater tendency to deterioration than the male ?

Gout in man is, as we know, chiefly confined to the male sex, and this may very plausibly be explained by supposing that this sex has, during many successive generations, been exposed to a gout-producing environment. The tempting conclusion, however, may be wrong. The greater frequency with which gout occurs among men may depend upon some physiological peculiarity ; and it is possible that if all men were henceforth to lead perfectly healthy lives, and all women to follow a mode of life especially calculated to induce gout, the proportion of *innate* tendency to this disorder among the sexes would yet be very much the same as it is at the present time.

It will be seen from this and the preceding chapter that we still have much to learn concerning the inheritability of characters which have been impressed upon the organism by its environment. I would, however, remind those who believe that the direct action of the environment has had no share in the differentiation of the sexes that, though the innate sexual divergences may not thus have arisen, yet the environment may work a very considerable modification even in a single lifetime, being well-nigh competent to produce such marked differences as those, for instance, which obtain between the oft-quoted domestic and the wild duck in respect of the leg- and wing-muscles ; and I have little doubt that the different environment to which the sexes are subjected during their entire *post partum* life is responsible for many peculiarities usually regarded as innate.

CHAPTER X.

PART PLAYED BY THE ENVIRONMENT INDEPENDENTLY OF SELECTION IN RENDERING THE SEXES UNLIKE.

SEEING that the environment, which is capable of working distinct modifications in structure, differs for the two sexes, its action is manifestly a possible cause of sexual divergence, independently of selection. Under it each sex is necessarily moulded differently, but whether the offspring are thereby affected is a different question.

Woman, from the very nature of her being, is compelled to live for the most part a quiet and secluded life. During the procreative period her chief energies and her time are devoted to the production and rearing of children, while to the man falls a more active and a far less circumscribed career. It is true that many savages treat their women as slaves and leave to them most of the heavy manual labour, but they themselves, though less laborious, are always active, being occupied chiefly in the chase and in warfare. Among civilised peoples it is the almost universal rule for the man to till the soil and to go forth and compete with other men in the manifold activities of bread-winning, the women occupying themselves with the care of their children and other domestic duties. The man has, in short, to exercise mind and body more than the woman; what wonder then that these, already rendered stronger than in the woman through sexual and natural selection, should by this means become stronger still?

Thus it comes to pass that each sex is unconsciously educated in those very qualities which are essential to it, the one in animal strength, intellect, and courage, the other in maternal solicitude, unselfishness, and sympathy. Note the two latter. The woman is constantly consorting with children, more especially during her procreative life, and thus, not only is there a fostering of the maternal instinct already evolved through sexual selection, but, because the proper care of children entails constant self-sacrifice and devotion, her power of sympathy and self-abnegation is much more developed than the man's. Maternal love is a gentle, voluminous emotion, smiting

> "—the chord of Self, that, trembling pass[es] in music out of sight,"

and I would here remark that it probably needs a corresponding refinement of nervous organisation; that is to say, the so-called 'tender' emotion is the outcome and the expression of a fine, delicate, 'tender' nervous system. And meanwhile the woman is not called upon to protect and provide for herself and her young to any large extent; that is the work of the husband and father (names signifying literally the 'house-manager,' the 'one who feeds'), and therefore, in her, courage, pugnacity, and daring are developed in a minor degree.

The man, during his long past, has received a totally different training. He has not been educated in unselfish devotion. He has been, as he is now, engaged chiefly in competition with other men, and this not in the limited sphere of home life, but in a wide arena where his courage, his combativeness, and his cunning have been continually tested and proportionately developed.

Hence in bravery, daring, pugnacity, love of adventure, and ingenuity he is superior to the woman, while in unselfishness and domestic affection he is her inferior. He is at one and the same time more intellectual, yet more passionate; more violent in the expression of his emotions, yet less deeply permeated by their influence. This no doubt partly arises from the fact that the complex sexual system in the woman is a perennial fountain of feeling, and that the maternal instinct is largely bound up with the emotions ; and partly from the fact that woman is less intellectual than man, the emotional and intellectual portions of our being standing to one another somewhat in inverse ratio.

Another characteristic mental trait of man as distinguished from woman is possibly in some degree traceable to the influence of his environment in that past period when tribal conditions prevailed. To the men fell the duty of defending the family, and that association of families which constituted the tribe, against the attacks of neighbouring tribes, and being thus knit together in bands, fighting against a common enemy in a common cause, a spirit of clannishness, or *esprit de corps*, gradually evolved among them, to which the women, occupied in the care of children and the like, remained comparative strangers. The advantage of a cohesive force which shall combine the units of a community, like the atoms in a molecule, is obvious, and although natural selection probably shared in its evolution, it is possible that it originated partly in the manner I have indicated—*i.e.*, by the direct action of the environment. This clannishness, so strong among men and so weak among women, is, as we shall see later, a fact of some interest to the physician.

The foregoing considerations throw some light on the tendency to disordered nervous action which women display. Circumstances have combined to make the nervous system of the man more vigorous and stable than that of the woman. Intense combativeness and courage tend to go along with sturdiness and stability of the nervous system, while a high degree of emotional development conduces to nervous instability : in proportion as the emotions are brought under intellectual control, in that proportion, other things being equal, will the nervous system become more stable. Am I not right in saying that the intellectual fighter, as well as the prize-fighter, is generally a man of tough nervous fibre ? It must, however, be acknowledged that courage and pugnacity may co-exist with a highly sensitive nervous organisation, as may also a high degree of intellectual development. The bravest warrior will sometimes blush like a girl from very bashfulness, and is not infrequently the victim of some serious neurosis. Most physicians will be able to recall such instances. Marlborough and Gordon suffered from angina pectoris; Cæsar and Napoleon, from epilepsy.

Now, not only do the sexes lead different lives, but the mode of life regarded as proper to each sex, and in part determined by natural laws, begins to be apportioned at a very early period in the career of the individual. Boys and girls are placed by their parents, from choice rather than from necessity, amid different environments; they are, in short, educated differently, that they may each receive the training best calculated to fit them for performing their proper share in the world's work. (How far this desirable end has been attained by the methods hitherto employed we need not here discuss.) Education, in its narrowest sense of 'scholastic,' has probably played a far less important part in evolution than is commonly supposed, for we must remember that even the most favourably circumstanced are not, from the biologist's point of view, very distantly removed from ancestors who formed part of the masses, and that these masses have only recently received any education at all; and inasmuch as evolution deals not with a few, but with many generations, it is clear that scholastic education cannot have materially contributed towards the differences in the sexes. Moreover, such dissimilarities as are traceable to it are obviously confined to the so-called upper classes.

But with this limitation, education has no doubt tended to accentuate sexual peculiarities. The woman's lot in life being of the quiet, domestic order, she has been taught to be gentle, graceful in her movements, sedate; the natural impulses to vigorous and healthful exercise of mind and body have been curbed. She has been cramped in her muscles, and cramped, too, in her brain; for although great pains have been bestowed on what may be called the superficial adornment of her mind, no determined effort has been made to secure for her a robust and well-developed intellect. Men, on the other hand, have been taught to be nimble, physically and intellectually, and they alone, till very recently, have been admitted to the learned professions. These educational disparities cannot fail to have impressed the sexes in the upper classes differently.

But much as woman has been, as a rule, handicapped intellectually, she has suffered still more in another direction. *In civilised communities the women lead a much more indoor life than the men*, and they must have thereby been physically injured. There can be no doubt that man, like most other terrestrial animals, is essentially adapted to an outdoor life. All the mammals—practically all—spend their lives in the open, and it is certain that our semi-human ancestors did so too. Man, having therefore evolved under these conditions, is structurally adapted to them, and his health invariably suffers if they are withdrawn. No doubt if his dwellings were properly constructed, due attention being paid to ventilation and other sanitary details, the ill-effects of his present mode of life might be reduced to a minimum ; but for ages past houses have been built without regard to hygienic principles, and they have in consequence been very far from affording that kind of environment to which man is by his nature fitted. Now, inasmuch as domestic duties tie the woman to her home during the greater part of the twenty-four hours, she more especially has suffered in this direction. The man, on the other hand, has been, and is still, for the most part engaged in outdoor pursuits, and hence, since the earliest dawn of civilisation, the two sexes have been exposed to a markedly different form of environment ; and the advantage being all on the side of the man, the health standard of the woman must inevitably have been relatively lowered. Thus it happens that women are apt to break down in health and to 'go off' rapidly after maturity, and especially after matrimony, while men preserve their vigour and whatever comeliness they possess far on into adult life. The beauty of the woman, like that of a flower, is delicate and fleeting: it buds and blossoms, and is gone while we look at it.

In agricultural communities the girl, until she reaches womanhood, lives almost as much in the open air as the boy. It is when she becomes a woman, marries, and has to look after her home that a marked contrast between her environment and the man's obtains, and it is then that she tends to fail in health. There is, it is true, some contrast always between the environment of the boy and of the girl, for boys are, as a class, the more active, enterprising, and adventurous; but from the health point of view alone, their environment is more or less equal, and even supposing the girl's to be much more healthy than the boy's, the evil effect upon her would not show the same tendency to be transmitted in the female line as if induced after adult life, for, as already observed, characters manifested by one sex before the procreative period tend to be inherited by both sexes alike.

During recent years the urban population of this and many other countries has increased at the expense of the rural population, and among the former the contrast between the two sexes as regards confinement is obviously not so great as among the latter. But evolution does not deal with a few, but with many generations; and if we extend our survey, not over years, but over centuries, we shall find that the general rule has been for the woman to be much more confined than the man. It should be remembered, moreover, that families rarely live for many consecutive generations in towns. Migration from town into country and from country into town is constantly occurring, so that, apart from the fact that residence in large towns tends to family extinction, for this reason alone it seldom happens that a family is purely town-bred for long together. Except, indeed, in fairly large towns this would be impossible, for in the smaller ones families are compelled to intermarry to some extent with the surrounding agricultural population; in such towns, moreover, a goodly number of the men follow outdoor pursuits. That the confinement entailed by town-life exerts an injurious influence on the men, and makes them more like women in their nervous health, is evident to every one who has opportunities of comparing country with town people. The Jews are essentially a town-bred people, and there has therefore not been, in their case, that contrast between the environment of the two sexes which has obtained with others. Now, it is well known that among the Jews the men are highly nervous and excitable.

I must guard against any misapprehension of my remark respecting the weakened health of the girl when she reaches womanhood. I do not say that the more or less sudden change of environment she then experiences is the sole cause of the failure in her health, but that the predisposition to functional disorder which she then shows, and which, no doubt, is due chiefly to the activity of her sexual system, is increased by the change. The presence of a complicated sexual system does not necessarily imply inferior health, as may be proved by studying the health of savages and the lower animals. Among the former the men and women live equally exposed lives, and there is not that broad contrast between the nervous health of the sexes which is noticeable among civilised races ; this is, I believe, also true of the gipsies. At the same time, her complex sexual system undoubtedly predisposes the woman to nervous troubles, apart altogether from the ill-effect of her usual environment, and this is proved by the fact that in spite of her indoor mode of life she almost always enjoys much better nervous health after the climacteric than during the period of sexual activity. Her nervousness is, in fact, more or less co-extensive with her sexual life. Furthermore, the women of primitive peoples show the characteristic feminine tendency to nervous disorders. Thus the only negress patient who ever came under my observation manifested in a well-developed form those symptoms of the climacteric which are so common among the women of white peoples.

It is not only from the effects of indoor confinement, pure and simple, that woman has suffered; the responsibilities, worries, and anxieties which the care of children entails cannot have failed to render the nervous system highly irritable. True, the man has his cares and troubles also, but they are probably not of that *irritating* kind which the mother has to bear. The farmer, pondering on the possible failure of his crops, is not subjected to the same nervous strain as his wife who sits up all night with a teething baby. For it is not so much the great troubles of life that wear and fret as the little cares. The former a man gathers up his strength to face; the latter insidiously eat that strength away. Most of us have known men who have met the reverses of fortune with equanimity, and who yet have given way to violent outbursts of impatience at trifling losses and discomforts. And so it is that incessant, petty worry—"the fretful stir unprofitable"—has a more disastrous effect upon the nervous system than real misfortune. Nor is this surprising, for life, after all, is made up of trifles, and the rock that defies the impact of the storm yields to the corrosive action of the raindrop.

In the present age, when the struggle for existence is fierce, men have far more business anxieties than they had in former times, but, taking one thing with another, I do not believe that the business troubles of a man are so harassing as the domestic troubles of the average woman. Where means are ample many of these no doubt are removed by servants, yet even then a conscientious and devoted mother cannot hope to go scot-free; there are anxieties which no paid help, however efficient, can bear for her. But ample means, it must be remembered, are the lot of a very small minority, and among the multitudinous poor the men, there can be no question, are far less worried than the women. Let any one compare the daily lot of the poor man, working away from home, with that of his wife, incessantly busied in the house, itself usually more or less squalid, amid the tumult and interruptions of her small flock.

That children may be very irritating to the mother, especially when cooped up in a narrow space, is obvious enough. One of the commonest complaints a woman makes when suffering from nervousness is that her children 'worry' her. Under ordinary circumstances she can put up with their tricks and the trouble they cause, but when her health sinks below par, she can do this no longer. Losing all self-control, she is apt to give way to angry outbursts, and a woman will often tell us, with tears, that she has had, by the strongest effort of will, to rush away from her children lest she should lay too violent hands upon them. Sometimes this feeling is actually homicidal; the wretched woman is afraid to be near a knife for fear she shall destroy one of them. No doubt, in such cases we are on the borderland of insanity, and must not attribute too much of the causation to the worry of the children; but few, I suppose, will deny the main truth of my contention.

Indeed, it is a matter of great wonder how the women of the poorer classes continue to exist under the constant stress of poverty and the never-ending worry of a large family. The fact is, as we have already had occasion to notice, women have extraordinary endurance under trial. Here is a case in point. A woman thirty-five years old came to me with her child who was sickening with measles. She was dressed in mourning and had, in fact, "just buried two children." She was very pale and hollow-cheeked, there were large black marks under her eyes, and almost all her front upper teeth had broken off from decay. She was big with child and expected very soon to be delivered; her husband was out of work, and every available article had been pledged. Truly, in her case sorrows had come "not single spies, but in battalions." How flesh and blood can endure such trials is, I say, very wonderful, but resignation and endurance are two of woman's chief characteristics; they have been educated in her from the remotest times. Long before man attained his present form he had dominated woman, and she had learned to bear.

Many will dispute that the woman is exposed to a more harassing form of mental environment than the man, and they may cite as opposed to this view the fact—certainly somewhat remarkable since the woman has a far more unstable nervous system—that more men go mad than women. Maudsley without hesitation explains this simply by reference to the differences in the environment of the sexes. He sums up the position thus: Men are exposed to more powerful extrinsic causes: women to more powerful intrinsic causes. "The strain of work," he writes, "for competence or wealth, the anxieties and apprehensions of business, the burden of family responsibilities, weigh more heavily as a rule upon the men who are the breadwinners than upon women."[1] He further goes on to remark that intemperance and sexual excesses, both of which are strongly predisposing causes of insanity, are more common among men than women.

To my mind, these alone are fully adequate to account for the excess of insanity among men, quite independently of an extra mental strain, which extra strain, moreover, I am—as I have stated above—inclined to disbelieve in, holding it to be more than counterbalanced by the harassing effect of home worries upon the woman.

A question of some interest here presents itself. If all the afore-mentioned external influences tending to overturn the mental balance are stronger in the case of man than of woman, should we not expect the nervous system, or, at all events, that highest portion of it which constitutes the material substratum of mind, to become gradually less and less stable in him as time goes on? This surely must be the necessary result if structural characters acquired by the male during procreative life tend to be inherited by the male offspring during the same period, the continued inheritance and accumulation of nervous weakness inevitably rendering the male, so one would think, the more nervous of the two.

It is, however, probable that a tendency to insanity does not necessarily go hand in hand with weakness of the entire nervous system; the subjection of man during many generations to an excessive action of the influences under

[1] "Pathology of Mind," 1879, p. 2.

discussion might very conceivably induce instability of the higher, or *mind*, centres, while the inferior nervous centres retained their stability, so that in general nervous health the man might still remain superior to the woman. Against this it may of course be urged that all neuroses are interchangeable—that is to say, that the fundamental weakness of the nervous system manifesting itself in one instance in loss of mental balance may express itself in many other ways; but, all things considered, we shall probably be right in regarding the insane diathesis and the general tendency to nervousness as separate, and in a measure independent of each other. Therefore, supposing a brother and sister to inherit an equal tendency to insanity, we should, when each becomes adult, expect the woman to be the more nervous. Exposed as her sex has been for ages past to conditions which lower the general bodily health, and to the harassing and irritating worries of domestic life, and possessed, moreover, in her own person of a highly complicated generative system, she is the inheritor of a delicate and unstable nervous organisation, which manifests itself in that condition rather vaguely expressed by the term 'nervousness,' and although such nervousness will probably always be greatest in those women who have the insane diathesis, it may be present in a highly marked degree without any special tendency to insanity.

But though we may expect the woman always to remain the more nervous of the two, and this in spite of the ill-effects on the man of intemperance, sexual excess, and brain strain, it is nevertheless probable that if men continue from this time forward to be more exposed than women to conditions inducing insanity, they will become increasingly nervous; and it seems to be generally acknowledged that this is what is actually happening.

Seeing, then, that the different environment to which each sex is exposed tends to mould each in a particular way, it follows that we have in our hands a power whereby we can alter the structure of both: we have only to subject each to a specific form of environment. Whether acquired characters are, or are not, inheritable, we can at least benefit the individual; and until the reverse is proved we shall, for practical purposes, do well to assume their inheritability.

According to Darwin's laws of heredity, characters acquired before the period of procreative life tend to be inherited by both sexes equally, and, if such is the case, we are debarred from exercising a specific influence on one sex alone before puberty. If, for instance, all girls were trained to habits of activity and perseverance from an early age, and all boys to habits of laziness and effeminacy, we should not thereby and directly obtain a race of effeminate boys and of masculine girls. Yet, indirectly, we should no doubt produce a specific racial effect upon the two sexes, because such different modes of training would affect the whole future of the individual, and the sexes thus differing in energy and perseverance during, as well as before, procreative life, would tend to transmit their peculiarities to the corresponding sexes in their offspring.

But in order to modify either sex alone we must begin in the nursery and the schoolroom, and we should, as Darwin observes, be increasingly careful, as adult life approaches, that the influence exerted be beneficial; we should then have ground to hope for an inheritance of the improvement thus wrought by one sex in the offspring at the corresponding period of life. But, as already stated, it is at this very period that the environment of the woman is injuriously altered: now is the time when it is no longer thought proper to allow her to obey the natural promptings of girlhood, and now it is that her long turn of incarceration begins, —or so at least it has been till quite recently; the modern movement towards the emancipation of woman from time-honoured restraints will no doubt work important changes in this respect as time goes on.

I have said that the environment is competent to produce very marked structural modifications in the course of a single lifetime. I am, indeed, confident that the different environments to which the two sexes are exposed are capable of producing during a simple lifetime many of the sexual peculiarities (psychic or otherwise) usually regarded as innate; which is as good as saying that if men and women were to change places, and each follow the other's mode of life, the men would be much more effeminate, and the women more masculine than at present.

In order to realise the truth of these statements it is needful to remember how very different the environments of the two sexes are in their psychic aspect; how circumscribed, for instance, is the life of a woman, how calculated to foster an unhealthy narrowness of mind. It is certain that many of the little weaknesses which are regarded as peculiarly feminine, belong essentially no more to the woman than to the man; they are but the result of her restricted field of mental action. A dull routine of household duties, with few or no mental distractions, could not fail to act with equally injurious effect upon the masculine mind if imposed upon it.

Then as regards the influence of the environment on the general bodily health. The ill-effects of woman's customary environment as contrasted with that of man, is well brought out by those cases in which the narrow, circumscribed, and comparatively monotonous life of the average woman is replaced by the bustling, active career of the actress, public singer, or the like. There seems to be little doubt that the latter, as a class, enjoy very good health, and this in spite of late hours and other unhealthy conditions. The beneficial influence of an active, stirring life upon the general health was well shown in the following case. A young woman, aged nineteen, had been for two or three years delicate; in fact, she was thought to be in a decline. She had a spare frame, was very anæmic, and suffered from the many symptoms, nervous and other, which usually accompany such a condition. As she gave promise of a good voice, she was at this time sent up to London to go through a regular course of musical training. During her two or three years of study her health improved somewhat, but at the end of this time she was still regarded as decidedly delicate. Shortly after she made her appearance in public, however, she took a decided turn for the better; the constant travelling from place to place to fulfil her engagements, and the attendant excitement, acted apparently as a tonic; she grew rapidly strong and stout, and at the present time it would be difficult to find a more robust specimen of her sex.[1]

[1] Doubtless the healthy exercise of singing has in this case had much to do with the good result, and here let me say that I do not think we make sufficient use of singing as a therapeutic agent. In it we have a most effective means of developing the lungs. The very deep inspirations which the singer is compelled to make cause a distension of a number of air-vessels ordinarily in a condition of semi-, or almost complete collapse; and, as a result, the circulation is hurried on through them, and they are able to grow to their fullest capacity. The same is true of the entire lung. Now, well-developed lungs, by facilitating the process of oxygenation, favour the nutrition of the body in general; therefore, by exercising the lungs in the manner indicated, we indirectly work a beneficial effect on the entire body. I believe that singing is a valuable adjunct in the treatment of anæmia, and that it is also very useful in the case of individuals possessing phthinoid chests. For what is a phthinoid chest but one encasing small, ill-developed lungs? The individual is phthinoid simply by virtue of these, and it is possible that the inherent predisposition to the disease is due entirely to his having inherited them—small, feeble, sickly lungs being unable to resist the repeated onslaught of the tubercular bacillus. Even the most healthy lung is predisposed to tuberculosis, for its structure peculiarly fits it to entangle and detain the parasites; how much more predisposed must a congenitally weak lung be!

That the vital capacity of the lung may be increased by habitually taking a series of deep inspirations is a well-known fact; many people, in fact, never use their lungs to their full extent. These organs do not, in ordinary breathing, extend downward to the extreme limit of the thorax, the diaphragmatic and costal pleura being in apposition for some distance, especially in front. Thus, the right lung, in ordinary inspiration, only extends down to the sixth rib in the nipple line; but during extraordinary inspiration the lungs insinuate themselves between these two layers of pleura, and in those who are accustomed to take deep inspirations their lower margins can be brought as low as the costal arch. The average individual, however, cannot inflate to this extent. The hypertrophy of the lung resulting from this kind of exercise manifests itself chiefly in increased *depth* of chest, as is strikingly shown by our great public singers. It must not be forgotten, however, that good singers start in the first instance with large chests, without which success in public singing is impossible.

I have said that deep inspirations favour the flow of blood through the lungs, from the right to the left side of the heart. Thus it is that occasional sighs (in other words, deep inspirations) interrupt the shallow breathing] constituting so-called 'breathless attention.' The shallow breathing leads to stagnation of blood in the right heart, and an occasional deep inspiration is necessary to relieve this. One is rather apt to lose sight of the fact that the respiratory movements are absolutely necessary to proper pulmonary circulation. That such is the case, however, is readily proved by holding the breath for a moment or so, when the stagnation of blood in the right heart will provoke epigastric pulsation and cause the veins in the head and neck to swell. It is further proved by the fact that the right heart is found engorged after death from suffocation or drowning, or, indeed, whenever respiration has stopped before the heart has finally ceased to beat. Lastly, it is shown by the remarkable hypertrophy and dilatation which the right heart undergoes in chronic lung diseases. In all these, the breathing is shallow, there is interference with the proper expansion and collapse of air vesicles, and one of the most important agents in pulmonary circulation is thus rendered less effective, with the result that the right heart has more than its normal share of work. This I believe to be the chief cause of those changes in the right heart which follow upon lung disease, though no doubt obliteration of vessels and narrowing of capillaries by longitudinal stretching (as in emphysema) are minor factors. That mere interference with respiration is competent to produce the cardiac change in question, is proved by the right heart suffering in spasmodic asthma unaccompanied by organic lung mischief. Periodic interferences with respiration are thus alone sufficient to affect the heart.

The above conclusion seems so evident that it is a wonder it has not been universally accepted, but in such works as I have consulted this important factor in the production of right heart disease secondary to lung mischief is not mentioned. Thus Greenhow, in his Lectures on Bronchitis (XIII. and XIV.), while attributing the consecutive changes in the right heart to 'pulmonary obstruction,' does not attempt to account for this obstruction ; yet it is quite evident that some obstruction there must be, and the question we have to answer is: What is its exact nature? Similarly, Balfour, in his excellent clinical lectures on heart diseases, lays great stress upon the diminution in the capillary area as the cause of the right heart change, but in the tricuspid regurgitation which not infrequently attends, temporarily, an attack of acute bronchitis and in which there is no such narrowing, he attributes the cardiac implication to "febrile relaxation and malnutrition" of the right heart (p. 146). Yet these conditions obtain in many other disorders than bronchitis without any such marked implication of the right heart, and although such relaxation and malnutrition play some part in provoking this latter, I have little doubt that the chief cause lies in the lungs themselves. During acute bronchitis there is a marked interference of that rhythmic expansion and contraction of air-vessels which is absolutely necessary to the proper flow of blood through the lungs ; there is an impediment in the capillary area, and hence increased work is thrown on the right heart, and this may result in temporary tricuspid regurgitation, and, if long continued, to hypertrophy and dilatation of its chambers.

CHAPTER XI.

THE VIEWS OF GEDDES AND THOMSON.

It was shown in an earlier chapter that germ and sperm cells contain in their nucleus or 'nucleoplasm' a substance (called by Weismann 'germ-plasm') which is the bearer of hereditary tendencies, and that the differentiation in the bodies of the two sex-cells has for its objects the bringing together of the two kinds of germ-plasm, and the nourishment, in the earlier stages of its career, of the new being arising from their union.

Whether or not we accept Weismann's view as to the existence of ovogenetic and spermogenetic nucleoplasm, few biologists will deny that the nuclei of the ovum and of the spermatozoon contain the essential germinal material, or 'germ-plasm.' Few, again, will deny that the germ-plasms of the ovum and spermatozoon take, on an average, an equal share in shaping the destiny of the new being to which they give origin. Sometimes the germ-plasm of one sexual element, sometimes that of the other, exerts the greater influence, so that in one case the offspring is more like the father, in another more like the mother; but, striking a general average, we may say that the germ-plasms of the ovum and spermatozoon share equally in determining the structure of the offspring.

Here we must again ask whether the primary object of fertilisation is the bringing together of two germ-plasms which differ only in that they are the bearers of *different* *hereditary tendencies;* or whether it is the union of two germ-plasms having quite different *physiological natures.* Let us carefully distinguish between the two. Granting that the two reproductive cells are equal as bearers of hereditary tendencies, it is still open for us to suppose that they are physiologically different, that each is characterised by physiological properties peculiar to it, and that it is the coming together of two such physiologically unlike plasms which constitutes the essential object of fertilisation.

We have seen that, while Weismann acknowledges sexual reproduction to have arisen in the first instance from some physiological necessity for the union of different cells (as in the conjugation of unicellular organisms), he is unwilling to allow that such necessity now exists among the higher organisms, contending that in the process of evolution this need has died away and been gradually replaced by the necessity for the union, not of cells possessing different *physiological*, but different *hereditary* tendencies, in order that, by the commingling thereof, abundant variations shall arise on which natural selection shall operate. Geddes and Thomson, on the other hand, although admitting that sexual reproduction has in this latter way very materially aided evolution, contend that the essential purpose of sexual union was at the beginning, is now, and is likely to continue to be, the union of cells physiologically unlike.

According to these writers, the differences in the bodies of the ovum and spermatozoon do not subserve secondary ends but constitute primary physiological differences, which are supposed to permeate the entire reproductive cell, including its nucleus. They maintain, moreover, that these physiological differences are not limited to the sex-cells, but characterise the entire individual—that the male individual and male reproductive cell on the one hand, and the female individual and female reproductive cell on the other, have physiological characteristics which constitute in the one case the essence of 'maleness,' in the other the essence of 'femaleness.'

These differences they sum up by saying that the male organism is the more katabolic, and the female organism the more anabolic. In other words, the male organism is characterised by the tendency to a rapid breaking down of complex molecules, and by a corresponding activity (expenditure of energy); the female organism by the tendency to a building up of molecules and by a corresponding inactivity or passivity (storage of force).

Similarly in regard to the reproductive elements: the spermatozoon is essentially katabolic; its energy is expended, not stored up, the cell being highly active and correspondingly minute; while the ovum is essentially anabolic, there is a strong tendency to the building up of molecules and storage of energy, and the cell is correspondingly large and inactive.

Thus the large, sluggish, inert ovum stands in striking contrast with the small, active, katabolic spermatozoon.[1]

It will be seen that in these authors' opinion the anabolic and katabolic tendencies constitute the criteria of maleness and femaleness—the degree of maleness and katabolism on the one hand, the degree of femaleness and anabolism on the other, rising and falling together.

Now I presume no one will for one moment deny that the ovum is more anabolic than the sperm, and the female organism more anabolic than the male, but the view taken in this work, and probably that which most modern biologists will be inclined to follow, is that the predominant anabolism on the one hand, and the predominant katabolism on the other are contingent, and result from the division of labour. According to this view, the spermatozoon has become modified for the purpose of securing the union of the two nucleoplasms, the body being especially adapted for motion, for seeking out and impregnating the ovum. The latter, on the

[1] The difference in size, answering to the difference in anabolic and katabolic tendency, is not always maintained, for while the germ is always larger than the sperm, and sometimes enormously larger, the female is by no means always larger than the male. Up to the level of the amphibians she generally is, but the reverse is the rule in the case of birds and mammals.

other hand, has become modified for the purpose of providing a fit environment for the young embryo, notably for furnishing it with proper food-stuffs at a period of its existence when it is not yet able to shift for itself. Similarly, the entire male organism has become modified with a view to seeking out and impregnating the female; and the latter for securing the proper environment for the new being during the earlier periods of its career.

Geddes and Thomson, however, hold a very different opinion regarding the morphological differences between sperm and germ, and between male and female. Respecting the latter, they write: "The agility of the male is not a special adaptation to enable that sex to exercise its functions with relation to the other, but is a natural characteristic of the constitutional activity of maleness. So brilliancy of colour, exuberance of hair and feathers, activity of sweat glands, are not and cannot be (except teleologically) explained by sexual selection, but in *origin and continued development* (the italics are mine) are the outcome of a male, as opposed to a female constitution. To sum up the position in a paradox, all secondary sexual characteristics are at bottom primary, and are the expression of the same general habit of body as results in the production of male elements in the one case, or female in the other."[1] Later, however (pp. 29, 30), while asserting that each sex has differentiated towards its respective goal by virtue of its inherent maleness or femaleness, they admit that sexual selection has been a "minor accelerant in the differentiation of the sexes," and, indeed, this concession is necessary to explain the greater size of the males of birds and mammals; for otherwise, to be consistent with their theory, the males should be smaller than the females, just as the spermatozoa are smaller than the ova.

[1] "The Evolution of Sex." Patrick Geddes and J. Arthur Thomson, p. 22. I fail to see the grounds on which the authors make this statement. The continual selection of the most beautiful, most powerful, or otherwise specially endowed males is surely competent to account for these sexual characteristics without any recourse to teleology.

Now, in my belief, this theory of a fundamental physiological distinction between the male and the female organism is demonstrably erroneous. The fact that the secondary sexual characters are occasionally transposed is surely of itself absolutely fatal to it. Yet, curiously enough, those singular cases in which the hen bird is the more gaily decked, active, eager, combative, ferocious, and courageous, and the male the more passive and sober coloured, are actually cited in support of it, its advocates arguing that in these special instances the female is the more katabolic, the more male, while the male is the more anabolic, the more female; so that the fundamental physiological differences necessary to sexual reproduction still obtain, being merely differently distributed. But the fact is strangely overlooked that in these cases there are no corresponding differences between ova and spermatozoa. The ova of the katabolic females are as anabolic as ova in general, while the spermatozoa of the anabolic males are as katabolic as they usually are . . . . Could we have a more perfect proof that, as far as sexual *individuals* are concerned, the so-called maleness and femaleness are not primordial and essential differences, but secondary and derived, the result, in fact, of sexual selection? [I lay particular stress upon these cases of transposition of secondary sexual characters, because they prove conclusively the unsoundness of the above views.]

Another argument against these conclusions is afforded by hermaphrodite organisms. Such organisms are both male and female, but how, I would urge, is it possible (as it must be, if maleness and femaleness are synonymous with katabolism and anabolism,) for one individual to be pervaded through its entirety by two diametrically opposite, and fundamentally distinct physiological habits? How can one organism be throughout, at one and the same time, essentially anabolic and essentially katabolic? The presence of the one tendency involves the absence of the other. It is true that many hermaphrodites are dichogamous; but it is almost certain (although Geddes denies this) that such dichogamy takes place because it is of advantage to the organism that self-fertilisation should be prevented, and not because the ripening of the two sexual elements at the same time is physiologically impossible. And again, a large number of organisms are not dichogamous, they *can* produce the male and female elements at the same time; in which cases tracts of tissue in close proximity give rise simultaneously to highly anabolic and highly katabolic cells. Hence it is manifestly impossible that the production of either kind of cell by a unisexual organism implies a pervading tendency throughout the organism either to anabolism on the one hand or to katabolism on the other.

While, therefore, we cannot agree with Geddes and Thomson, that the katabolism and anabolism which undoubtedly characterise the male and female sexes respectively, express primary and fundamental sexual differences, we shall nevertheless find it useful to direct our attention very carefully to what is in any case a most important sexual difference, and one having no small pathological significance. I therefore now propose to consider the chief arguments on which their conclusion is founded.

The cochineal insect affords a good example of the characteristic katabolism and anabolism of the male and female respectively. "The female cochineal insect, laden with reserve products in the form of the well-known pigment, spends much of its life like a mere quiescent grub on the cactus plant. The male, on the other hand, in his adult state is agile, restless and short-lived . . . . a vivid emblem of what is an average truth throughout the world of animals—the *predominant passivity of the females*, the *predominant activity of the males*."[1] Again: "The insect order of bee parasites is remarkable for the completely passive and even larval character of the blind parasitic females, while the adult males are free, winged, and short-lived. Throughout the class of insects there are numerous illustrations of the excellence

[1] *Op. cit.* The italics are mine.

of the males over the females, alike in muscular power and sensory acuteness. The diverse series of efforts by which the males of so many different animals, from cicadas to birds, sustain the love-chorus affords another set of illustrations of pre-eminent masculine activity."

This contrast is, however, not so marked among the higher animals. In them "it shows itself rather in many little ways than in any one striking difference of habit, but even in the human species the contrast is recognised. Every one will admit that strenuous, spasmodic bursts of activity characterise men, especially in youth and among the less civilised races; while patient continuance, with less violent expenditure of energy, is as generally associated with the work of women."

It is further pointed out that the body temperature is in many cases lower in the female than in the male. It is, for instance, in plants, insects, and the human species, and this is taken to indicate that with them the females are more anabolic than the males. The fact that in many species the females are longer-lived than the males points in the same direction, and the authors suggest that women are longer-lived than men, apart altogether from the greater immunity of the former from unfavouring external circumstances.

They also contend that the predominant katabolism of the males is shown by their frequent brilliant colouring. Pigments being waste products, an excessive production of them is "the expression of intense katabolism."[1] They similarly explain the superabundant growth in the male sex of hair and feathers, the exaggerated activity of the sweat-glands, and the development of combs, wattles, horns, and such-like skin excrescences—all of which, they hold, point

[1] The theory that the various skin appendages may subserve the purpose of excretion was, I believe, first advanced by Sir James Paget in his classical lectures on surgical pathology: "The hair, for example, in its constant growth, serves, not only local purposes, but for the advantage of the whole body, in that, as it grows, it removes from the blood the various constituents of its substance, which are thus excreted from the body."—3rd Edit., p. 18.

to "a predominant activity in the skin of the feverish males;" and they quote Rolf to the effect that it is the vigorous growth of the blood-vessels in the horn protuberances of the stag and in the feather papillæ of birds which 'conditions' the excessive growth of horns in the one case, and of feathers in the other—a position which no one is likely to dispute with them. But what, I would ask, conditions the arrangement of the blood-vessels, so that the various skin appendages shall grow according to a fixed and definite design? That the frontal protuberances of the stag, for instance, receive during the growth of the antlers an abundant blood-supply is only what might be asserted *à priori*, but the existence of this abundant blood-supply does not explain how the antlers have, through the ages, evolved to such beautiful proportions, and the only reply forthcoming is that here sexual selection must be admitted to have played some part, though its influence has been secondary to that of the predominant katabolic habit of the male.

Again, though the assumption that the brilliant colouring of the males is due to extreme katabolism is ingenious, it is one against which strong arguments may be advanced.

In the first place, the excretion of pigments by the skin is a very slow and laborious process: pigments may be eliminated far more rapidly by means of the bile and urine. Then, again, the females may be more brilliantly coloured than the males (but to this objection it is replied that in such cases the females are the more katabolic). It may further very pertinently be asked—Does the hypothesis account for the fact that the pigment in its excretory passage through the skin paints it in beautiful designs? It might be just as satisfactorily eliminated in the form of compounds of a dull, uniform tint; nevertheless, there is great variety of colour and infinite complexity of design. Surely this variety and orderliness of pigmentary deposit subserve a purpose? I am aware that the anatomical arrangement of the bones and blood-vessels accounts in some measure for the design; but that it does so only partially is evident from the fact that the colouring matter is most profusely excreted in those parts where it can be best displayed, and this seems to suggest some other purpose than mere excretion. It is true that light is favourable to pigmentary deposit, and therefore we should expect it to be most abundant in the most exposed parts; pigment, however, may be profuse in unexposed parts, as in the axilla of man. Moreover, if the pigmentary deposit is a mere expression of maleness, why does the cock-bird take such pains to show off the beautiful colours and design of his plumage before the hen?[1]

Finally, it may be pointed out that the colouring of animal (as well as of vegetable) organisms is very completely under the control of selection. One has, in support of this statement, merely to allude to the wonderful protective colouring displayed throughout the animal and vegetable worlds, and so ably and interestingly described by Wallace.

Against Darwin's explanation of the greater beauty of the male birds an objection is urged which seems, at first sight, to have some weight—namely, that his explanation presupposes a permanent æsthetic standard on the part of the females—"a standard fashion from generation to generation;" for, if the females were to select according to individually different tastes, uniform types of beauty would be impossible; and yet these certainly obtain. Seeing that in the human species fashion is so fickle, how, they ask, can it be constant among the lower animals? To which it may be replied that, although fashion in dress is continually changing among modern civilised communities, yet the standard of human beauty is fairly constant for any one people; and that although it is to a certain extent true that 'every eye forms its own beauty,' nevertheless, in any given community there is a fair agreement as to what constitute, unmistakably, 'types of beauty.' Moreover, it must be remembered that fickleness of fashion is a mark more especially of the progressive races; in the East, where all is stationary and stereotyped, and men to-day are living

[1] See "Note" at the end of the chapter.

as their ancestors have lived for hundreds—nay, thousands—of years there is no such constant change in decorative art, personal or other. The Hindu still weaves the brilliant threads in which he delights into the same designs as his father and his father's fathers did before him; the metal worker of Benares still hammers his brass into patterns as old as his craft itself; the Bedouin Arabs of to-day dress very much as did the patriarchs; the Syrian woman still, like Hannah of old, 'exalts' her horn. And among the lower races of mankind we find the same uniformity, the same conformity to ancient modes; and though their standard of beauty is very different from that of civilised peoples, it is very definite and stable; they do not adopt, for instance, European standards on coming in contact with Europeans. The Hottentot mother still squeezes her baby's nose flat in the belief that a snubnose is the most beautiful; the dandy of the Andaman Isles still paints one side of his face red, the other green; and the Red Indian brave looks with contempt upon the 'pale-face,' just as the more cultured Chinaman does on the 'ugly, red-haired English,' and the big-footed Western ladies. The fact is, that as the organic scale is descended, the more instinctive does the organism become, the more stereotyped the nervous system. Hence it is that the sexual instincts of the lower animals are stereotyped, in the strictest sense of the word, and it would be surprising if the taste with which Darwin accredits certain hen-birds were not stereotyped along with the rest.

The authors find a further argument in favour of their view in considering the question—What determines sex? Every unisexual individual is at one stage of its career hermaphrodite. What determines its ultimate sex? Does the organism carry within itself its future sexual destiny? Or is the sex which it ultimately assumes the result of environmental conditions? It is quite certain that in some cases the sex is determined by modifying the environment, but whether this is true in all it is at present impossible to say. As a rule, it is found that circumstances favouring anabolism favour also the development of the female sex, while circumstances favouring katabolism tend to the development of the male sex. Thus the proportion of female to male tadpoles rises when the supply of food is increased; in the case of certain fish the percentage of females has been actually increased, with increase of food, from 56 per cent. to 96 per cent.; and, as regards bees, "within the first eight days of larval life the difference of a little food will determine the striking difference between the worker and queen." A similar result follows from increasing the food-supply of flies, moths, crustaceans, and even mammals. Of the highest mammal—man—it is said, for instance, that more boys are born after wars than during a long-continued peace, and after serious epidemics than under circumstances of healthy existence, when the percentage of female births rises. In the one case circumstances favour katabolism, in the other anabolism, and "if influences favouring katabolism make for the production of males, and if anabolic conditions favour females, then we are strengthened in our previous conclusion, that the male is the outcome of predominant katabolism, and the female of equally emphatic anabolism."

NOTE.—Although I believe selection to have played an important part in the evolution of beautiful animal forms, yet it is quite certain that much of their beauty has arisen independently of it. This is suggested by the fact that the beauty of the vegetable world and of inanimate nature cannot be explained on the principle of selection. We cannot—*e.g.*, adequately explain the beautiful forms and colouring of wild-flowers on the supposition that they have evolved by natural selection to attract insects and thus ensure cross-fertilisation. Variety, brilliancy, and delicacy of colour may in some measure have evolved by this and kindred means, but assuredly not grace of outline.

How, then, are we to account for the beauty of flowers, and other natural objects—in a word, for the beauty of 'nature'? The popular belief that the surface of our planet is in itself and of itself beautiful; that is to say, that there is in the world outside us an actual *concrete* beauty similar to that which exists in consciousness, cannot of course be accepted. Beauty is purely mental, and no more exists independently of mind than does taste, smell, or any other phenomenon. No one would for one moment maintain that a saline taste is inherent in salt; it is on all hands acknowledged that salt is merely an agent capable, when applied to certain nervous structures, of exciting a certain sensation, or mental state which, however, bears no analogy to anything existing in the agent producing it, though it is to that agent that we apply the terms 'salt taste,' 'saline,' 'saltness.' And in like manner it cannot be said that beauty exists in nature. Here likewise it has to be admitted that the external world is merely a cause of a certain mental state distinguished, as far as language is concerned, from other mental states by terming the exciting causes of it beautiful; in other words, that certain external agents operating upon certain of our end-organs are capable of pleasurably affecting that part of our consciousness which we call our æsthetic faculty, though these æsthetic effects bear no likeness whatever to anything in those agents. We will, for convenience, denominate this power of the external world to excite æsthetic feelings within us, its 'æsthogenic' power.

But while it will be readily conceded that there is no concrete beauty in nature, it may still be argued that nature is *necessarily æsthogenic*, that it is so constituted as to excite our æsthetic being and to create in us the belief that it is inherently beautiful. Nevertheless, it is not difficult to show that even this assumption is false. The truth is, not that nature is necessarily and essentially æsthogenic (*i.e.*, to all and every conceivable creature under all and every conceivable circumstance) but that it has accidentally become æsthogenic by virtue of its operation on the nervous systems of man and other animals during their evolution. One can conceive of beings belonging to other worlds, with nervous systems somewhat like our own, but evolved under different conditions, to whom this planet, if they were transported to it, would appear unlovely.

But in order to substantiate this conclusion, let us consider the case of simple sensations. Take, for instance, taste again. Everybody knows that a certain sapid substance cannot be regarded as necessarily agreeable or the reverse (or, more accurately, as necessarily producing agreeable sensations or the reverse); and that its pleasant or unpleasant 'taste,' as we denominate the sensation it produces, depends essentially, not upon its inherent nature, but upon the nervous organisation of the individual tasting it. Different species of animals are very differently affected by the same substance, its effects depending upon the peculiar way in which the nervous system has in each case evolved. Each species has evolved so as to be agreeably affected by certain substances, and disagreeably by others, the object being to attract the organism towards the former as beneficial, and to guard it against the latter as deleterious. We cannot, therefore, arbitrarily divide substances into those which necessarily produce pleasant, and those which necessarily produce unpleasant tastes (sensations). There is nothing intrinsically peculiar to either class. And what is true of taste sensations is true also of all others. It is, therefore, manifest that those things which produce pleasant sensations in us do this by virtue of the peculiar way in which the human nervous system responds to contact with them, and hence it follows that had the various external agents operating upon us been quite different from what they actually are, our nervous organisation would also have evolved differently, and therefore be differently affected by them.

Now, inasmuch as the æsthetic impressions made on us by nature are but a complex of such simple sensations as we have been examining, it is evident that we cannot, from the premiss that nature produces æsthetic enjoyment in us, argue the conclusion that therefore it is of itself and in itself beautiful; all that is proved is that our nervous system is now such that nature is *for it* æsthogenic; in other words, that certain æthereal and atmospheric undulations and vibrations striking on our end-organs produce in us the pleasurable effect we call 'beauty' in the object or objects producing it. For in thought and speech we transfer the impression made upon ourselves to the thing making that impression, and think and speak of the latter as an attribute or property of the former.

Taking the truth of the above assumptions as granted, we have now to ask: How can we explain this peculiar evolution of the nervous system? Natural selection does not solve the problem for us, for while such crude sensations as tastes and smells serve very definite purposes in informing the individual of what is useful or innocuous, and what harmful to him, and have thus come under the influence of natural selection, this has not been the case with the complex æsthetic effects evoked by nature, for the capacity to be æsthetically affected by natural objects and conditions does not increase one's chance of survival. To many a healthy man "a primrose by the river's brim" is a yellow primrose and nothing more. Indeed, it is probably those most susceptible of æsthetic emotions who tend to be morbidly sensitive in their nervous organisation, and certainly neuroses appear to be very common in æsthetically endowed families.

Herbert Spencer has suggested that the æsthetic faculties (*e.g.*, the faculty of music) have developed by education, conscious or unconscious, from generation to generation—*i.e.*, by direct equilibration. This view Weismann naturally confutes, inasmuch as he denies the inheritability of somatogenetic characters, and our inability, with our present knowledge, to decide upon this latter question renders Spencer's explanation of their evolution, otherwise so plausible, problematical. Bearing, then, in mind the doubtful nature of any speculations which postulate the inheritability of somatogenetic characters, I may mention that it has often occurred to me, and in this I presume I have been unconsciously following Spencer (although I must hold myself entirely responsible for the suggestion), that the sense of beauty with which the external world inspires us has evolved by the continual operation upon the nervous organisation of those external agents which stimulate the senses. There is no doubt whatever that such agents are capable of so moulding the different sensory systems of an individual that one which at first causes a disagreeable sensation shall after a time cause an agreeable one; and assuming the inheritability of somatogenetic characters, we may suppose that many stimuli have in this way, quite independently of natural selection, become capable of exciting agreeable sensations in an organism on the first contact. And if such is the case with crude sensations, may it not be also with that more complex sense of the beautiful excited in us by a contemplation of nature—may not, in fact, the æsthogenic power of the various forces, collectively known as 'Nature,' have evolved by their continual operation throughout countless generations upon various portions of the nervous organisation, the nervous system becoming the while so adapted to them that the respondent nervous changes issue in complex pleasurable mental states ?

Here it is needful to observe that much of what is beautiful is beautiful by association and by suggestion, and not merely by reason of intrinsic properties, not, *i.e.*, by virtue of the simple sensations directly excited by it. Indeed some (*e.g.*, Alison, and yet more forcibly Jeffries) have denied the existence of intrinsic beauty on this ground alone, maintaining that whatever is beautiful is beautiful by association, and by association only, that white owes its æsthetic charm to the notion of purity it suggests ; the mountain cataract, the boundless ocean, the vault of heaven, the thunderclap, the lightning flash, to the suggested idea of power ; the rugged castle, to its suggestions of past glory and of might ; certain movements, such as the spring of a mountain goat, to their suggestion of ease ; certain curves, by calling forth similar associations. A white, smooth skin, delicately tinted with red, suggests health, youth, and soft, warm touch sensations ; a shrunken, dry, yellow skin, calls up the idea of infirmity and age, and lacks the suggestion of agreeable contact.

It need scarcely be remarked that this view is in favour of my proposition that 'nature is not necessarily æsthogenic.' I cannot, however, go the length of Jeffries, who even maintains that all the beauties of music arise by association ; for, beyond all doubt, certain sounds are pleasing independently of it, and though, doubtless, the highest æsthetic effects are largely due to association, we have still to acknowledge that nature is to some extent æsthogenic independently of it.

The adequate consideration of this question would require more space than I can here allow myself. I shall not, therefore, seek further to substantiate my view, but will merely add that it is not inconsistent, although at first sight it may appear to be, with the teachings of those writers (*e.g.*, Ruskin) who assert the existence of ideal beauty, and who maintain that in proportion as art realises this ideal it is perfect ; in proportion as it falls short of it, imperfect. The fact that there is no concrete beauty outside us, answering to our sense of the beautiful (which is a mental state, of which alone we can know anything) ; and the further fact that the visible universe is not intrinsically, but only accidentally, æsthogenic, must not blind us to the reality of beauty. Beauty is as real, and in the same way real, as anything else of which our senses make us cognisant ; as real as light, heat, saltness, sound, scent ; and, like all these, is subject to definite laws, to elucidate which is the task of such masters as Reynolds and Ruskin. The position they take up is, I presume, somewhat as follows : All those whose æsthetic sense is most acute and most highly cultivated agree upon certain principles, certain criteria, by which to decide what is beautiful and what is not ; from which it may be argued that an individual whose taste does not conform to these principles shows imperfect æsthetic development. Should he, however, admire something which appears unlovely to one endowed with keener æsthetic sense than himself, it would not be correct to assert that there is no beauty in that which he admired, for if he admires it, it is beautiful to him; the true position is this: If such an one were to develop his æsthetic faculties to the full, that which before was beautiful to him might—probably would—become ugly, but he would not thereby be a loser; he would now be capable of more varied and more intense æsthetic pleasures, he would stand upon a higher æsthetic level. Or, to put it another way, if the æsthetic faculty were incapable, by the most careful education, of attaining a higher level than that it attains in the average uncultured individual, the canons of art would be quite different from what they are now, and yet one might still, and with equal justice, speak of ideal beauty, as Ruskin does. Only the ideal would be changed. In short, the ideal shifts as evolution advances.

PART II.

CHIEFLY CONCERNED WITH THE PATHOLOGICAL APPLICATION OF CONCLUSIONS ARRIVED AT IN PART I.

CHAPTER I.

GEDDES AND THOMSON'S VIEWS APPLIED TO MAN.

THE consideration of the views of Geddes and Thomson has emphasised the fact that the male sex is for the most part more katabolic than the female. There can be no doubt that it is so in the human species, and we shall find it very useful to bear this truth in mind in the study and treatment of disease. It is needful, however, to point out that there are exceptions. Some men—those whom we should term lymphatic—are essentially anabolic; and similarly there are women—of the nervous, energetic type—who are essentially katabolic. In all cases of nervousness it is desirable to determine under which category our patient should be placed, and the task will be found as interesting as it is useful; but before showing the practical application of these remarks, we may consider the evidence in support of the above proposition—viz., that women are on an average predominantly anabolic and men predominantly katabolic.

Women, as a class, show a greater tendency to put on fat than men, and the tendency is particularly well marked at puberty, when some girls become phenomenally stout. I would here remark, by the way, that one possible cause of this may be the periodic loss of blood which begins at that time: for it was noticed by Hippocrates that the periodic bleeding of animals is conducive to the laying on of fat. I only suggest this, be it noted, as a possible factor; it is certainly not a leading one. Not only do women put on fat more readily than men, but they lose it very rapidly—more rapidly, I should think, than men, but of this I am not sure. It is well known that of all the tissues of the body adipose tissue gains and loses in weight the most readily, and the facility with which women gain fat is obviously an important physiological attribute, it being necessary that they should be able to store up food-stuffs for the nourishment of the growing fœtus and new-born child; and, further, that they should be able to draw rapidly upon this stored-up material. It is most interesting to note how individual women differ in their fat-storing tendencies. Sometimes, as already observed, fat is stored up at the time of puberty in abundance, but in these cases it generally happens that the individual becomes thinner by about the age of twenty, and two or three years after this she may become very much thinner. As a rule, during the first months of pregnancy fat is absorbed, but in many cases this is again deposited during the later months. The effects of lactation vary widely: some women increase very considerably in weight during this period; others show an equally marked tendency to lose weight; in others, again, the weight remains stationary. These differences serve as an index of the natural tendency, whether to anabolism or katabolism, and need to be inquired into if we wish to gauge it.

Just as women differ widely among themselves in their fat-forming tendencies, so also do men, and it is often desirable that we should know the past history of our patient in this respect. Some men, like some women, cannot be got to put on fat under any circumstances; others, no matter how active nor how careful in regard to food, remain abnormally stout. Of course it must be borne in mind that the anabolic or katabolic tendency of the body does not necessarily indicate a correspondingly anabolic or katabolic habit of the entire nervous system. Occasionally individuals intellectually very katabolic—like Dr. Johnson—are physically distinctly anabolic; and it is certainly not rare to meet with men and women who, in spite of excessive stoutness, are very active, both in body and mind. As a rule, however, the reverse is the case: the naturally lean are generally the most energetic; I say the *naturally* lean, because the leanness may be merely a result of the activity.

The anabolism of women is shown in another way: women, as a class, are much less active than men—much more stay-at-home. Particularly is this the case with married women, although it is not infrequently true of the young and unmarried. Thus we have on the whole a much greater difficulty in getting women to take sufficient exercise than in getting men. After the climacteric, however, women frequently become much more active than during their menstrual life.

The anabolic tendency of women often manifests itself some time before, during, and some time after puberty. For two or three years before puberty the girl is very apt to become listless and languid, to tire easily, and to display a tendency to loll about; and she may continue in this condition two or three years after puberty has distinctly declared itself. A similar tendency, accompanied by lethargy, is very apt to attend the menstrual periods throughout the whole of menstrual life.

The anabolic habit of women is further shown by the fact that they require more sleep than men; for on the whole the quantity of sleep which an individual takes is a fairly accurate measure of his anabolic or katabolic tendency, small sleepers being for the most part katabolic, great sleepers anabolic. This perhaps does not hold good before the period of puberty, for more sleep is taken during childhood than after, and yet children are active and katabolic. It should be observed, however, that while children expend a large amount of energy, they are also continually storing it up in the form of new tissue.

Although women sleep longer and show a greater disposition to sleep than men, Macfarlan states that they can better bear the loss of sleep, and most physicians will agree with him. This seeming paradox may perhaps be explained as follows:—Women, being more anabolic, have, as a rule, a relatively larger fund of reserve energy to draw upon; and, moreover, their nerve force does not run out so rapidly as in men; men, on the other hand, expend their energy rapidly, and have not, therefore, a large reserve store to fall back on; consequently they rapidly feel the effects of diminished sleep.

In woman the pulse-rate is more rapid than in man, beating on an average 80 per minute in the former, and 71.5 per minute in the latter. Now, one would rather expect women, as the more anabolic, to have the slower pulse—katabolism implying an active circulation. The pulse-rate, however, bears a peculiar relation to the height of the body, diminishing in inverse proportion to it,[1] and inasmuch as women are, on an average, considerably shorter than men, we may, I think, in this way reconcile the apparently contradictory facts.

The respirations also are more rapid in women than men, and a similar explanation applies here.

Lastly, women bear the loss of blood better than men—another fact which may be associated with their anabolic tendency, implying, as it does, a large reserve of energy. Whether they recover more readily from surgical operations I have not been able to ascertain. One would rather expect they would, but Sir James Paget, to whom I applied for information on this head, informed me that he had not observed any difference in this respect.

[1] See Landois and Stirling's Physiology, 3rd edit., p. 107.

CHAPTER II.

GEDDES AND THOMSON'S VIEWS PATHOLOGICALLY APPLIED.

We now turn more particularly to the pathological application of Geddes and Thomson's views.

The great constitutional anabolism of women causes them to submit more readily to enforced rest than men. Of course individual peculiarities have to be taken into account, but the naturally active man is very apt to revolt against this regimen, and women of katabolic tendency also bear it ill. They may even lose weight in bed, and make rapid strides towards recovery directly they are allowed to get up. On the other hand, the man of anabolic tendency does not feel the restriction of his activity so much as the one who is ordinarily katabolic.

The fact that women bear rest well, and also rapidly store up energy, *i.e.*, increase in weight, enables us frequently to produce striking effects merely by putting them to bed and feeding them up. In this way we cure the emaciated hysteric.

Not only do women, as already noticed, sleep longer than men, but they, moreover, show a greater readiness to sleep, a fact which harmonises with their anabolic disposition. Hence we should expect women to suffer less frequently from sleeplessness than men; and this, I believe, is the case. One of the greatest difficulties we have to contend with in nervous men is sleeplessness, a result, no doubt, of excessive katabolism; their nervous centres do not readily take on that quiescent or anabolic state which constitutes the essence of sleepiness, but are abnormally alert; they unduly expend energy, are too katabolic, and the more nervous the man, the more excessive, probably, this tendency.

Here we may allude to the amount of sleep required by different people. In this, as in all things medical, experience is the great test. Most intelligent people can find out for themselves what is good or bad for their health, though it is true that many do not realise the necessity of making common-sense observations to this end until they are fairly advanced in life, and some not even then. Thus, when a patient asks his physician whether such and such a thing is good for him, the latter can often best answer him by putting another question: by asking, namely, whether any ill-effect is experienced after it. If not, then in all probability, it is not harming him (I say, in all probability, inasmuch as an injurious agent may work its effect insidiously; generally, however, this guide is a safe one). We are asked, for instance, whether alcohol is good or bad for a particular individual. In many cases we can at once answer definitely, but in others we cannot. We then ask our patient to abstain totally from alcohol for two or three months, and meantime to compare his health with what it was while he was taking alcohol. If the circumstances of the individual are the same during each period, save in respect of the alcohol, we have a scientific means of answering him with the utmost precision. Similarly in respect of sleep; most people can tell from their own observation how much sleep is good for them—what is too much and what too little. But independently of their own observation we may be guided to a right conclusion by another consideration. The excessively anabolic we should, on *à priori* grounds, expect to err on the side of excessive sleep, excessive anabolism predisposing to laziness, drowsiness, sleep—in all of which conditions the nerve-centres are in an essentially anabolic state. Hence the fat, lazy, 'lymphatic' individual, who shows an excessive tendency to sleep, should not indulge it; the centres should be encouraged to become more katabolic. On the other hand, the active, restless, nervous individual, should be encouraged to sleep long, that the centres may be rendered more anabolic. Many cases of serious nervousness can, I feel convinced, be traced to excessive nervous katabolism—an undue tendency to nervous explosion. I do not now so much allude to sudden and temporary nerve-storms as to that *continuous explosive habit* which manifests itself by incessant activity of brain and muscle—by a mind ever on the alert, and by restless movements of the facial muscles, eyes, hands, and other parts. In such cases our business is to induce anabolism, and to this end we should encourage the disposition to sleep.

The great recuperative power of women is worthy of note. Not only do they bear loss of blood extremely well, but many of the most sickly show an extraordinary power of fighting against exhausting diseases. Tenacity of life, in fact, appears to be greater among them than among men, and I know of few facts in biology more remarkable. So much, indeed, is male mortality in excess of female that, though the number of males born is decidedly greater than the number of females, the female population is considerably larger than the male. And this excessive mortality of the male sex obtains not merely in the case of a few diseases, but in almost all. Thus, exclusive of deaths from diseases connected with the female generative system, the mortality of the male sex is greater than that of the female in practically all diseases excepting cancer, chorea, gallstones, peritonitis, diphtheria, and whooping-cough.[1] The number of males born in England during the years 1878–87 was 1038 to every 1000 females;[2] yet in 1888 the population of England and Wales was 13,931,592 males and 14,697,212 females,[3] and the tables given for the last fifty years show a similar excess. Again, the average death-rate in England in 1888 was for the males 18.8; for the females, 16.8; increased in London to 20.0 and 17.0

[1] Registrar-General's Report, 1888, p. xxviii.

[2] *Ibid.*, table 10, p. xli.

[3] *Ibid.*, table 1, p. xxxii.

respectively. The same disparity is observed in each county; thus in Surrey (extra metropolitan) it was 15.7 for the males, 13.2 for the females; in Bedfordshire, 18.5 for the males, 16.1 for the females, and in no single county was there a departure from the rule.[1] We have not, therefore, to deal here with a mere coincidence, but with a fixed law. How, then, are we to explain the greater mortality of the males? Are we to suppose it is because the male sex is exposed to a more unfavourable environment than the female, or that this sex is less tenacious of life?

The former explanation will doubtless occur to many. That it is not the whole explanation will soon be shown, but how far is it an explanation at all? Although I attach the greatest importance to the influence of the environment on an organism, I am convinced that the part played by an unfavourable environment in causing the proportionately greater mortality of the male sex has been much exaggerated. Are we, in the first place, quite sure that the environment of the male sex *is*, on the whole, more unfavourable than that of the female sex? More men than women die from accidents, it is true, but this excess does not affect the comparative mortality in any notable degree. Intemperance, also, no doubt plays a far larger part in provoking disease among men than among women, and the same is perhaps true of syphilis; but having said this, we have indicated the chief circumstances tending to increase the unfavourableness of the male environment. And against the evil effects on the male of intemperance, syphilis, and the conditions leading to accident, we have to set the injurious effects on the woman of prolonged confinement. The contrast in this respect is not so marked in towns as in the country, town men being much confined (yet even then not so much as town women). In the country the men spend most of their time out of doors, the women being occupied nearly all day at home. This constant confinement, together with the exhausting effects of child-bearing, nursing, and the continual irritation of household worries, tells profoundly on the

[1] Registrar-General's Report, table 10, p. xli.

woman's health ; so that after a few years of married life the blooming girl is but too often changed into a haggard, bloodless woman. If we put these ill effects in the balance against those peculiar to the man's environment, it may fitly be asked whether the country man is really much worse off as regards environment than the country woman. We can hardly think he is. Nevertheless, we find here in the country the male death-rate as much in excess of the female as in the towns, and this at least suggests a greater tenacity of life on the part of women.

But now we come on firmer ground than mere speculation as to the merits and demerits of the respective environments, about which it is impossible to do more than surmise : we have actual proof that the female sex is more tenacious of life than the male. It can be shown that the mortality of the male sex is higher than that of the female, quite independently of environmental peculiarities. The male death-rate in England during the first five years of life is 69.5 per thousand, while the female is only 59.7. Now during these five years the environment is very much the same for both sexes, and notably for the first two or three years. After this it tends to differ, becoming wider and more varied for the boy than for the less active girl, a circumstance which will probably operate chiefly by exposing him to injury, and injury is very apt to provoke disease, such as tubercule, in which way we may perhaps explain the greater tendency to meningitis—whether 'simple' or tuberculous—among boys than among girls. For the first two years, however, we may, as I have said, regard the environment of the two sexes as practically the same, and what do we find ? During these years the male mortality exceeds the female more than at any other period. Thus, to instance a few diseases, I gather from the Registrar-General's Report for 1888 that the total mortality from diarrhœa at all ages is considerably greater for males than females and *that this is true for the first year of life* (p. xxv.) ; also that the death-rate from measles at all ages is greater for males than females, and it is expressly stated that this excess is entirely due to their higher mortality in the first two years; "at each later year in the first quinquennium and in each later age-period the female mortality is the higher" (p. xxiii.)

The accompanying table gives the mortality from a number of diseases at all ages for either sex per standard million.[1]

Small-pox . . .	1854–87	M. 183
		F. 148
Measles . . .	1848–87	M. 426
		F. 408
Scarlet Fever . .	1859–85	M. 763
		F. 738
Diphtheria . . .	1859–87	M. 157
		F. 176
Croup	1848–87	M. 221
		F. 192
Whooping-cough . .	1848–87	M. 451
		F. 554
Diarrhœa / Dysentery . .	1848–87	M. 932
		F. 835
Enteric Fever . .	1869–87	M. 288
		F. 277

It will be observed that, with the exception of diphtheria and whooping-cough, the mortality is distinctly higher in the males.[2] The total mortality from all these diseases we find to be 3421 per million for the males and 3328 for the

[1] Registrar-General's Report, 1888, table F., p. xxi.

[2] Possibly the larger larynx and greater muscular strength of the boy may account in some measure for the smaller mortality among males from diphtheria.

females, but if it be taken for the first few years of life, the disparity is much greater. We have, therefore, definite proof that during the first five years of life at all events, the female is more tenacious of life than the male in respect of these diseases.

The following table,[1] giving the average annual death-rate for the two sexes in England during the last fifty years (1838–88) at different periods of life, ['age-periods,'] is highly instructive:—

Ages.												
All ages.	0–	5–	10–	15–	20–	25–	35–	45–	55–	65–	75–	85 and upwards.
Deaths to a Thousand Living.												
Males.												
22.7	69.5	7.8	4.4	6.1	8.2	9.4	13.0	18.9	32.8	67.7	147.6	313.1
Females.												
20·6	59.7	7.5	4.5	6.6	7.8	9.4	12.0	15.6	28.0	59.9	134.2	287.7

From this it will be seen that up to five years the mortality of the male is decidedly greater than that of the female, being 69.5 for the one and 59.7 for the other. From 5–15 the male death-rate is only slightly in excess of the female. From 10–20, however, the female mortality is greater than the male. From 20–35 the male mortality is again slightly the higher, remaining so up to extreme old age; and so marked is this increase in male mortality after the period of middle life, that it seems doubtful whether it is entirely due to innate differences in the sexes. While I think that an innate tenacity of life on the part of the female continues even after middle age to be the chief cause of the female death-rate being lower than the male, yet it must be acknowledged that these statistics afford some ground for the belief that the environment of the male is, on the whole, more injurious than that of the female, and that the increasing disparity in the death-rates

[1] Abridged from table 13, p. xliv. of Registrar-General's Report, 1888.

after the middle period of life is in part due to the fact that the accumulated evil effects of that environment then begin to tell upon the man.

There are two periods which are peculiarly critical to the female. Of these the more important is the period of puberty. The mortality at this age seems to be especially due to diseases of the respiratory organs which at all other periods of life are more fatal to the male sex. The following passage in the Registrar-General's Report may be quoted in this connection :—

It is "sufficiently clear that before any satisfactory answer can be returned to the question, whether any given disease is more fatal in the one than in the other sex, it is absolutely necessary to take age into account. There are, it is true, some diseases among those to which both sexes are liable, that are at every age-period more destructive to one sex than the other. Such, for instance, are gout, carbuncle, alcoholism, diabetes, fistula, pleurisy, aneurism, calculus, cystitis, and generally diseases of the urinary organs, which at each age-period carry off more males than females; such also are cancer, chorea, and gallstones, which are practically at all ages more destructive to women. But in the majority of cases, one and the same disease is more fatal at some ages in one sex, and at other ages in the other. As instances may be cited phthisis, apoplexy, syphilis, erysipelas, and hernia ; to which may further be added several others, which, though at most age-periods they carry off annually more males than females, yet in the exceptional period of puberty reverse the order of fatality, and are more destructive to the female sex ; such are pneumonia, bronchitis, and generally the diseases of the respiratory organs, and such also are pericarditis and rheumatic fever."—B. P. Henniker, Reg.-Gen. An. Report, 1888, p. xxviii.

Small-pox also appears to be peculiarly fatal to the female at this period. Thus, while the average male death-rate from this disorder for all ages is 183 per million for the males, and 148 for the females, at the time of puberty it is greater for the latter.[1]

The second and third years appear to mark a similar

[1] Registrar-General's Report, 1888, p. xx.

critical period in the female, the mortality from many diseases which before this time are more fatal for the male sex now being higher for the female. Such diseases are diarrhœa, measles, diphtheria, typhoid, and small-pox.[1] Henniker gives the following explanation:—

"The general explanation appears to be that the first year of life, and in a smaller degree also the second, is pre-eminently dangerous to male children, who from a pathological point of view are weaker than girls of corresponding age, and, if not more liable to be attacked by most illnesses, are at any rate more liable to succumb to them. These first years of life over, the two sexes for the rest of early childhood stand more on an equality; and, more of the weakly males having already succumbed, there may perhaps now be even some slight inferiority on the side of the girls."[2]

The fact that it is necessary, in considering the comparative mortality of the sexes, to take age into account is of interest, and notably so in regard to the zymotic fevers, for it shows us, not only that each sex varies at different age-periods in respect of certain subtle nutritional peculiarities, but that these variations do not run parallel for either sex. Instance the case of small-pox cited above. Typhus affords a similar example. Murchison[3] points out that while the mortality from this disorder is greater among males than females, being 19.6 and 18.2 per cent. respectively, yet it is at one particular period, namely, between the ages of five and fifteen, *twice as great among the females as among males!* It is also noteworthy that the mortality from a particular fever does not vary as the tendency to contract it. Thus, while the male death-rate from typhoid is greater than the female, the latter is considerably higher from the third to the twentieth year, *although the liability to contract the disorder during these years is considerably less in the case of the female.* Similarly, scarlatina, though attacking males less frequently[4] than females, is more likely to terminate fatally with them.

[1] Registrar-General's Report, 1888, p. xxii. [2] *Ibid.*, p. xxiii.

[3] "The Continued Fevers of Great Britain," 2nd edit., 1884, pp. 238-9.

[4] Registrar-General's Report, 1888, p. xxvi.

In no diseases is the recuperative power of the female sex better shown than in those of the nervous system. The prognosis of nervous disorders is on the whole more favourable in women than in men. This conclusion is, I think, borne out by observation of isolated cases. Such experiences are, however, often misleading; questions of this kind can only be fairly decided by an appeal to statistics, and on this particular question statistics of but one class of nervous diseases are available—those of the mind. I shall deal with these in a separate chapter; it is enough here to observe that two important conclusions are easily deducible from them:—(1) That recoveries are more common among insane women than among insane men; (2) That the mortality is less among the former than the latter. These results are, no doubt, partly due to the fact that the male sex is more liable to gross organic lesions of the nervous system than the female, but we may fairly, I think, in part explain them by assuming a greater innate recuperative power in the female sex.

Men being more katabolic than women, and their nervous centres, therefore, more explosive, one would expect them to show the greater tendency to those disorders which are attended by an excessive expenditure of energy. For instance, we should look for a greater frequency of the severer forms of neuralgia among them than among the anabolic women. We know that real angina pectoris is far more common in men than women, and I am inclined to think that the like is true of the other severe forms of neuralgia. The most terrible facial neuralgia I ever witnessed occurred in a man.

For the same reason one would rather expect mania to be more frequent among men than women, but if, according to the view ably supported by Bevan Lewis, mania is essentially due to profound dissolution, we cannot well connect the tendency to it with the katabolic tendency—with the tendency to the expenditure of energy. Whether an individual has mania or melancholia depends—so this author contends — not upon any intrinsic explosive tendency of nerve centres but upon the depth to which nervous dissolution has proceeded. He writes :—" Fundamentally distinct as these mental states would appear to be, we have little doubt that the process of reduction is the same for both; but in maniacal states the dissolution is to a *greater depth*—the difference is one of degree."[1]

It is somewhat doubtful whether mania is more common in men than in women. The generally received opinion is, I believe, that it is, but according to R. Boyd's tables [2] females are more frequently attacked than males. These tables show the females in considerable excess as subjects of mania under the age of twenty-five, the proportion being as 55 to 30, while melancholia, on the other hand, is shown to be more common in males, the proportion for all ages being as 188 to 132; and it may be remarked by the way that melancholia is most common in the males between the ages of 60 and 65; whereas in females it is most common between 20 and 35, and between 40 and 45. Writing on pubescent insanity, Bevan Lewis affirms that maniacal states predominate over states of depression both in the male and female, but not to the same extent in the former as in the latter, so that melancholia is more pronounced in the pubescent insanity of the male than of the female.[3]

In a subsequent chapter (*Woman an Undeveloped Man*) reasons will be given why women should be more liable to intense nervous explosions than men, in spite of their anabolic habit.

The katabolic tendency of the male sex as compared with the female is well shown by comparing the crimes of which the two sexes are respectively convicted. The following table indicates some of the more important crimes com-

[1] *A Text-book of Mental Diseases*, W. Bevan Lewis, London, 1889, p. 163.

[2] *Journ. Ment. Science*, vol. x. pp. 496–7.

[3] *Ibid.* p. 339.

mitted by patients received into the Broadmoor Asylum from 1863 to 1882[1]:—

CRIMES.	M.	F.
Murder	237	152
Manslaughter	14	9
Attempt to murder, maim	209	36
Assault, common	17	3
Treasonable and seditious offences	7	0
Burglary and housebreaking	109	7
Robbery on the highway	6	1
Larceny and petty thefts	241	106
Arson and malicious burning	87	7
Felony (not otherwise described)	45	9
Threatening by letter	6	1
Attempted self-murder	4	0

The various crimes enumerated in this table are, of course, predisposed to by peculiar mental constitution, independently of katabolic or anabolic habit. They are further predisposed to by circumstance, and the circumstances of the man are more in favour of them than those of the woman. We may, however, fairly connect the katabolic habit of the male, his predominant activity, with a tendency to commit them. An anabolic habit, a tendency to passivity, on the other hand, acts as a hindrance to crime.

It will be observed that attempts at suicide are more common among men than women. In Europe suicides are three times as numerous among men as among women—a fact we may associate with their respective katabolic and anabolic habits.[2]

[1] Abridged from the table compiled by W. Orange, and referred to in his Presidential Address at the Annual Meeting of the Med.-Psych. Ass., July 27, 1883. See *Journal of Mental Science*, vol. xxix. p. 336.

[2] For some interesting remarks on the comparative tendency of the sexes to crime see "Das Weib in der Natur- und Völkerkunde," H. Ploss, Leipzig, 1884, vol. i. s. 26. In civilised communities the women have a greater tendency to crime than among more primitive peoples. This proportion is greater in towns than in the country, and greater in the North of Europe than in the South. Otto Hausner ("Vergleichende Statistik von Europa," Lemberg, 1865, vol. i. s. 135) has compared the relative tendency to crime of the sexes in many countries. Taking the whole of Europe, crimes committed by men are five times as frequent as those com-

Does the pregnant woman show a greater resistance to disease than the non-pregnant? It has often been contended that she does—that when a phthisical woman, to instance a particular disorder, becomes pregnant, the disease temporarily subsides, to burst out afresh after parturition. Now, there is certainly an analogy between the elaboration of complex molecules for storage in the mother's own body as so much potential energy, and the elaboration of such molecules for the nourishment of the fœtus; and since a strong anabolic tendency, however induced, is inimical to tuberculosis (in which disorder katabolic tissue-disintegration is intense, and co-extensive with the entire body) it might fairly be argued that the excessive anabolism of the woman during pregnancy is inimical to the progress of the disease. This is, however, mere speculation, and perhaps entirely misleading in nature; for in the first place it is not absolutely certain that the disease is arrested during pregnancy, and in the second, it must be remembered that the anabolism of the mother is similarly increased during lactation, yet, so far as I know, no corresponding immunity from disease—tubercular or other—has ever been remarked during this period. Rather is the contrary view—that nursing predisposes to disease—the more likely.

mitted by women. According to Dr. D. Nicolson the average daily population of the convict prisons of England in 1871, was 8218 men, 1217 women (*Journal of Mental Science*, vol. xxiii. p. 181); and the numbers of criminal lunatics under detention in asylums and other licensed houses on September 29, 1875, were, respectively, 520 males, 158 females (*Ibid.* p. 185).

CHAPTER III.

THE COMPARATIVE LIABILITY OF MAN AND WOMAN TO GROSS LESIONS OF THE NERVOUS SYSTEM.

It has been remarked in passing that the male sex is decidedly more liable than the female to gross lesions of the nervous system. In this chapter I propose to give evidence in proof of this statement.

The disparity is observed from the earliest age, and hence cannot be wholly due to differences in the environment of the two sexes. Thus male idiots preponderate over female in every country in Europe, Mitchell estimating, from an examination of 1345 idiots, that the proportion is as 100 to 79.[1] It was found in the census of the insane in Prussia (1880) that 9809 males and 7827 females were born idiots, and Koch has some interesting observations to the same effect.[2]

No doubt the greater size of the cranium in the male predisposes to idiocy by rendering the brain liable to injury during labour, but it certainly does not entirely account for its excess among males. Not only malformations of the nervous system, but practically all kinds of congenital malformations are more common in the male sex,[3]

[1] *Edin. Med. Journal*, vol. xi. p. 639.

[2] *Journ. Mental Science*, vol. xxvi. p. 435.

[3] I was led to this opinion by a consideration of the generalisation set forth in the text, namely, that the male sex is more liable to vary than the female; and I found my anticipation correct by a reference to the Registrar-General's Reports. The following table is constructed from the

a fact which may be explained by an important biological law pointed out by Darwin, viz., that the male sex is more variable than the female throughout the entire animal kingdom, man being no exception. He varies between wider extremes than woman; and thus we find idiots and

Reports for the years 1884-1888. In it the deaths from congenital defects per million of the persons living in England are given for either sex.

Diseases.	1884.		1885.		1886.	
	M.	F.	M.	F.	M.	F.
Spina Bifida . . .	21	25	20	26	22	22
Imperforate Anus . .	14	7	9	5	10	4
Cleft Palate, Hare-lip . .	9	5	8	6	8	6
Other congenital defects .	10	9	12	9	12	10
Total	54	46	49	46	52	42

Diseases.	1887.		1888.		Average for the 5 years.	
	M.	F.	M.	F.	M.	F.
Spina Bifida . . .	22	24	18	24	20.6	24.2
Imperforate Anus . .	9	4	9	3	10.2	4.6
Cleft Palate, Hare-lip . .	8	5	7	7	8	5.8
Other congenital defects .	13	8	12	12	11.8	9.6
Total	52	41	46	46	49.6	44.2

Taking the average of these five years, we find that the deaths from congenital defects per million was 49.6 for the male sex, 44.2 for the female. There is, contrary to my expectation, a decided excess of deaths from spina bifida for the female, the average being 20.6 male, 24.2 female. This female excess cannot be chance, since it obtained in four of the five years, in the remaining year (1886) the numbers being equal, viz., 22. In deaths from malformation of either end of the alimentary canal there was a marked excess of male cases, the average deaths per million from imperforate anus for the five years being 10.2 males, 4.6 females; and for cleft palate and hare-lip, 8 males to 5.8 females. I doubt not that a similar excess would be found for other malformations of the alimentary canal.

geniuses alike more common in the male than in the female sex, just as are dwarfs and giants.

Other gross organic defects of the nervous system besides idiocy, are more common in the male sex. I allude to those which are due not to arrested development, not to imperfect evolution, but to marked dissolution of nervous tissue, to serious degenerative changes. This is strikingly brought out in the subjoined list of structural nervous lesions. It is by no means always easy to distinguish between mere functional derangement and unmistakable structural disorder, as for instance in the case of epilepsy, paralysis agitans, and tetanus. Among the diseases enumerated below I have classed 'genuine' epilepsy as functional, for although of course some peculiarity of structure underlies this disorder (Bevan Lewis, indeed, claims to have discovered a distinct microscopic change in it), it cannot be said to be due to any gross lesion. Paralysis agitans and tetanus, on the other hand, I have regarded as organic diseases; for while no lesion has yet been discovered in the former, none can doubt that it is essentially a structural disorder—the character of its symptoms clearly pointing to serious degenerative change; and tetanus has to be similarly classed, seeing that it is due to a micro-organism, and in this respect falls under the same head as tubercle. Tetany, on the contrary, like such disorders as laryngismus stridulus and infantile convulsions, may be safely classed as functional.

For the following extracts I am indebted almost entirely to W. R. Gowers' "Diseases of the Nervous System." We may fairly accept them as conveying the most recent information on the subject of which they treat.

Acute Meningitis of the Cord.—"The disease is more common in males than in females" ("Diseases of the Nervous System," vol. i. p. 189).

Chronic Internal Meningitis of the Cord.—"Affects men more frequently than women" (p. 196).

Spinal Meningeal Hæmorrhage.—"More common in men than in women" (p. 204).

Acute Myelitis.—" Males suffer more frequently than females " (p. 213).

Chronic Myelitis.—" The disease is most common in the male sex " (p. 238).

Acute Anterior Poliomyelitis.—" Boys are somewhat more prone to suffer than girls, in the proportion of four to three, but (to judge by a series of fifty consecutive cases which I have tabulated in my note-books) it is only under two years that a greater liability in boys can be traced " (p. 253).

Acute Ascending Paralysis.—" The disease affects males more frequently than females " (p. 275).

Locomotor Ataxy.—" Males suffer far more frequently than females, the proportion being about ten to one. When every allowance is made for the different incidence of causal influences, the fact seems to indicate a proclivity inherent in the male sex. The same preponderance of males obtains in a disease that has some alliance with tabes—general paralysis of the insane " (p. 288).

Primary Spastic Paraplegia.—" The disease affects both sexes in almost equal frequency, presenting in this a contrast to posterior sclerosis " (p. 330).

Ataxic Paraplegia.—" Males suffer much more frequently than females " (p. 341).

Hereditary Ataxy (Friedreich's Disease).—" Males slightly preponderate (thirty-five males to thirty females) " (p. 350).

Progressive Muscular Atrophy.—" The disease is more frequent in males than in females, the proportion being about three to one " (p. 357).

Pseudo-Hypertrophic Muscular Paralysis.—" Males furnish the majority of the cases, but the actual degree of preponderance is not yet certain. Published cases show a proportion of seven to one, but of forty-three cases that have come, directly or indirectly, under my notice, thirty-three were males and ten females. This discrepancy is perhaps due to the fact that the slighter liability of the females influences the character of the disease as well as its occurrence. In them it is slighter in degree, later in development, and less frequently causes death. Hence the disease is more likely to escape notice in females. . . . . It is probable that a proportion of four males to one female is near the truth" (p. 387).

Hæmatoma of the Dura Mater.—"This condition is met with chiefly in males, less than one-fourth of the cases having been in females. . . . . The tendency to the disease is enormously increased by the tissue-changes incidental to age. . . . . The affection is commonly secondary; some cases have followed an injury to the head, but the diseases to which it is most frequently consecutive are some forms of chronic insanity (especially general paralysis of the insane) and chronic alcoholism" (vol. ii. p. 294). The greater frequency of the disorder in males than in females cannot, therefore, be entirely ascribed to the greater exposure of this sex to injuries."

Acute Cerebral Meningitis.—"Taking all forms together, the disease is more frequent in males than females, but the several varieties exhibit some difference in this respect" (p. 296).

Hydrocephalus.—"The Registrar-General's returns for the twenty-five years ending 1872 give the deaths from hydrocephalus in males under five as 91,681, and females as 66,708" (p. 299 *n.*).

Epidemic Cerebro-spinal Meningitis.—"Males are said to be attacked more frequently than females. Of 255 fatal cases in Stockholm, 149 were boys, 106 girls" (p. 327).

Cerebral Hæmorrhage.—"Males suffer more frequently than females, although the difference is less than is commonly asserted" (p. 353).

Infantile Meningeal Hæmorrhage.—"The condition seems to be as frequent in one sex as in the other" (p. 381).

Cerebral Embolism.—"Occurs with equal frequency in both sexes" (p. 389).

Infantile Hemiplegia (acute cerebral infantile palsy).—"Rather more common in females than in males. Of eighty cases of which I have notes, thirty-five were in boys, and forty-five in girls" (p. 422).

Cerebral Abscess.—"Is far more common in males than in females. Of 232 cases, 174 occurred in males, 58 in females, the ratio being as three to one. The various causes do not, however, influence the two sexes in the same proportion. From ear disease the ratio of the males to females is 2 to 1. From injury, 5 to 1; from suppuration elsewhere, 4 to 1. The greater liability of the males to traumatic abscess is readily explained by their more frequent exposure to injury; their greater liability to abscess from other causes is less easy to understand" (p. 436).

Intra-cranial Tumours.—"The liability of males to suffer is twice as great as that of females. Of 650 cases of various forms of intra-cranial tumour, 440 occurred in males, 210 in females. The greater liability of males is not due, as might be imagined, to the influence of syphilis, for it is true (as will be seen) of all forms of tumour, with the apparent exception of sarcoma. The difference has been ascribed to the influence of traumatic causes, but it is not probable that this influence accounts for more than a small part of the excess, since it is rarely to be traced, and the difference in the sexual liability is as marked in the case of children as in that of adults . . . . . Age has little influence in relation to sex. The relative affection of males and females is nearly the same in each period of life, but there is a marked tendency, as in so many diseases, for the sexual difference of the early and adult periods to disappear in the decline of life; over fifty the two sexes suffer equally" (pp. 454–5). After this age the cases rapidly become less numerous.

Intra-cranial Aneurism.—"Males suffer more frequently than females, in the proportion of 3 to 1" (p. 494).

Disseminated or Insular Sclerosis.—"Occurs in both sexes with nearly the same frequency" (p. 507).

Chronic Bulbar Paralysis.—"Males are rather more liable than females" (p. 524).

Paralysis Agitans.—"The disease is more frequent in men than in women, the proportion being as 5 to 3. Of 80 cases of which I have notes, 50 were men and 30 women" (p. 589).

Tetanus.—"The ordinary forms of the disease are far more common in males than in females. In traumatic cases the proportion between the sexes is nearly as 6 to 1. The idiopathic form also occurs in males more frequently than in females, although the disproportion is not quite so great as in the traumatic form. Of 46 idiopathic cases which I have collected, 37 were males and 9 females, a proportion of 4 to 1. Doubtless the chief cause of the different liability of the sexes is to be found in the increased exposure to the immediate causes that is involved in the occupations of men. . . . . The few cases in childhood (five to ten years) occur in each sex with almost equal frequency" (pp. 623–4).

Menière's Disease (Aural Vertigo).—"It is more common in men than in women; of 93 consecutive cases, 62 were male, and the proportion was about the same in private as in hospital patients" (pp. 726–7).

Diabetes Mellitis.—"Occurs more frequently among men than women in the proportion of about 3 to 1."[1]

Addison's Disease.—"By far the larger number of cases have occurred in men before the middle period of life."[2]

Chlorosis, which is probably a nervous disease, is practically confined to the female sex.

It will be seen that in the great majority of the above diseases males are more frequently affected than females, the exceptions being only five, and (from their rarity) comparatively unimportant, viz.: infantile meningeal hæmorrhage, cerebral embolism, infantile hemiplegia, disseminated sclerosis, and primary lateral sclerosis;[3] and in only one of these is the female sex more frequently affected than the male, viz., infantile hemiplegia—a rare disorder, and one, moreover, probably due primarily rather to some fault in the vascular than in the nervous system. The other four disorders affect the two sexes equally. One of these, embolism, is essentially due to disease in the vascular system; the remaining three—disseminated sclerosis, primary lateral sclerosis, and infantile meningeal hæmorrhage—are

[1] T. Lauder Brunton: Russell Reynolds's "System of Medicine," vol. v. p. 384.

[2] Samuel Wilks: *ibid.* p. 361.

[3] I have not included chlorosis.

decidedly rare; some, indeed, have doubted the existence of the last named.

Wherefore it is manifest that the male sex is far more liable to suffer from gross organic nervous lesions than the female. The question now meets us: How far is this proneness innate, and how far due to peculiarities of environment? There is no doubt that the environment of the male sex is, on the whole, more calculated than that of the female to induce organic nervous disease; but after making all due allowance for environmental differences, we are compelled, as we shall see, to fall back upon some innate peculiarity of the nervous system of the male to account for the pathological disparity.

To begin with, the disparity is observed in early childhood, when there are practically no differences in the environment of the two sexes. Thus, boys are more frequently affected than girls with the following disorders:—

Acute anterior poliomyelitis.
Pseudo-hypertrophic paralysis.
Cerebral meningitis.
Epidemic cerebro-spinal meningitis.
Cerebral tumour.

Further, when during adult life differences in the environment of the two sexes obtain, they are quite incompetent to account for the great disproportion between the respective liability of each sex to certain disorders. Thus, males are ten times more frequently affected with locomotor ataxy, and many times more frequently with general paralysis of the insane, than females. Males, morever, suffer three times more than females from progressive muscular atrophy; four times as often from hæmatoma of the dura mater; three times as often from cerebral abscess and tetanus, and twice as often from cerebral tumour. There is nothing in the respective environments to warrant us in attributing to these alone such a great inequality.

Gowers points out that the preponderance of syphilis in the male sex does not wholly explain the wide disparity between the sexes as regards their liability to be affected by locomotor ataxy; and further that the greater exposure of the male sex to injury does not of itself account for the preponderance of cerebral abscess in that sex.

In regard to tumour of the brain—males are more liable than females to all forms, "with the apparent exception of sarcoma." This is significant, for sarcoma is almost certainly parasitic, and it should not therefore surprise us that sarcoma of the brain does not follow the others abovementioned in being twice as frequent in the male sex as in the female, seeing that the tendency to this particular tumour must be due, not to an inherent tendency to tumour-formation in nervous tissue, but to an inability to resist the effects of a particular micro-organism. In this connection it must, however, be noted that males are more liable than females to tubercle, tetanus, cerebro-spinal meningitis, and carcinoma, the three former of which are certainly, and the latter very probably, due to parasitic action. Primary carcinoma of the brain must, however, be very rare.

The inherent proneness of the nervous system of the male to undergo organic change being then indisputable, can we in any way account for it? We have seen that throughout almost the entire organic kingdom the males are more apt to vary than the females—*i.e.*, the more prone to acquire new characters; it is, however, doubtful whether this principle helps us to explain their peculiar innate tendency to undergo nervous dissolution or *degenerative* change, and if we except certain of the benign neoplasmata, all the above organic lesions are essentially degenerative; they are examples of dissolution. The principle may perhaps explain the greater tendency manifested by the male sex to benign tumour of the brain, seeing that this may be due to excess of formative power, such as we might look for in the highly variable male; but with our present inadequate knowledge it is of course evident that we cannot on it explain also the tendency of the male nervous system to be affected with parasitic diseases.

CHAPTER IV.

THE RELATIVE FREQUENCY OF THE MORE IMPORTANT FUNCTIONAL NERVOUS DISORDERS IN THE TWO SEXES.

HAVING considered the relative frequency with which the two sexes are affected by the various organic diseases of the nervous system, we may now very briefly compare the frequency with which they are affected by some of the more important functional nervous disorders.

Chorea "affects girls nearly but not quite three times as frequently as boys. A combination of recorded statistics yields 365 boys to 1000 girls. The preponderance of girls is least in childhood, and increases after puberty. The disease is rare in lads over sixteen. Between twenty and thirty it is practically confined to the females" (Gowers, vol. ii. p. 548).

Saltatoric Spasm.—"Occurs in both sexes, and seems to be rather more frequent in males than in females" (p. 584).

Habit-Spasm.—"Is said to be more common in females than in males, but it is very often seen in boys" (p. 586).

Spasmodic Torticollis.—"Is more common in women than in men" (p. 611).

Tetany.—"Is rather more frequent in males than in females, the proportion being as seven to six, but this relation does not obtain at all ages . . . . . Of 150 cases that I have collected from various sources (including 8 observed by myself) 142 are available for comparison in these points :—

Ages	1–4	5–9	1–9	10–19	20–29	30–39	40–49	50–61	
Males	26	5	31	23	9	4	5	4	= 76
Females	8	3	11	13	15	19	8	0	= 66
	34	8	42	36	24	23	13	4	

In early childhood the disease is far more frequent in males than in females, but between the ages of twenty and fifty, the liability of the sexes is reversed, and females suffer twice as frequently as males" (pp. 646, 7).

Writer's Cramp.—"The affection is very much more common in males than in females, especially in its motor form, doubtless because comparatively few women are engaged in occupations that involve a large amount of writing. If all forms are included, males constitute two-thirds of the sufferers, but a still larger proportion, at least five-sixths, of those who present the motor form" (p. 658).

Epilepsy.—"Females suffer from epilepsy rather more frequently than males—in the proportion of about six to five" (p. 677). This conclusion is based on 1450 cases. R. Reynolds thinks the two sexes are practically affected equally with epilepsy ("System of Medicine," vol. i. 295). There are, he contends, more females in out-patient departments, because more women can attend.

Neuralgia.—"Women are more prone to neuralgia than men, but the degree of their liability has often been over-estimated, and the excess of females among the sufferers disappears in the second half of life" (p. 735).

Migraine.—"Females suffer from migraine more frequently than males, but their preponderance is not great" (p. 776).

Exophthalmic Goitre.—"Women are far more prone to suffer than men, the ratio being about five to one" (p. 807).

Laryngismus Stridulus.—The male sex is the more liable; of forty-eight cases, thirty-four were males and fourteen females. Vogel also writes that boys are more commonly affected than girls, "a fact almost all authors admit." Mackenzie observes, "The greater liability of the male sex which occurs in other laryngeal diseases holds good here" ("Nervo-muscular Affections of the Larynx").

Hysteria is much more common in the female than in the male.

Hypochondria is much more common in the male than in the female.

Angina Pectoris is more common in the male than in the female.

Infantile Convulsions are, like most other children's diseases, more fatal in the male than in the female sex. Thus the following table, constructed from the Registrar-General's Reports, gives the deaths from convulsions in either sex per million of living persons in England during the years 1884–1887 inclusive:

Years.	Males.	Females.
1884	985	721
1885	931	675
1886	951	698
1887	885	654

The Reports do not expressly state that the convulsions alluded to were infantile, but in all probability they were almost entirely so. Nor can we from them conclude with absolute certainty that, because convulsions were more fatal in the male than in the female, therefore they were more numerous in the male sex; though this may be argued with a fair degree of certainty.

Let us now arrange the above disorders according as they affect the one or the other sex more frequently:

Affecting Males more frequently than Females.	*Affecting Females more frequently than Males.*
Tetany.	Habit spasms.
Laryngismus stridulus.	Spasmodic torticollis.
Writer's cramp.	Epilepsy.
Angina pectoris.	Neuralgia.
Infantile convulsions.	Migraine.
Hypochondria.	Exophthalmic goitre.
	Chorea.
	Hysteria.

It may be mentioned that whooping-cough is more common, and also more fatal, among girls than boys, but how far nervous peculiarity plays a part in predisposing the female sex to this disorder it is difficult to say. It might be argued that the specific catarrh is equally common in either sex, while the whoop, by which alone the disorder can be certainly diagnosed, is more common in the female, the assumption being that the nervous organisation of the latter is more explosive than that of the male. Such an argument must, however, at once be discarded, seeing that, even in the child, the nervous centres are more explosive in the male than in the female, and especially is this the case with the laryngeal centres—laryngismus stridulus, *e.g.*, is decidedly more common in the male than in the female sex. On the whole, therefore, we must conclude that the female is more susceptible than the male to the microbe of whooping-cough.

We may now briefly inquire how far it is possible to explain why one sex should be more prone to suffer from certain of the above disorders, and the other sex from certain others of them:—

Tetany, Laryngismus Stridulus, Convulsions.—The greater mortality of boys over girls has already been remarked upon. This is the case in nearly all diseases (diphtheria and whooping-cough being almost the sole exceptions); and the fact may possibly be explained by the boy being more katabolic than the girl. Thus, to take rickets, we should naturally expect the katabolic boy to be more seriously affected with this complaint than the anabolic girl, and therefore to suffer more seriously from its nervous manifestations—to wit, *tetany, laryngismus stridulus,* and *convulsions.* In rickets, the nerve-centres are, of all tissues of the body, the most seriously affected. On the other hand, the true explanation of the excessive proneness of the boy to suffer from these three disorders may lie in a greater innate tendency to explosion on the part of the nerve-centres involved in them in the one sex than in the other.

Writer's Cramp.—The more frequent occurrence of this disorder in the male sex is perhaps due entirely to the fact that men are more frequently engaged in continuous writing than women.

Neuralgia, Migraine.—The greater liability to neuralgia and migraine manifested by the female sex is largely due to peculiarities in the female environment. The indoor life of women is especially productive of a host of minor nervous disturbances, amongst which neuralgias are to be reckoned. Furthermore, women are particularly prone to suffer from the various forms of anæmia, be it from that peculiar disorder, chlorosis (of the origin of which we are still entirely ignorant), or from the anæmia connected with pregnancy, parturition, lactation, confinement indoors, and improper feeding.

Other Minor Functional Troubles of women, such as palpitation, giddiness, headache, backache, numbness, flushing, dyspepsia, fainting, may be largely referred to the same causes as the above; many of them, however, may be directly connected with their peculiar sexual organisation. Into this subject it is unnecessary to enter further here.

Angina Pectoris.—Anginoid attacks are more frequent in women than men, but the reverse is the case with true angina. As the latter is generally associated with calcareous coronary arteries, or with degeneration of the aortic valves, both of which are more common in men than women, this may help to explain the greater frequency with which men are afflicted with it, though it is probably not the entire explanation.

Hypochondria and Hysteria.—I do not stop here to discuss why hypochondria is so characteristic of the male, and hysteria of the female sex, since the subject is considered in various parts of this work.

CHAPTER V.

THE INFLUENCE OF SEX ON PROGNOSIS IN INSANITY.

THE influence of sex on the prognosis in insanity is a subject of some importance. There is probably no class of diseases, and certainly no class of nervous diseases, for which such elaborate statistical tables have been constructed as for those of the mind. In our endeavour, therefore, to discover how far sex influences the prognosis in nervous diseases generally, we naturally turn to these, and we shall probably not be far wrong in assuming that the conclusions we arrive at in respect of them are to some extent true of nervous disease in general.

Three facts stand out prominently in reference to this question:—

1. That the mortality is higher among insane men than among insane women.

2. That the chances of recovery are distinctly better among insane women than insane men.

3. That gross organic lesions of the brain are more common among insane men than insane women.

I have collected a number of statistics bearing upon these questions, but there will be no need to quote from more than a few of them. As to the relative *mortality and recoverability of the sexes*, Thurman,[1] Hood,[2] Boyd,[3] and Stewart[4]

[1] "Observations and Essays on the Statistics of Insanity," p. 65.

[2] "Statistics of Insanity," p. 26. [3] *Jour. Ment. Science*, Jan. 1865.

[4] *Ibid.* July 1865.

all agree that the recoverability is greater in the female sex and also that the mortality is less in it, with the exception of Stewart, who concludes that the latter is equal for the two sexes.

The mortality in Scotch and English asylums in the five years 1862–1866 on the average numbers resident was as follows :[1]—

Years.	Scotland.		England.	
	Males.	Females.	Males.	Females.
1862	10.54	8.84	11.67	8.14
1863	8.79	7.53	12.09	7.83
1864	8.74	7.54	12.77	9.42
1865	7.56	6.90	12.85	8.49
1866	8.72	7.98	13.09	8.58
Average	8.84	7.69	12.51	8.50

It will be observed that in each of these years the mortality both in England and Scotland was distinctly greater for the males ; notably was this the case in English institutions.

Chapman found the proportion per cent. of recoveries on admissions into the Retreat between 1796 and 1844 to be 43.46 for the men, and 50.26 for the women.[2]

The same writer gives the mortality per cent. on the average number resident in institutions for the insane as 12.76 for the males, 8.65 for the females.[3]

During the year 1859 there recovered in English institutions for the insane 1476 males, 1757 females.[4]

In 1867 the recoveries and deaths in the same were as follows :[5]—

Recoveries.		Deaths.	
Males.	Females.	Males.	Females.
1.510 ...	2.062 ...	1.876 ...	1.489

[1] *Jour. Ment. Science*, Jan. 1869, vol. xiv. p. 549.

[2] *Ibid.* vol. xxiii. p. 188.

[3] *Ibid.* vol. xxiii. p. 55. The above results are based on 70 Asylum-years, 1865–1869 inclusive.

[4] Fourteenth Report of the Commissioners in Lunacy.

[5] The Lunacy Blue-Books for 1867.

The percentage of recoveries on admissions to the Royal and District Asylums in Scotland from 1858 to 1867 was as follows :[1]—

Years.	Males.	Females.
1858	33.6	40.3
1859	32.1	40.8
1860	37.7	40.1
1861	39.8	41.1
1862	34.9	42.4
1863	32.8	40.8
1864	30.5	31.9
1865	36.6	36.6
1866	29.1	34.1
1867	33.0	39.6

Thus, in each year, except 1865, the percentage of recoveries was greater among the females.

The mortality per cent. among the inmates of the lunatic wards of the poor-houses in Scotland during the same years was :[2]—

Years.	Males.	Females.
1858	9.9	8.2
1859	14.7	5.7
1860	6.5	7.9
1861	16.2	11.2
1862	8.6	10.9
1863	8.2	9.1
1864	7.9	7.6
1865	5.9	4.0
1866	7.8	5.2
1867	10.9	6.9

A curious fact is brought out in the thirteenth Annual Report of the Commissioners in Lunacy for Scotland. The number of deaths for both sexes, according to this report, is greatest in winter; but the "tendency to death is in summer greater among females than males. We have not the means of ascertaining whether the difference as shown to exist between the male and female mortality in asylums in summer and in winter, extends to the general population."[3]

[1] *Jour. Ment. Science*, vol. xiv. p. 552. [2] *Ibid.* p. 553.
[3] *Ibid.* vol. xvii. p. 397.

The percentage of recoveries upon admissions into English asylums during 1882 was:[1]—

Males.		Females.
34.85	...	44.46

The subjoined table, abridged from one contained in the Thirty-seventh Report of the Commissioners in Lunacy, gives the percentage of recoveries and deaths in several classes of institutions; and it will be observed that in only one case is the general rule departed from, viz., in that of single private patients:—

	Proportion per cent. of Recoveries to Admissions.		Proportion per cent. of Deaths to the Average Numbers resident.	
	Males.	Females.	Males.	Females.
County and Borough Asylums	36.18	44.53	11.75	7.64
Registered Hospitals	41.36	46.85	7.37	3.85
Metropolitan Licensed Houses	25.11	37.17	13.74	6.99
Provincial Licensed Houses	27.94	36.56	11.24	8.55
Single Private Patients	19.44	15.71	2.87	5.90

Inasmuch as women more frequently recover from insanity than men, we should expect to find that among the insane of asylums more women have had previous attacks of insanity than men, and such is the case in all the asylums of which I have examined the reports.

Now, how are we to explain this condition of things? The greater recoverability and smaller mortality among the female insane is perhaps in part due to their greater innate recuperative power, but it must be also largely due to the fact that the nervous system of the male sex is, on the whole, more liable to serious organic lesions than that of the female. The female sex is more frequently affected with a purely functional form of insanity than the male sex. Thus, Davison, after remarking upon the excessive mortality of the males over the females in the

[1] Thirty-sixth Report of the Commissioners in Lunacy, 1882.

Chester Asylum, observes: "The number of deaths which occurred in the course of the year was thirty-two males and eleven females. The difference in the mortality of the sexes is very marked, and may be accounted for by the fact that the mental derangement among the men is more frequently complicated with grave bodily disease—the woman enjoying a comparative immunity from the ravages of general paralysis of the insane."[1] It is interesting to observe here that moral causes are more effective in provoking insanity in women than in men. P. M. Deas' figures point "to the great excess of hopeless forms of insanity among the men, as compared with the women,"[2] and he believes that the disparity may be partly explained by the fact that general paralysis of the insane is more common among men.

Before leaving this subject of the relative recoverability and mortality of male and female insane patients, it may be mentioned that, according to Boyd, age has a peculiar influence in this connection.

The Greater Frequency of Gross Lesions of the Encephalon in Insane Men than in Insane Women has been incidentally brought out in the preceding remarks, and it is no doubt part of the general truth that they are more subject to organic disease of every part of the nervous system.

Of 255 men admitted into Dr. Deas' asylum during the five years 1872–1876 inclusive, 93 had died by the end of 1877, while out of 220 women admitted, only 47 had died.[3] The causes of death in these cases are instructive. They were as follows:—

	Males.		Females.
Cerebral affections . . .	66	...	20
Respiratory diseases . .	5	...	3
Cardiac ,, . .	4	...	3
Phthisis pul.	8	...	8
Other diseases . . .	10	...	13
	93	...	47

Excess of Male over Female Patients in Private Asylums.—Taking all institutions together, female patients are in

[1] *Jour. Ment. Science*, vol. xxi. p. 297. [2] *Ibid.* vol. xxv. p. 11. [3] *Ibid.* p. 14.

excess of male. There seems, however, good reason to believe that the number of people who become insane is nearly the same for each sex; in which case the excess of female patients may probably be explained by the greater mortality among the male. But while the foregoing statement holds good for pauper asylums, it is somewhat remarkable that matters are reversed in private asylums, as will be seen from the following figures:—

The number of patients in English institutions for the insane on January 1, 1859, was:[1]—

	Males.		Females.	
Pauper .	. 7913	...	9507	Excess of females = 1594
Private .	. 2416	...	2177	Excess of males = 239

In Scotland at the same time the numbers were:[2]—

	Males.		Females.	
Pauper .	. 2285	...	2695	Excess of females = 410
Private .	. 1544	...	1354	Excess of males = 190

and again in 1862:[3]—

	Males.		Females.	
Pauper .	. 2394	...	2863	Excess of females = 469
Private .	. 1520	...	1359	Excess of males = 161

On January 1, 1863, the private and pauper patients in England and Wales were distributed as follows:[4]—

	Males.		Females.	
Pauper .	. 9909	...	12089	Excess of females = 2180
Private .	. 3042	...	2299	Excess of females = 743

In Scotland in the same year the distribution of the patients was:[5]—

	Males.		Females.	
Pauper .	. 2393	...	2896	Excess of females = 503
Private .	. 519	...	533	Excess of females = 14

On January 1, 1886,[6] there were in the public asylums

[1] Thirteenth Report of the Commissioners in Lunacy.

[2] *Jour. Ment. Science*, vol. vi. p. 466.

[3] Fourth Annual Report of the General Board of Commissioners in Lunacy for Scotland, 1862, p. 417.

[4] Seventeenth Report of the Commissioners in Lunacy, 1863, p. 176.

[5] Fifth Annual Report of the General Board of Commissioners in Lunacy for Scotland, 1863, p. 226.

[6] Twentieth Report of the Commissioners in Lunacy, 1866.

of England and Wales 2397 more females than males, while in the private asylums there were 788 more males than females. In 1867, however,[1] while among the pauper patients the females were largely in excess of the males, they were, contrary to the rule, in excess (by 308) in the private asylums also.

The general rule therefore seems to be, that the males exceed the females in private asylums, while the reverse is the case in public asylums ; but owing to the far larger numbers of both sexes in the latter institutions, this distribution does not affect the previous statement that, taking the whole population, female patients are in excess of male. Are we, then, to conclude that, among the upper classes, the male sex is proportionately more frequently affected than among the poorer classes ? This is very possible, for among the former bread-winning involves greater wear and tear of brain than among the latter. Probably also among the upper classes men are sent to asylums for a degree of disease which does not prevent women from staying at home.

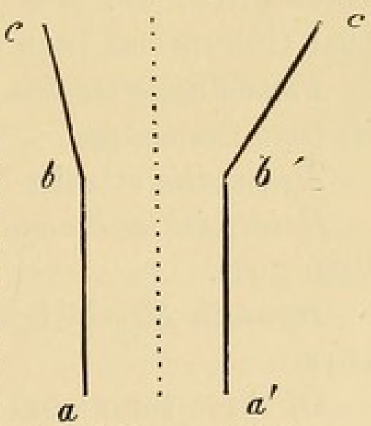
[1] *Jour. Ment. Science*, vol. xv. p. 589.

CHAPTER VI.

WOMAN AN UNDEVELOPED MAN—NERVOUS DIFFERENCES BETWEEN THE BOY AND THE GIRL—MENTAL CHARACTERISTICS OF THE CHILD—MENTAL RESEMBLANCES BETWEEN THE CHILD AND THE SAVAGE.

From the earliest times there have been those who have regarded woman as an undeveloped man. This view is in harmony with the fact pointed out by Darwin, that in almost all unisexual animals the adult female is more like the young of either sex than the adult male. There can be little doubt that this law applies to the human species, and that the woman is more like the child than is the man. Up to the time of puberty the development of the boy to some extent runs parallel with that of the girl, but even before this period each is marked by distinct characteristics; there is from a very early age a foreshadowing of the essentially masculine and feminine traits, and a radical difference in the nervous organisation of each. At puberty the unlikeness of the two sexes suddenly increases, each developing in opposite directions, but the male diverges more than the female, who thus retains more of the ante-pubertal state. These facts may be diagrammatically represented as at Fig. 7, in which the line *a b c* represents the development of the female, the line *a′ b′ c′*

Fig. 7.



FEMALE. MALE.

that of the male, *b* and *b′* marking the period of puberty. Up to that point the two sexes develop on more or less parallel lines; beyond it each diverges from the other, as shown by the lines *b c*, *b′ c′*; but the latter diverges more than the former.

Differences between the Boy and the Girl in Nervous Organisation.—Although the development of the boy and the girl is to some extent similar up to puberty, yet each displays distinct peculiarities of nervous organisation. This is shown not only in health, but in disease also. In the case of certain nervous diseases the comparative frequency with which boys and girls are affected may be stated with some accuracy. Thus boys are, with one exception (that of infantile hemiplegia), more frequently affected than girls by the following six varieties of organic nervous disorders :—

Idiocy.—The proportion of male to female idiots is about as five to four.

Acute Anterior Poliomyelitis affects four boys to every three girls ; but it is only in boys under two years of age that Gowers has been able to trace this greater liability.

Pseudo-hypertrophic Paralysis is considerably more common in boys than girls.

Meningitis attacks boys more frequently than girls.

Epidemic Cerebro-spinal Meningitis is more common in boys than girls.

Infantile Hemiphlegia is rather more common in girls than boys.

Of three functional nervous disorders girls are more frequently affected by two, boys by one ; thus :—

Habit Spasm is more common in girls than boys.

Chorea is three times more common in girls than boys.

Tetany affects boys under ten three times more frequently than girls of the same age.

It may here be mentioned also that suicide is much more common in boys than girls. I see from a table recently quoted in the *Pall Mall Gazette* that during six years (1883–1888)

163 boys committed suicide in the elementary schools of Germany, against 46 girls.

We have, therefore, abundant proof from the field of pathology that the nervous system of the boy differs in some important respects from that of the girl.

Herbert Spencer regards woman as to some extent an undeveloped man, believing that her general development has been arrested by the special activity of her sexual system, in her the procreative functions playing a more important part than in the man.

If the proposition that the woman resembles the child more than does the man is correct (and it is borne out by actual observation), we should expect it to hold good of the nervous system as of all others, and we have, therefore, now to inquire how far the woman and the child are alike in nervous organisation.

In order to arrive at any exact conclusions on this head, it will first be advisable to consider the nervous characteristics of the child, and I shall limit my observations to mental characteristics.

Mental Characteristics of the Child.—The peculiarities of the child-mind are of course such as belong to an inferior grade of mental evolution. Many of them may be apprehended by keeping in view the fact that the nervous substratum of mind is built up on the reflex type. The subject will be dealt with in some detail at the end of this work, but I may point out here that all mento-motor actions (*i.e.*, peripheral changes wrought through mind) are either actually reflex or derived from the reflex type. In the simplest form of such actions the individual acts upon the impulse of the moment ; an impression at the periphery starts a series of nerve-currents, which, travelling up to the highest centres and setting up therein certain changes which are attended by consciousness, are immediately reflected towards the periphery, causing definite change there also. In the more complex forms of mento-motor actions, however, the central changes—material and mental—thus initiated are of a more complex nature; in place of immediate action there is delay, the nervous currents lingering for some time in the highest level before the efferent periphery is energised: there is on the mental side deliberative reflection. Now, in proportion to the complexity of those material (and corresponding mental) changes in the highest nervous level which intervene between the afferent and efferent impulses, in that proportion has mental evolution proceeded—in that proportion is the individual removed from a mere instinctive organism and capable of the higher forms of thought.

These distinctions between a primitive and a highly evolved mind may, so far as the material side is concerned, be represented as follows:—

FIG. 8.

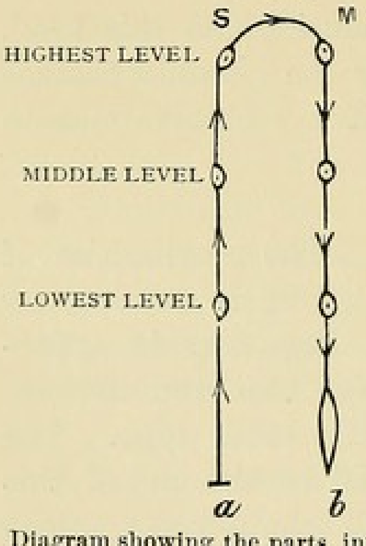


Diagram showing the parts involved in a simple reflex mental act. The nerve-current started at the afferent periphery, *a*, is, when it reaches the highest sensori-motor level (*S M*), at once reflected towards the efferent periphery, *b*, the material (and corresponding psychic) change taking place in *S M* being comparatively simple.

FIG. 9.

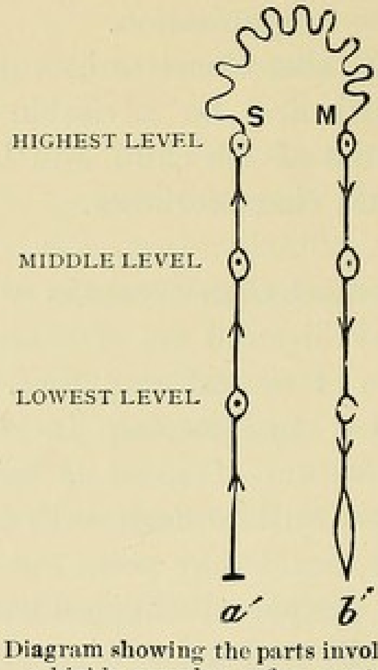


Diagram showing the parts involved in a highly complex reflex mental act. The nerve-current started at the afferent periphery, *a*, when it reaches the highest sensori-motor level (*S M*), sets up therein a complex series of mental (and corresponding psychic) changes before the afferent periphery is energised.

The above considerations enable us to appreciate several of the differences between the adult and the child mind. Thus—

(1) Children lack will-power, acting, as they do, in only a minor degree upon ideal impulses. Their conscious actions are essentially of the simple reflex mental type. In short, they show little tendency to reflect before acting, and rarely pursue a line of purposive conduct for any length of time, being attracted hither and thither by every passing impression.

(2) The child is essentially imitative, displaying originative faculty in only a small degree. This imitativeness is closely related to the lack of will-power and of reflection, for it shows, as Herbert Spencer observes, a mental action largely dependent upon the outer incidents of the moment.

(3) Children are highly emotional, and, moreover, they pass rapidly from one emotion to another; one moment they are in tears, another in laughter. Here again we see the tendency to live in the present, the inability to be affected by ideal states. Hence, also, the child is very impulsive; he acts without reflection, and his passions, being unopposed by ideal impulses, are allowed full play; he flies into a passion when his mother will not give him what he wants, because he is unable, in the absence of reflection, to see that she refuses for his own good. Very big children—quite grown-up, in fact—are often in a similar predicament; they fancy their elders are unkind or even cruel, because this is denied them and that insisted upon; they, like the little ones, are dominated by an overpowering impulse, and are unable to realise all the bearings of the case.

Anstie was, I believe, the first to suggest that a violent outbreak of passion was due rather "to the removal of the check ordinarily imposed by reason and will"[1] than to a primary stimulation of the nervous arrangements engaged in the outburst. Bevan Lewis has some interesting observations on this head. "Certain features," he writes, "which characterise the mental type of the child spring into obvious prominence in the adult subject of mental disease. The infantile mind is, above all things, characterised by lack of *control*—its instincts, passions, desires, actions, all alike

[1] "Stimulants and Narcotics," p. 78, 1864.

exhibit in a high degree a want of inhibitory restriction, and the further development through childhood and youth to adolescence and adult age is a record of the slow progressive superposition of controlling centres. . . . . Normal mental development is specially characterised by this uniform and progressive establishment of self-control (so to speak) upon higher and still higher levels."[1]

(4) Another characteristic of the child-mind is feebleness of the faculty of attention. The attention is apt to wander from one subject to another, and if by an effort it is kept fixed, or unusually prolonged, mental fatigue results.

(5) It need scarcely be said that the capacity for abstract thought is also feebly developed in the child.

(6) Children are very observant, and have quick perceptions.

(7) They show a strong craving for sympathy, especially when hurt or ill, when they will cry for nurse or mother, and manifest the liveliest pleasure in being petted and sympathised with. So strong is the craving, that a child will often seek sympathy for its own sake. Having, for instance, cut its finger or bruised its leg, it will sometimes affect to feel pain long after it has subsided, as is shown by its forgetting, in a most amusing manner, which is the injured member. Similarly, children feign illness for the sake of procuring sympathy, though this, it must be acknowledged, is more often done from other motives, such as to obtain some coveted indulgence.

(8) The sense of dependence is strongly developed in the child. It does not rely upon its own powers, but willingly places itself under the sheltering wing of another —above all, of its mother. It has a strong instinct of veneration, and is easily filled with vague, superstitious awe.

(9) The child lacks courage, and is easily frightened; especially in the dark, which its imagination peoples with terrible beings.

(10) Children, and particularly boys, show a remarkable

[1] "A Text-book of Mental Diseases." W. Bevan Lewis. London, 1889.

fondness for animals. They love to keep dogs, rabbits, guinea-pigs, &c.

(11) A further characteristic of children, not to be overlooked, is the activity of their imagination, and their tendency to mistake the creatures of their fancy (" the false creations of the mind ") for concrete realities. This lively imagination often expresses itself in the most beautiful poetic creations, but it tends to atrophy as the child's knowledge of the world widens. The unknown and wonderful becomes, first, the familiar, and then the commonplace, and if something of the poetic instinct survive the nursery and the schoolroom, the all-absorbing race for wealth which engrosses civilised mankind soon stifles it in all but the chosen few.

The lively imagination of the child, while on the one hand it may lead to poetic creation, on the other hand may tend to the falsification of facts in a dangerous degree. Children are apt to tell of all sorts of strange things that have befallen them. A family of four children used to vie with one another every morning at breakfast in recounting the wonderful dreams they had had over-night, and it soon became evident that their experiences of dreamland were pure fabrications. To such a length did this habit grow upon them that the mother soon found it necessary to let it be understood that the first little boy or girl who had another such strange dream would be given a dose of castor-oil, and from that day forth the dreams miraculously ceased!

Another instance of the child's tendency to live in a world of imagination is afforded by its games. Children love to play at 'pretending'—shopkeeping, engine-driving, 'church,' 'house,' and so forth—anything, in fact, that they have seen their elders do (wherein, again, comes the element of imitativeness).

Mental Likeness between the Savage and the Child.—Now, it is well worthy of remark that all these mental traits of the child characterise also primitive man, and so much is this the case, that the savage has very appositely been called "the baby of the race." Sir John Lubbock has drawn particular attention to the analogy in the following passage:[1] "Thus the mind of the savage, like that of the child, is easily fatigued . . . . a short conversation wearies him." He cannot be depended upon as the bearer of a message, for he is easily "distracted on the way by counter-attractions." Further, his emotions, like those of the child, are readily aroused, and are equally transient. "The language of both, too, is very defective in words expressing abstract ideas; their thoughts, and therefore their speech, are occupied chiefly with the concrete."[2]

Again, the cruelty of the savage, his love of fighting and of the chase, his strong tribal instincts, his tendency to single out individuals for some personal peculiarity (as shown in such names as Forkbeard, Harefoot, Bluetooth, Longshanks), these all have their counterparts among the boys of civilised peoples, in their free use of their fists, their occasional bullying, their sham chases, their games of rivalry, and their uncomplimentary nicknames for one another.

But it is unnecessary to enter further into the mental characteristics of the savage, though we may note, as we quit the subject, that his love of pets is, as Galton has shown, very strongly developed, and with this I am inclined to connect the love of children for animals. For just as savages are like children, so likewise are children like savages, and indeed the latter is the more correct way of putting the truth; what is but a temporary stage of mental development in the child being the permanent mental condition of the adult savage.

[1] "The Origin of Civilisation," p. 522.

[2] The English language bears out this point in a very marked way. Most words relating to "religion, law, government, and war, to the less obvious processes of the mind, and to matters connected with art, science, and philosophy (general and abstract terms), are commonly of classical, and mostly of Latin origin." For culture came to the English chiefly, though not always directly, from Rome, and the influx of ready-made classical words in an early stage of the language stopped the formation of native words to express the new ideas to which contact with Roman civilisation gave rise. Had the Norman Conquest, *e.g.*, been delayed until the English had acquired a civilisation of their own, general and abstract ideas would have found expression in Teutonic forms of speech.

CHAPTER VII.

WOMAN AN UNDEVELOPED MAN (*continued*)—MENTAL RESEMBLANCES BETWEEN THE WOMAN AND THE CHILD.

We have now to inquire how far the mind of the woman resembles that of the child. Schopenhauer has perhaps more than any other writer insisted upon their mental kinship. His opinion I here give at some length, if only to show to what extremes a great philosopher may pursue an idea if it but chime in with his tone of thought:[1]—

"For the care and education of our earliest years women are peculiarly adapted, inasmuch as they are themselves childish, silly (*läppish*), and unreflecting (*kurzsichtig*)—in a word, childrenall their lives. . . . . Look at a girl as she plays, dances, and sings with children the whole day long, and ask yourself how a man with the best intentions would acquit himself in her position. . . . . The nobler and more perfect a thing is, the slower and later is it in reaching maturity. The man scarcely attains his full mental power before his twenty-eighth year, the woman is mature at her eighteenth. But there is a reason for this; it is because there is little to mature in her. Wherefore women remain throughout life children, seeing only the nearest, cleaving to the present, mistaking the appearances of things for the things themselves, and placing trifles before the most weighty concerns. . . . . Only the man blinded by

[1] Arthur Schopenhauer, "Parerga und Paralipomena." 2 Aufl. herausg. v. Frauenstädt. II. Bd. Berlin, 1882, p. 647.

L

sexual passion could call the stunted, narrow-shouldered, wide-hipped, short-legged sex the beautiful one. . . . . Neither for music, nor for poetry, nor for the constructive arts, have they really and truly either sense or susceptibility; when they affect them, it is mere mimicry, and simply and solely for the purpose of coquetry."

It is quite clear that the views of the brilliant pessimist on this subject are not the result of calm and passionless observation; yet no one can doubt that women have, as a rule, more of the child in them than men. The difference is to a large extent innate, yet it is greatly accentuated by the differences in the environments of the two sexes, the circumstances of the man tending to differentiate him more and more from the child, while those of the woman tend to maintain the resemblance. Her career is for the most part circumscribed, and calculated to foster the weaker points of her character rather than, as his is, to strengthen it.

To turn now to the analogies between the feminine and the child-mind. Women, as a class, are inclined to be weak-willed, acting upon the impulse of the moment; without, that is to say, due reflection (= ideal impulses). They are, moreover, markedly imitative, and consequently only to a limited extent original. They are very emotional, and pass rapidly from one phase of feeling to another—from tears to laughter, from frowns to smiles. Like children, too, but in a less degree, they are observant and have quick perceptions. They also crave sympathy, but, unlike children, they are very ready to bestow it. Further, they are imbued with a deep sense of dependence; they have the instinct of veneration strongly developed, and they are much prone to superstition.[1]

That the religious bias is stronger in women than in men is easily proved by comparing the relative numbers of each sex attending places of worship. The disproportion is remark-

[1] "Women all over the world, be they as different as they may, yet agree in this: they all incline in greater or less degree to superstition."—"Bosnien, Land und Leute," Adolph Strausz, Wien, 1882. Quoted by Ploss, *op. cit.*, Band I. s. 242.

able in many European countries, but especially in France. I also find, by an examination of statistics, that religious excitement is more frequently given as a cause of insanity in women than in men. Thus in a table setting forth the causes of insanity, H. G. Stewart gives it as operating four times in men to nineteen times in women.[1] We must, however, be careful not to confound causes with symptoms, and it is perhaps more often a symptom of insanity than a cause. But, be this as it may, its greater frequency among insane women than insane men is undoubtedly due to the stronger religious temperament of the former.

How far women surpass men in their likeness to children with respect to the imagination it is difficult to say. That men are not free from the tendency to draw upon their imagination is certain—the habitual "yarner" is familiar to all. I once knew an educated, middle-aged man in whom the habit of misstating facts was so strong that it was practically impossible to believe one word he said; and yet his friends only smiled at the weakness, well knowing him to be perfectly honourable, and not taking his romancing seriously. I afterwards discovered that this peculiarity had characterised him from early childhood. I am disposed to think, however, that the tendency to romance is, as a rule, stronger in women than in men—notably in young women, so frequently have I observed it in those of the uneducated orders. This fact is worth remembering in connection with certain mental tendencies in the hysteric. I find in the natural tendency of the immature mind to romance one factor at least in the evolution of mythology, and in this, if I mistake not, I am at one with Carlyle.[2]

The fondness of women for animals is not greater than that of men, probably not so great. I am inclined, however, to think that this is only because their affection for what is helpless, trustful, and dependent usually finds its satisfaction in the care of children. Where this outlet is absent,

[1] *Jour. Ment. Science*, vol. xi. p. 157.
[2] See Odin in his Lectures on "Heroes and Hero-worship."

the woman generally multiplies her pets, and certainly her solicitude for them is greater than the man's.

Women, like children, are timid and easily frightened. The lack of courage in either case has its origin primarily in a sense of weakness; but a lively imagination and an uninformed intelligence are also factors in it. In consequence of this timidity, fright is a much more potent cause of functional disturbance in women than in men. This has been well shown by Gowers in the case of epilepsy:—"As might be anticipated, in childhood it (fright) is equally effective in each sex; at puberty it is most effective in females, and after twenty it is seldom traceable in men, but it is still a relatively frequent cause in women."[1]

Of the several characteristics of children pointed out above, there only remain two to be considered, viz., feebleness of attention and incapacity for abstract thought. As both of these are due, in grown-up people, to the absence of intellectual training rather than to radical mental conditions, it follows that the average woman, whose mental development has hitherto been left very much to chance, is in these respects more on a par with the child than is the average man; but as the education of the two sexes more and more approximates, less difference between them will be observable. I have not found the capacity for abstract thought less in educated women than in educated men.

[1] "Diseases of the Nervous System," vol. ii. p. 678.

CHAPTER VIII.

WOMAN AN UNDEVELOPED MAN (*continued*)—PATHOLOGICAL APPLICATION OF FOREGOING CONCLUSIONS.

FROM the pathological point of view it will be found convenient to divide women into two classes: those who retain the child-mind in a large degree, and those who do not. A childlike simplicity in woman has a captivatingness about it up to a certain age, but Romanes is no doubt right in maintaining that a time comes when it ought to be "put away with other childish things, and in whatever measure it is allowed to continue after childhood is over, the individual has failed to grasp the full privilege of human life."[1] Tennyson, however, seems to express the truth better:—

> "Yet in the long years liker must they grow:
> . . . .
> He gain in sweetness and in moral height,
> . . . .
> *She mental breadth, nor fail in child-ward care,*
> *Nor lose the child-like in the larger mind;*
> Till at the last she set herself to man,
> Like perfect music unto noble words."

But, in fact, the whole matter turns, like many another controversy, upon the meaning of terms, and here of the term 'childlike.' If by 'childlike' we mean sincere, trustful, truthful, without egoism or conceit, transparent, honest, simple (in its real sense of 'without folds,' without duplicity), then we have it on authority not to be gainsaid that for

[1] *The Nineteenth Century*, May 1887.

woman (and for man too) the child-mind is the highest, not, whatever the sacrifice, to be lost in the 'larger mind.' But if by 'childlike' we mean (what it is better, for distinction's sake, to call 'childish') petulant, wayward, unreflecting, impulsive, without self-control, ignorant, then childishness has to go, with all else pertaining to the imperfect state of immaturity, if a beautiful maturity is to be attained.

Those women who retain in a marked degree the child-mind in so far as regards absence of self-control and reflection, afford the most apt soil for hysteria. In fact, the hysteric state is very often a *mêlée* of childish peculiarities.

Thus, weakness of will is a well-known characteristic of hysteria. It is essentially upon the weak-willed woman, who lacks tenacity of purpose and responds to every passing passion, that hysteria fastens, and there is no more potent charm against it than a strong will.

Emotionality is another prominent factor in this disorder. The element of feeling even in the cultured woman is much stronger than in the man, and thus her thoughts and acts are more swayed by it than his; for which reason tears in woman have generally less significance—at all events in our own race—than in man. This emotional disposition is particularly marked in the childish woman, the outbursts of emotion to which she is liable imperceptibly shading off into genuine hysterical attacks.

We have seen that the adult differs markedly from the child in the power of self-control, and that it is to lack of this, rather than to a primary overaction of the nervous arrangements involved, that emotional outbursts are due. It is owing to this lack that woman, in spite of her anabolic habit, is more liable to them than man. This is strikingly shown by the fact that female prisoners are far more apt than male to fits of insubordination, and so infectious is this tendency that a prison matron confessed to her successor[1] that, when she heard the sound of crashing glass and the

[1] The authoress of a very interesting work, "Female Life in Prison," 1862, to which I am indebted for the above facts.

general turmoil of an outbreak among the inmates, she had the greatest difficulty in restraining herself from joining in the *mêlée*. It must, however, be remembered that these outbreaks are largely predisposed to by the excessive monotony of prison life, and this, no doubt, was telling upon her, and inducing the inclination. The same authority points out a curious and interesting fact, which may be mentioned, in passing, as an exception to the general rule that the male sex varies between wider extremes than the female—viz., that the female prisoners are much more troublesome than male, just as the female inmates of lunatic asylums are the more obstreperous. The writer ends by giving her adhesion to the view :

> "For men, at most, differ as Heaven and earth,
> But women, worst and best, as Heaven and Hell."

The childlike craving for sympathy is another peculiarity of the hysteric temperament. This craving is frequently the clue to the whole malady. It must be borne in mind, however, that women have greater reason to covet sympathy than children, sympathy being the keynote of woman's nature. She is by habit more altruistic than man, having constantly to sacrifice herself for her children. Not only, therefore, has she the childlike yearning for sympathy, but she is endowed with that larger sympathy which is born of the maternal instinct. What wonder, then, that this instinct, so deeply pervading the woman's nature, should run riot, so to speak, in the hysteric ?

The imitativeness of women, which is one of the chief means of their remarkable adaptability, should also be noticed in connection with hysteria and allied nervous states, though how far a predominant imitativeness may take part in hysteric phenomena I do not know ; the various forms of neuro-mimesis are probably almost always unconscious imitations of other diseases. Women are certainly more liable to be 'infected' with (*i.e.*, to imitate) neuroses than men, and the various infective neuroses of the Middle Ages were probably commonest among them.

It may be regarded as certain that imitativeness plays a part in the production of insanity. A person inclined to insanity is far more apt to develop it if much with one already insane than if surrounded by the sane. Brunet goes so far as to say that "there is in man such a tendency to imitation that no one can live continually with a madman without losing his own reason."[1] Most will doubtless regard this as rather too severe an indictment against our asylum superintendents, for though, beyond all doubt, people thrown much in the society of lunatics tend to get 'peculiar,' there must be a strong innate tendency to insanity when such unhappy results follow. Given the tendency, however, imitativeness no doubt helps to develop latent insanity; and women, being more imitative than men, are probably more injuriously affected by consorting with the insane than they.

Female Nurses

There is another possible consequence of this greater imitativeness of the woman which may be mentioned by the way. Probably one of the reasons why husband and wife tend, as is so often observed, to grow like one another in facial expression is that each unconsciously imitates the other, and one would expect the wife to be more influenced by the husband than him by her, seeing that the woman is the more apt imitator of the two. A further cause, I believe, lies in the fact that each gets into the same way of thinking and feeling, and this sameness in mental condition finds its reflex in the countenance.

In one point—viz., general bodily activity—men are more like children than women, since, as we have seen, women strongly tend towards passivity. And yet there is a form of bodily activity in the liking for which the civilised woman more resembles the child than the civilised man, and that is dancing. I have been told that women are no more fond of dancing than men, that their love for conventional 'dances' owns other causes than mere delight in rhythmic movement, causes, viz., such as the music, the homage they receive from the men, and the general air of

[1] *Jour. Ment. Science*, vol. xxiii. p. 129.

festivity and life. But, making due allowance for these influences, I think there can be no doubt that women care more for the amusement. Let any one observe the dancers around a street organ; a man or boy is seldom seen among them. The child and the savage are both very fond of dancing, a fact which I reserved while considering the mental characteristics of the two, inasmuch as love of dancing cannot be regarded as a purely mental characteristic, although no doubt dancing is to a large extent an emotional exercise, and constitutes a form of excitement in harmony with woman's emotional temperament. The dancing epidemics of the Middle Ages are obviously related to the war and other ceremonial dances of the savage. The movements of such dances tend to excite strong emotion and to arouse enthusiasm; for just as the various emotions tend to call forth particular movements, so, contrariwise, do the movements expressive of an emotion tend to call forth that emotion. Thus the movements of these wild dances imperceptibly shade off into the co-ordinate movements of the hysterical fit—into 'hysteroid' movements, to use a term originated, I believe, by Sir W. Roberts, and adopted by Gowers. Hence it is possible that the love of dancing, so peculiarly strong among women, is the outcome of a nervous organisation affording a suitable soil for hysteria. The dancing affords an outlet for pent-up energy.

The resemblance between the motor activities of the woman and the child is even better brought out by the tendency which each displays to chorea. Octavius Sturges, in his able writings on chorea,[1] has contended that this disorder is simply an exaggeration of certain restless, fidgety movements which are normal to the child. These, he maintains, imperceptibly shade off into the actual disorder; a proposition no one will, I presume, deny, although few will agree with him that rheumatism takes no part in causing this abnormal exaggeration.

The peculiar tendency, in the nervous system of children, to spontaneous discharges, which render them liable to

[1] "Chorea and Whooping-Cough," London, 1877.

chorea, is of great interest. It gradually diminishes, as Sturges shows, as the body comes under the control of the will; thus, as he observes, the child habitually expresses itself "all over," and the growing girl displays the same choreic tendency, though in a less degree, in the ungainly movements of the hobbledehoy age. Gradually, however, with normal development, these spontaneous movements become less pronounced, the muscular expression of the emotions being confined to more and more limited groups of muscles. Nevertheless, the nervous system of the woman preserves more of the choreic tendency than that of the man, as shown by the far greater frequency with which chorea attacks the former than the latter. And this explosiveness of motor centres in woman is worthy of note in connection with the motor manifestations of hysteria.

The following passage from Gowers may be quoted in this connection: "Just as an emotion is naturally expressed by muscular actions, in the 'jumping for joy' of a happy child, the stamping of rage, or the wrung hands of distress, so the violent emotional discharge of hysteria may be associated, in more severe cases, with violent movements of the limbs, purposive in aspect, but purposeless in aim."[1]

Lastly, we need not be surprised to find in hysterical women a strong tendency to romance, to falsify facts; for in hysterical states the nature of the woman, always in some degree childish, becomes, as we should expect, yet more so, seeing that disease is essentially a process of dissolution, *i.e.*, a reversion to a more primitive type. This romancing tendency is related to the hysterical cunning.

[1] "A Manual of Diseases of the Nervous System," by W. R. Gowers, vol. ii. p. 222.

CHAPTER IX.

WOMAN AN UNDEVELOPED MAN—(*continued*)—INTELLECTUAL CAPACITY OF MAN AND WOMAN COMPARED—RATE OF MENTAL EVOLUTION IN THE TWO SEXES—MENTAL CONDITION OF THE WOMAN AFTER THE CLIMACTERIC.

WE have now seen good reasons for concluding that the woman more than the man maintains throughout life the mental characteristics of the child, and this leads me to touch briefly upon the question, so frequently discussed nowadays, whether the man is mentally superior to the woman. The general drift of my remarks hitherto has obviously been in favour of the view that the man is the more intellectual of the two, and such is, in fact, the view I should incline to—with a qualification, to be presently mentioned. This being so, it may be pertinently asked—How are we to account for the fact that women acquit themselves as brilliantly as, or more brilliantly than, men in examinations open to both sexes? In reply I would point out that the mere capacity for storing away facts—and examinations are very largely a test of this capacity—does not necessarily, as I shall show in a future chapter, go along with the highest order of mind.[1] It is further probable that women think more quickly than men, and this also helps them in examinations, though here again the capacity for rapid thought is not a necessary mark of a high order of intellect. Another

[1] According to Romanes, men have more retentive memories than women, taking the whole period of their lives. In early life, however, he thinks the memory of woman may be as good as that of man.

point to be remembered is that originality of thought is of little help in most examinations, which rather require the assimilation of facts and of other men's opinions. Finally—and I venture to lay particular stress upon this—mental evolution is much more rapid in woman than in man, and the difference is observable at a very early age. Thus, to take a particular instance, a little girl two and a half years old is intellectually ahead of her brother, who is fifteen months older, and the observation is made constantly that girls are more precocious than boys. It is therefore unfair to pit a girl of sixteen or seventeen against a boy of the same age, who probably does not arrive at her stage of mental evolution until he is twenty-one or twenty-two years old.

Here it may be remarked that not only do the two sexes, but different individuals, irrespective of sex, differ considerably in the rapidity of their mental evolution. It has, for instance, been found that, when black and white children are educated together, the former up to a certain age keep pace with, indeed generally surpass, the latter; but that after this time the black children make little progress, their mental evolution seeming to come to a stand-still, while that of the white children continues. We have here an example of the well-known fact that backward children frequently achieve greater ultimate success, intellectually, than the precocious —"Age seldom performs the promise of youth." The law, as Schopenhauer insists, seems to be this: the slower the mental evolution the better the ultimate result. Now, inasmuch as mental evolution is slower in the male than in the female sex, the conclusion would appear to follow that the mind of woman does not continue to evolve as far on in life as the man's, and such, I am inclined to think, is the case; nevertheless, on investigating the work done by a number of eminent women, I have not been able to find actual proof that their mental evolution ceases till after fifty,[1] beyond which age it is doubtful if the man makes much intellectual advance either.

[1] See "Causation of Disease," Part II.

But whether the rate of mental evolution is in inverse proportion to its extent or not, it is certain that individuals differ greatly in regard to the age at which that evolution ceases. Many, like the black children just spoken of, suddenly come to a dead stop; while others, comparatively dull in early life, surprise all by their brilliant intellectual triumphs later. Such are popularly believed to have succeeded through sheer hard work, and they are probably held up as examples of what industry may achieve; whereas it would be more correct to attribute their ultimate success to the gradual and natural unfolding of powers which were before only nascent.

The four reasons above enumerated appear to show that the fact of women standing as well as, or higher than, men in examination lists is not inconsistent with their intellectual inferiority. I have said that I maintain their inferiority, but with a qualification. It is this. I believe that, taking one individual with another, there is greater intellectual equality between the sexes than is generally supposed; that is to say, that the thoroughly stupid members of either sex are proportionately about equal in number, and also the rank and file, and even the talented members. The balance may be somewhat in favour of the men, but not, I think, very much; *it is only when we pass into the region of genius that we see the intellectual disparity of the two sexes unmistakably revealed.* Genius of the highest order is practically limited to the male sex. Nor can this be explained on the ground that women have not been allowed the same opportunity as men. Opportunity undoubtedly accounts for much, but not for all, for, as has been well said, "Genius does what it must, talent what it can;" and we cannot doubt that, had a woman Shakespeare or Beethoven potentially existed, the world would have heard of her in spite of unfavouring external circumstances.

I do not, however, consider that this all but absolute limitation of genius to the male sex necessarily implies a much higher *average* intellectual range in it, and I believe that the limitation is itself simply a result of the universally applicable law already enunciated—that natural variations are more common and pronounced in the male than in the female sex. A genius is an extreme natural variation—in a sense, an abnormality. Frederick Treves observes:[1] "Such minds as are imaginative or poetic in a marked degree must be regarded as abnormal" ('freaks of nature' some would call them). This view has frequently occurred to me, and, if such be the case, the greater frequency of genius among men than women is in conformity with the law. Confirmatory of this view also is the fact that the opposite mental type—the idiot—is much more frequently met with among boys than girls. We cannot, I think, wholly explain this by the greater size and the consequent greater liability to injury during birth of the male child. Most idiots, like most, or all, geniuses, are, I take it, destined to be the one or the other at an early stage of their embryonic career: their future is predetermined in the germ.[2]

Professor Jastrow, of Wisconsin University, has recently made some experiments which further tend to show that the view just advanced is the correct one. He caused a class of fifty students—male and female in equal proportions—to write one hundred different words as fast as possible. "The lists given by the women were more alike than those of the men. The former show only 1123 different words, whereas the latter show 1376. The women have only written 520 words that occur once in the lists, while the men have written 746. So far as it goes, this tends to show a greater originality of thought and breadth of mind in men than in women. Women, it seems, are more apt to repeat themselves than men."[3] We are not told how great was the difference between the best and worst man,

[1] See his very able and gracefully written paper on "The Physiology of some Phases of the Poetic Mind."—*Jour. Ment. Science*," vol. xxiv. p. 64.

[2] Of course I do not exclude environmental influence as helping to shape the destiny of the germ. The environment would be adequate to make of an embryo Shakespeare a cretin.

[3] *Globe*, February 13, 1891.

or between the best and worst woman, but I venture to say that if the lists had been examined as to this point it would have been found greater between the former than the latter.

The greater size of the male brain (= 10 : 9.3) has been put forward in favour of the view that man is superior in intelligence to woman. This argument is nullified by the fact that the size of the brain increases with the size of the body, without any necessary increase in mental capacity. Thus, the brain of the whale is greater than that of man, while, on the other hand, the dog, which is far more intelligent than the whale, has a very much smaller brain.

According to Tiedemann,[1] the female human brain is, in comparison with the size of the body, even larger than the male brain—a fact all the more significant, seeing that women have more adipose tissue than men.

Other investigators have calculated the ratio of brain-weight to the height of the body in either sex. Thus, Thurnam finds that "whilst the brain-weight is nearly 10 per cent. less in the female, the stature is only 8 per cent. less; "while Broca states that the relative size of the brain of the female depends at the same time on her physical and intellectual inferiority."[2] This conclusion is, however, scarcely sound. The weight of the body, and not the height (which depends chiefly on the length of the legs), should be taken into comparison.[3]

After the climacteric we should expect the woman to approach the man in her nervous proclivities, for it is well known that disease, atrophy, or removal of the ovaries causes the female to assume many of the characteristics of

[1] *Phil. Trans.*, 1836, vol. cxxvi. p. 503.

[2] "On the Weight of the Brain," &c. J. Thurnam, *Jour. Ment. Science*, vol. xii. p. 8 *et seq.*

[3] The reader may consult on this subject Meynert, "Vierteljahrschrift für Psychiatrie," 1867. Parts I. and II. Also Parchappe, "Recherches sur l'Encéphale," *Prem. Mémoire*, 1836, p. 76.

the male. And such is the case. Not only does the woman approximate the masculine type in certain physical characters, but in her nervous constitution also. She becomes more active, less a creature of feeling, more intellectual. Nevertheless, she happily retains many of her feminine characteristics. The events of her procreative life, the bearing and rearing of children, years of sympathy and affection for them, leave an impress which persists to the end. In only rare cases is all womanhood thrown off, as by one famous character, who acknowledged the fact in the words:

"Autrefois, quand j'étais femme."

This retention of her feminine nature after the climacteric is shown by a study of the functional nervous disorders which affect the woman then. For many years she continues liable to the same class of nervous disorders as affect her during procreative life, and particularly at the climacteric; bursts of nervousness recurring during the next ten, twenty, or thirty years, or for a period even longer than this. I speak from observation.

CHAPTER X.

EGOISM OF THE MAN AND ITS PATHOLOGICAL EFFECTS.

THE greater selfishness and egoism of the man and the more sympathetic nature of the woman are facts of some pathological importance. One needs very little experience of the world to discover how much more egoistic men are than women. Talk with a man, it is *I, I, I,* with him all the time; a woman obtrudes her own personality far less; she readily realises that there are others to be thought of besides herself, and her quick sympathy puts her *en rapport* with them. Not but what all human beings, independently of sex, are by nature egoistic. An instance of the well-developed egoism of the gentler sex came under my notice recently. A lady staying in a large boarding-house grew quite popular with the other ladies simply by patiently listening to their confidences. She became, as it were, the official confidante of the establishment; but though one after the other would unburden her heart to her, not one showed the slightest desire for a reciprocity of confidence; what was wanted was a sympathetic listener, to whom each might descant freely about herself and her affairs. This, however, does not negative my main conclusion, that man is, taking him altogether, more egoistic than woman; and it is a matter of frequent comment that there is nothing a man likes so much to talk about as himself.

The greater egoism of the male sex shows itself before puberty, when it is especially manifested in the disposition to brag—rare, I believe, among girls. Probably most of us can recall boys at school who held decidedly inflated notions of their powers, especially their physical powers, on which, rather than on their intellectual acquirements, boys chiefly pride themselves. We should expect this, seeing that they correspond, in their mental evolution, to the primitive type of man, in whom muscular strength and prowess in the field constitute the essential tests of fitness to survive. A boy is generally very proud to recount his various pugilistic experiences, in which, it is needless to say, he is invariably the victor, and until he learns the truth in personal encounter, he is quite ready to believe himself the equal, if not the superior, of all his companions. When manhood arrives the tendency to brag is usually put away with other childish things, yet it sometimes continues through life. The braggart, though a well-known character among men, is rare among women.

Girls, it is noteworthy, display no such pride in their physical powers as boys, and it is no doubt the greater physical strength of boys as compared with that of girls which gives rise to the feeling of independence in the one and of dependence and corresponding timidity in the other—a distinction well typified in those skilfully-drawn characters Tom Tulliver and his sister Maggie.

The already well-developed egoism of the male increases at puberty; in regard to the mental contrast of the two sexes at which period Bevan Lewis writes:—

"His newly-awakened faculties, like all nascent mental products, are wondrously fresh, active, and potent; hence, naturally tending to falsify relationships from want of a due contrasting power, his powers and abilities are vastly exaggerated, and beget an unfortunate egoismus. His plots and schemes savour of the wildest vanity; whilst the self-complacent all-sufficiency with which he reveals these plans betokens the overpowering of normal contrasting experiences by the new-begot factors. Every faculty whereby he becomes a unit of power in the domestic or social circle is represented in false quantities, and a disproportionally intensified and overweening self-esteem is the natural outcome.

The sexual divergence at this immature age certainly tells in favour of the gentler sex. The male adolescent has had his characters faithfully rendered by the amiable satire of Thackeray in the person of Pendennis, whilst his frailties have received less consideration at the hands of Carlyle"—

whom the author proceeds to quote:[1]—

"I have heard it affirmed (surely in jest) by not unphilanthropic persons, that it were a real increase to human happiness, could all young men from the age of nineteen be covered under barrels, or rendered otherwise invisible, and there left to follow their lawful studies and callings, till they emerged sadder and wiser at the age of twenty-five. With which suggestion as a practical scheme I nowise coincide. Nevertheless, it is plausibly urged, that as young ladies are to mankind precisely the most delightful in those years, so young gentlemen do then attain their maximum of detestability. Such gawks are they, and foolish peacocks, and yet such vulturous hunger for self-indulgence, so obstinate, obstreperous, and vainglorious; in all senses so froward and so forward."—*Sartor Resartus*, 'Getting under way.'

Egoism being intense in the pubescent boy, it is not surprising to find it characteristic of male pubescent insanity. Thus Skae and Clouston, describing such a case, observe that the subject "had a great deal of that self-confident, would-be-manly air, which boys are so apt to assume at the age of puberty, and although not naturally of a combative tendency, nor possessed of any great pugilistic acquirements, he professed himself ready to fight with any man."[2]

The same intense egoism is displayed in male adolescent insanity. Bevan Lewis writes:[3]—

"The subject usually comes before us excited, highly elated, his attitude, demeanour, and expression indicative of intense self-complacency and assurance. . . . . In the more coherent states the subject, unprompted, reveals his exalted notions; talks of his acquirements as a scholar; expatiates on his skill as a

[1] "A Text-book of Mental Diseases," p. 353.

[2] "The Morisonian Lectures on Insanity," by Doctors Skae and Clouston, *Jour. Ment. Science*, vol. xix. p. 497.

[3] "A Text-book of Mental Diseases," pp. 354–5.

workman; revels in the supposed possession of rare and much-esteemed faculties, of persuasive eloquence, of poetic talent, of wondrous vocal powers, of the gift of tongues, of artistic abilities, or histrionic powers of a high order; or his thoughts course in the direction of his muscular energies; he assumes his strength to be almost superhuman, and regards himself as a champion walker, runner, wrestler, or the like. . . . . Egoistic sentiments prevail, and are the fount from which issue extravagant schemes of action. . . . . Towards their own sex this self-assumed superiority calls forth often an aggressive conduct, an overbearing manner amounting to arrogance, which involves them in frequent disputes and quarrels. To the gentler sex their conduct is often gallant and condescending."

The egoism of the male continues through life. This might be illustrated in many ways. Thus, when Dickens described the famous Bumble, he was depicting a member of a very extensive class, for the egoism of the man very often reveals itself in official pomposity, or 'Bumbleism.' Especially is this the case with the ignorant when in authority. Such tend to become autocratic, and sometimes offensively, but perhaps even more frequently amusingly, egoistic. There is a subordinate official connected with a certain ancient college in whom authority, unchecked during many years of faithful service, has allowed natural egoism to develop in a very striking degree. Any one not acquainted with the facts would imagine this pompous old man to be the chief personage of the institution—an opinion, I am inclined to believe, he holds himself. He reminds one of that famous bellows-blower who imagined that it was he who made all the music, the performer on the keys being quite a secondary person.

Those—whether men or women—who are placed in positions of irresponsible authority have to be very careful to guard against an autocratic and unduly egoistic tendency—schoolmasters, and hospital and workhouse matrons, for instance. I am acquainted with a member of the former class, who, although he joined the Volunteer Force at its foundation, has, with the express object of combating this tendency, remained a private to this day. At school, as he says, he has it all his own way, and he finds that placing himself under the authority of others—some of whom were perhaps not born when he joined the force—exercises a most healthful disciplinary influence on him.

Now it is a very remarkable fact that this predominant egoism, manifested in the pubescent and adolescent insanity of the male, is absent in the corresponding forms of insanity of the female, and that the same difference is observable in general paralysis of the insane, a disorder, as is well known, much more common in men than women, but, so far as the morbid anatomy is concerned, essentially the same in both. In the male general paralytic the excessive egoism displays itself in the characteristic large delusions of the disease; in the female it is far less obtrusive, expressing itself merely in personal vanity. The following morbid symptoms are exaggerations of characters normal to the two sexes respectively:—

"Fantastic decoration is much indulged in, especially by the female paralytic; scraps of coloured stuffs, ribbons, and coloured paper are stitched on to their clothing as insignia of distinction, or as an addition to the attractiveness of the subject. The sexual characteristics are prominently developed, the female especially betraying much personal vanity or much self-consciousness in the presence of the opposite sex; she is often engaged on matrimonial alliance; connubial subjects occupy the chief theme of her delusions; and, occasionally, a well-marked erotic state prevails. On the other hand, the male paralytic raves upon wealth, property, social position, professional attainments, manual dexterity, artistic ability, muscular power, and endurance."[1]

From this extract it is seen that when general paralysis occurs in woman she is apt to show much "vanity and self-consciousness in presence of the opposite sex." We do not find her, like the man, vaunting her extraordinary powers; it is her personal attractions which chiefly occupy her thoughts. The great importance which most women attach to personal appearance may be seen by reference to ladies' journals, especially to the inferior ones, in which whole

[1] Bevan Lewis, *loc. cit.*, p. 257.

columns are taken up in asking and answering questions relating to the means of obtaining and preserving beauty.

A further pathological bearing of this form of feminine egoism has been pointed out by Savage.

"To my thinking," writes he, "the worry produced in a woman by any disfigurement is hardly sufficiently recognised. I have seen women with hairy moles whose lives were burdens to them; and in Bethlem we had one 'pig-faced' woman whose insanity was associated with her appearance. In another case, a very broad-rooted nose, which gave the woman a very bull-faced aspect, was, to my mind, the chief cause of the mental disorder. . . . . Of the peculiarities, none are so potent as those which, in a woman, make her believe that she is no longer lovable. A woman who thinks that because of her aspect she is repulsive to husband and to children, is already far down the road to melancholia. . . . . A more common group of cases is that occurring about 40 and later. Single women have come to the conclusion that they are not attractive, and magnify some defect; and married women, fearing the loss of their husband's love with the change in their own feelings, may become morbidly self-conscious or jealous. If at this period any bodily peculiarity appears, the morbid mental state may rapidly develop." [1]

So deeply rooted is personal vanity in woman that it may persist, as Maudsley remarks, "amidst the decay of all that is good in female nature."[2] It is a well-developed characteristic among the female inmates of prisons, as shown by the following extract :—

"Women whose hearts have not quailed, perhaps, at the murder of their infants, or the poisoning of their husbands, clasp their hands in horror at the sacrifice of their natural adornment (the hair); weep, beg, pray, occasionally assume a defiant attitude, and resist to the last, and are finally only overcome by force. . . . . I can remember one person delirious for a day and a night after the operation [of having her hair cut]. . . . . She was a young, fair Scotch girl, and her 'Dinna cut my hair—oh! dinna cut my hair!' rang along the deserted corridors with a plaintive earnestness." [3]

[1] *Jour. Ment. Science*, vol. xxxii. pp. 221, 222. [2] *Ibid.*, vol. ix. p. 77.

[3] "Female Life in Prison," by A Prison Matron, 3rd edit., 1862.

The writer from whom this is quoted relates other instances of the same kind—how one woman tried to secure some tallow to use as a pomade, and how another concocted from the red cotton of the shirts she had to wash a cosmetic with which she beautified her cheeks, thereby exciting the envy and curiosity of her fellow-inmates, to whom (as to those in charge) the source of the rouge remained for a long time a mystery.

In a number of French writings on the climacteric (dating from the end of last century) I find constant mention of the effect which the loss of physical charm at that critical period produces on the woman's mind. It is assumed in almost all these writings that the woman then suddenly passes from a state of great loveliness into utter unloveliness—is transformed from a Venus into a perfect hag—surely an exaggerated view.[1]

We have seen that the man has generally more confidence in his own powers than the woman in hers, and that this is largely due to his greater physical strength. Owing

[1] Thus C. P. Gardanne writes: "She has lost her charms beyond hope of recovery" ("Dissertation sur les Avis aux Femmes," &c., Paris, 1812).

A. Assegond: "Women now become more like men, and with their charms lose a part of their character" ("De la Femme considérée à l'Age critique," Paris, 1821).

P. Maurice: "There are women who bemoan unceasingly the ruins of their beauty, and who employ all the arts of a ridiculous coquetry to attract the attention and homage of men, and who embellish themselves artificially with the roses and lilies of youth.

'Pour réparer des ans l'irréparable outrage.'—*Racine.*"

("De la Ménopause," Paris, 1832.)

C. Bardout speaks of the "Law of nature which has fixed this period for the loss of feminine beauty" ("Considérations générales sur la cessation du Flux menstruel," &c., Paris, 1816).

Most of these writers describe in detail the loss of physical charms. Thus the skin is said to lose its suppleness and lustre, the cellular tissue to diminish, the voice to become rough, and so forth. After enumerating these losses, P. Armand, contrary to other authors, continues: "It is not, however, rare for women, far from experiencing changes *aussi facheux*, to acquire a degree of beauty they never had before" ("Considérations sur l'Age critique des Femmes," Paris, 1820).

to this he has dominated the woman, in whom there has thus evolved a sense of dependence. Instinctively feeling herself the weaker, she craves for a strong arm on which she may lean, and by which she may be protected.[1] The greater courage and pugnacity of the man have probably also aided in causing this difference, but, be the explanation what it may, no one can doubt that the man is more confident in himself, and feels himself more able to stand alone than does the woman, although it must be acknowledged we occasionally meet with men having very little self-reliance. These considerations have an interesting application; from them one would *à priori* conclude that the timid and dependent woman would more readily become the victim of delusions of persecution than the self-confident and egoistic man, who is apt to labour under large delusions as to his own importance; and such is actually the case.[2]

[1] It cannot be too frequently repeated that, given a certain environment, continuing through a series of generations, a species must either become adapted to it or die out. This will happen whether acquired characters are inheritable or not. On the assumption that they are, the continued repression of women by men has necessarily caused them to be innately more dependent than men; on the assumption that they are not, the same result has been induced by indirect means alone—by natural selection, by the annihilation of women who have offered resistance to the wills of their husbands.

[2] My authority for the statement that women suffer more frequently from delusions of persecution than men is a French one, but I have unfortunately lost the reference. It was contained in an article treating of the relative frequency of these delusions in the two sexes, and it impressed itself upon my mind, because it bore out *à posteriori* my *à priori* conclusion.

CHAPTER XI.

FURTHER PATHOLOGICAL EFFECTS OF THE EGOISM OF THE MAN.

THE intensified egoism of the man leads him to make more of illness than the woman. If a woman magnifies her sufferings, it is in order to procure sympathy; being ever ready to give it, she craves it for herself, and in the case of the typically hysteric patient the craving no doubt becomes morbid, and manifests itself in extreme selfishness. With the man it is otherwise; he makes much of his sufferings because they are his; they inconvenience him, disturb the serenity of the little world of which *he* is the centre; speaking generally, it is not that he wants sympathy; on the contrary, he often prefers to be let alone.

This contrast between the sexes is further brought out by the relative degree of anxiety respecting health and the fear of death which each manifests. Nervous women are not, as a rule, *anxious* about their health; even if they believe themselves the victims of some serious disorder, they are not so much disturbed by the dread of a disastrous termination of it as by the actual trouble and discomfort they feel. The hysteric seldom, if ever, experiences the slightest sensation of fear; indeed, the more seriously ill she believes herself, the better is she pleased, and the physician who takes the gloomiest view of her case stands highest in her esteem.[1] But with the nervous man the case is very

[1] In the above remarks I exclude from consideration those cases of

different. He consults doctor after doctor, so full is he of fears; first he fears he has got this, then that: self-absorption leads to constant dread.

Now all this is somewhat remarkable, since the man is, as regards external danger, so much more courageous than the woman. It should be observed that it is not, except in rare instances, till adult life is approached, or actually reached, that this pathological egoism develops itself in the male. As a rule a boy is not alarmed by any illness he may have, any more than a girl; hence, in this respect the condition of the woman corresponds with that of the young of either sex, and this accords with the biological fact established by Darwin, that when the adult male differs markedly from the adult female, the latter is of the two the more like the young of either sex.

It is chiefly in the case of the slighter and commoner forms of disease that men make more of their ailments than women, it being a very wonderful and a very happy fact that when any one—man or woman—is stricken with a really grave disorder, there is a calm—almost, it would seem, providential—resignation. A patient who is dangerously ill, seldom troubles much about himself, and is rarely haunted by the fear of death;[1] and so true is this that when any one complains much of his suffering, it may generally with tolerable safety be concluded that no serious organic mischief is present. No doubt, natural selection has prevented the evolution of a fear of death in those cases where it would interfere with the chance of recovery. The most hopeful man stands, other things being equal, the best chance of recovery in any given case of disease, and there

nerve-storms (notably such as affect the cardiac nervous system) which are attended by dread of impending death. In such cases the fear is a symptom, like the pain or other abnormal sensation, and disappears after the attack.

[1] "Of the great number," writes Sir Henry Holford, "to whom it has been my painful professional duty to have administered in the last hours of their lives, I have sometimes felt surprised that so few have felt reluctant to go to the 'undiscovered country, from whose bourne no traveller returns.'"—*Essays and Orations.*

has thus been a selection of the most hopeful, the least fearful.

"It is a circumstance somewhat remarkable, that those persons should be in general found to dread most their departure from this state of being, to whom it has proved least productive of enjoyment. . . . . The unhappy hypochondriac is unwilling to lay down the burden which oppresses him. The rack of life upon which he is stretched, he prefers to the repose of the grave. He is loth to relinquish that breath which is spent in little else than sighs and lamentations."[1]

Possibly one reason why men are inclined to exaggerate their minor ailments is because of their comparative immunity from suffering, in consequence of which all abnormal feelings, when they do occur, acquire undue importance from the mere fact of their infrequency; nevertheless, the hypochondriac thinks no more lightly of his abnormal sensations because he is habituated to them; their long continuance, in fact, tends to heighten his fears.

'But'—it will perhaps be argued—'we hear more frequent, if less loud, complaints from women than from men.' This is possibly true, but it does not prove that women are more given to exaggerate their ills. They suffer from minor ailments and abnormal sensations far more than men do; they suffer, in fact, from that class of disorders in which complainings are more frequent, and their complainings are probably in direct proportion to their suffering of mind and body. In the serious disorders just now alluded to there is, perhaps, all things considered, actually less suffering than in these slighter ones; one of the reasons probably being that in the former the sufferer is recognised and treated as such, and remedial or alleviating measures taken; whereas the latter do not necessitate a departure from the ordinary daily routine, which hence is gone through under much discomfort, if not in actual pain.

The physician, who has perhaps had but little personal

[1] "Essays on Hypochondriasis," &c., Essay III. John Reid. London, 1821.

experience of physical suffering, is naturally inclined to think that his patient must be magnifying, or *imagining*, her sufferings, if he can detect no organic mischief to confirm her statements. This, I believe, is a mistake to guard against; for my own part, I make a point of listening attentively to the complainings of every patient who comes before me, and even a slight knowledge of the different forms of nervousness in women is sufficient in almost every case to prevent any possibility of deception. To take a single example: Flushings are very common in nervous women; in fact, more frequently present than not. Now, these flushings are most troublesome to the patient; they have a characteristic mode of development and decline, and are, moreover, attended with a definite series of symptoms. When, then, I ask a patient if she has flushes and she answers in the affirmative, and when, without putting leading questions, I get from her a history which accords with my knowledge of this symptom, I know that I am dealing with a woman who is in a genuinely nervous condition, and who, if the flushes are pronounced, is a real sufferer.

If we compare the symptoms of which nervous women complain, we shall be struck with the marked similarity in different cases. I do not mean that there is a complete likeness between any two cases in their entirety, but a likeness as regards certain groups of symptoms (*e.g.*, the symptoms that constitute a 'flush' or a 'headache'), and when one woman after another is found complaining of very similar groups of symptoms, the actual existence of those symptoms is placed beyond doubt.

Some skill is needed in eliciting a proper history of these cases. When it is a question of detecting actual organic change, most observers will fairly well agree in their conclusions; but when the symptoms are almost entirely subjective, no two persons will obtain the same history unless they have each an intimate knowledge of the symptoms to be sought for, and some experience of the proper method of examination. I have over and over again observed the complete inability of students to get at a full and accurate history of cases of nervousness, a circumstance largely arising from their ignorance of what to look for; and even when furnished with a definite method of inquiry they are often singularly unfortunate in their results, obtaining a record of symptoms which only very remotely corresponds with the patient's actual condition. In order to obtain a reliable history of a case, extreme care and patience are needful; there must be long and thorough examination; the questions put must be simple and to the point, and they should be repeated several times, and in different ways and sequences, if there is any doubt as to the accuracy of the answers. After thus placing ourselves in the position of cross-examining counsel, we have little difficulty in sifting the evidence, separating the important from the unimportant, the relevant from the irrelevant. I need scarcely add that the obvious error of framing our questions in such a way as to elicit the answers we expect must be guarded against.

Now I say deliberately, after having carefully studied the minor forms of nervousness in women, that women do actually suffer far more than most physicians give them credit for; and if in the out-patients' room the wail of complaining comes rather from them than from the men, it is because to their lot falls a larger share of those disorders which provoke such manifestation. It must be conceded, however, that the desire for sympathy often provokes the complaints, for women find relief in the sympathy which these elicit.

No one that will look around him can suppose that women, as a class, complain for complaining's sake. How often does a woman come to hospital not for herself, but for her child, when it is she who has far the greater need of relief; and if, noting her ill look, we inquire after her health, the answer comes—often half-apologetic—that she has "not been feeling quite herself lately," when in plain English she has been for some time past full of aches and pains. It is said that extremes meet: certainly the pathetic and the ridiculous are often closely allied. One of the most miserable specimens of womanhood, physically regarded, that I have ever seen, was in the habit of bringing for my inspection a really fine, healthy-looking boy. He was suffering from some very trivial ailment; yet his mother would grow eloquent about his distressing condition, and never once did she speak of herself till I broached the subject. To see this frail, sickly woman discuss, with troubled face and gesture, the health of her rosy, vigorous urchin, was a sight to call forth very mingled emotions.

One more point remains to be noticed here. Women lack the external interests which divert a man's attention from himself. The usual monotony of the woman's environment to some extent forces her mind back upon itself; she dwells upon her troubles, mental or physical, simply because she has little else to think of; whereas the man's pursuits tend rather to lift him out of himself. In fact, the woman's life, in spite of her egoism being less developed than the man's, favours *self-attention*, that most potent intensifier of suffering. "Attention," says Sully, "involves an intensification of consciousness, a concentration or narrowing of it on some definite and restricted portion of the mental scene; or, to express it otherwise, it implies a turning of the mental eye in a particular direction so as to see the objects lying in that quarter as distinctly as possible."[1] Hence, when the 'mental eye' is directed to some bodily pain, that pain is felt with the utmost acuteness. We have here, then, another way in which a woman's sufferings are made proportional to her complainings.

[1] "Teacher's Psychology," p. 81.

CHAPTER XII.

THE FACULTY OF PERCEPTION IN MAN AND WOMAN COMPARED.—OTHER CONSIDERATIONS.

WOMEN have, according to Romanes, "a greater refinement of the senses, or higher evolution of the sense organs," than men. He further maintains, and about this there can be little doubt, that they have the more rapid perception, a fact which he thinks is partly due to their greater sense-refinement. "Houdin, who paid special attention to the acquirement of rapidity in acts of complex perception, says he has known ladies who, while seeing another lady 'pass at full speed in a carriage, could analyse her toilette, from her bonnet to her shoes, and be able to describe not only the fashion and quality of the stuffs, but also to say if the lace were real or only machine made.'"

Another example of the rapid perception of women, cited by Romanes, though, as he observes, not an instance of perception pure and simple, may very well be quoted here:—

"I have tried a series of experiments, wherein reading was chosen as a test of the rapidity of perception in different persons. Having seated a number of well-educated individuals round a table, I presented to them successively the same paragraph of a book, which they were each to read as rapidly as they could, ten seconds being allowed for twenty lines. As soon as the time was up I removed the paragraph, immediately after which the reader wrote down all that he or she could remember of it. Now, in these experiments, where every one read the same paragraph as rapidly as possible, I found that the palm was usually carried off by the ladies. Moreover, besides being able to read quicker, they were better able to remember what they had just read—that is, to give a better account of the paragraph as a whole. One lady, for instance, could read exactly four times as fast as her husband, and could then give a better account even of that portion of the paragraph which alone he had had time to get through. For the consolation of such husbands, however, I may add that rapidity of perception as thus tested is no evidence of what may be termed the deeper qualities of the mind—some of my slowest readers being highly distinguished men." [1]

About the truth of this last observation there can be no doubt. Acuteness and rapidity of perception are proverbial in the savage, who can see, smell, and hear what would make little or no impression upon the sense-organs of a civilised man.[2] Similarly, children are very quick in their perceptions. Like savages, they are essentially objective: their attention is absorbed by outer things. But as age or culture advances, the individual becomes more reflective, and since during reflection the mind does not respond, or responds in only a slight degree, to external impressions, it follows that with this widening out of the domain of reflection, there tends to take place a parallel decrease in the range of perception. The reverse is also true. Just as the habit of reflection tends to blunt the acuteness of perception, so anything which narrows the range of perception tends to develop the faculty of reflection. How is it that we generally associate spectacles with wisdom or learning? Is it not in some measure because, sight-perceptions being in him who wears them weak, and the attention thus less distracted by outer events than in the individual with keen eyesight, he is thrust in upon himself, and tends to become

[1] *The Nineteenth Century*, May 1887.

[2] "There are many testimonies to the acute senses and quick perceptions of the uncivilised, and also to their acute and minute observation. Along with which there naturally goes great skill in those actions depending upon the immediate guidance of perception."—*Principles of Sociology*, § 40 (Collins' "Epitome of the Synthetic Philosophy").

reflective? Until recently glasses were worn chiefly by the old, in whom we naturally look for wisdom, or they were worn by the short-sighted, whose condition tends to beget a reflective habit. Imagine a highly myopic boy. Such an one can see nothing clearly beyond the range of a few feet until furnished with glasses: the domain of his perceptivity is restricted, and thus while a lad with keen sight has his attention absorbed by the outer world, and from the first awakening of his intelligence takes the liveliest interest in its wonders as they gradually unfold to him, the short-sighted boy is thrown in upon himself, and necessarily becomes more thoughtful, takes more readily to books, and is more apt to blossom into a scholar. Herein lies one of the reasons why we associate spectacles with learning. It must not be supposed that myopic boys are naturally endowed with a greater capacity for learning than others; their greater intellectual development is simply due to greater exercise of the reflective faculty.

There is, perhaps, a second reason why myopia tends to induce a reflective habit. It is well known that the myope inclines to sedentary occupations, and this inclination is generally attributed to his restricted vision. R. D. Batten, however, raises the question, and with much force, whether the myope does not differ from the emmetrope in other important respects than in his vision, whether, namely, there may not be profound cardiac, vascular, and other differences between the two; but whatever be the explanation of this sedentary inclination, it tends, as will readily be allowed, to beget a habit of reflection.

From these considerations it follows that rapidity and keenness of perception—I am using the term here in its strict psychological sense—far from necessarily going hand in hand with a high intellectual development, show a tendency to stand in inverse ratio thereto.

I do not mean to imply that keen powers of perception are a mark of inferior intellectual *capacity*, and contrariwise; but rather, that where we find the perceptive powers exceptionally keen, the intellect has not, as a rule, been greatly exercised, and *vice versâ:* the very practical man, though he may have great intellectual capacity, has certainly not developed his intellect to the full, for had he done so, it must have been at the expense of his practicalness. Of course the best type of scientific man—the Darwin, the Newton—combines keenness of perception with great reflective capacity; but it is not among such that we find practical men as ordinarily understood. A further qualification must also be made. While savages, children, and women are more perceptive than the average civilised man, it is only as regards certain particulars. The savage has a keen perception of certain sights and sounds, and, similarly, children are very observant of much which their elders fail to notice; but, on the other hand, the men of civilised communities are quick in perceiving many things —especially things concerning their own interest—which would quite escape the notice, perhaps I should say the insight, of the savage or the child; but here the term 'perception' involves something more than mere sense-perception, and it will, I think, be acknowledged that in the simple perceptions—in other words, in the refinement of their sense-organs—the savage, the child, and the civilised woman are superior to the civilised man.

And here a question of very great interest arises, which, though it leads us somewhat beyond the scope of our present inquiries, may be briefly considered. Are the sense-organs in the savage innately more sensitive than in the civilised man, or is their greater keenness due to greater exercise by the individual? The opinion has until recently been universally held that the sense of smell, to instance one in particular, is innately much stronger in the former than in the latter simply because in the one case it has been kept in active use, while in the other it has for many generations served but little purpose in the struggle for existence, and has consequently fallen into disuse. But if the effects of use and disuse in the parents are not inherited by the offspring, the question arises whether the sense of smell *is* innately less sensitive among the civilised than among savage people. It is true that disuse is known to exercise a racial effect, animals inhabiting dark caves for many generations, for example, becoming blind; but, as we have already had occasion to notice, Weismann forcibly argues that this may be explained without assuming that the effects of disuse are inherited, and if he is right, a useless character will take a much longer time to disappear than if such effects are transmitted; for which reason, and for others which space will not allow me to set forth, we should expect the sense of smell to be potentially as strong, or nearly as strong, in the civilised man as in the savage; and this conclusion Wallace has recently urged, citing, in proof of it, the case of the North American Indian, who, if brought up in a civilised community, appears to have a sense of smell no more acute than that of the average civilised individual. Two important corollaries follow from this conclusion:—(1) That we inherit from our remote ancestors many characters of which, since they remain in abeyance, we know nothing, or next to nothing; (2)—and this is generally acknowledged, though not perhaps sufficiently realised—that we may, by exercise, bring out many hitherto latent capacities.

As regards the first of these two propositions. If the effects of disuse are not inherited, there must lie dormant within us a thousand characters that belong to the savage, and are only kept under by the nature of our environment; even in our ashes, the ashes of our far-off ancestral nature, the wonted fires must be still burning. I am not contending that the civilised man does not differ innately from the savage (undoubtedly mental evolution has proceeded much farther in his case), but that this evolution has only partially eradicated the savage nature. Again are we confronted with the question constantly cropping up, and which must for some time remain the greatest psychological question of the day: How does mental evolution proceed? Are we to believe, with Wallace, that it takes place on lines peculiar to itself,—that we cannot apply the principles of physical evolution to the 'unseen universe of spirit;' or does natural selection suffice to account for it? Until quite recently, the answer came glibly enough. Following the lead of our greatest living thinker, evolutionists replied that the summation throughout successive generations of acquired mental characters—in short, of the effects of use—was sufficient, of itself and by itself, to account for the mind of man as at present evolved. Nor can the opinion of Herbert Spencer be assailed in any but a reverential spirit, or relinquished, considering the brilliant prospects it holds out for the future of the race, without regret. Yet the more the hypothesis is considered, the stronger the light thrown upon it by further research, the narrower seem the grounds for maintaining it, and, in my belief, we shall eventually have to accept, instead, the view that it is essentially by natural selection, and by natural selection alone, that mental evolution has proceeded. The extent to which this process has operated in weeding out the intellectually and morally unfit from among the civilised is not yet properly apprehended: if it were, less difficulty would be felt in accepting this conclusion. Wallace contends that selection cannot account for the evolution of the mathematical, musical, and artistic faculties. Space fails for a consideration of each of these, but to take one only—the mathematical—I feel convinced that his position is untenable. "How," he argues in effect, "can this faculty, scarcely present at all in the savage, whose arithmetical calculations are limited by the number of his fingers and toes, have evolved by natural selection to the degree in which it is present in a senior wrangler?" I would, however, suggest that it is highly improbable that the average child of civilised parents, brought up among such savages, would count any further than they: we are apt to forget the prolonged education, unconscious as well as conscious, which civilised children receive. Again, he urges that the success of modern civilised peoples "at home and abroad, as colonists or as conquerors, as individuals or as nations, can in no way be traced to this faculty" ("Darwinism," p. 467); whence he concludes "that its present gigantic development" is wholly unexplained by the theory of natural selection, and must be due to some altogether distinct cause. Apparently he regards the mathematical 'faculty' as quite distinct from other mental 'faculties;' yet surely the fact is that mathematics is a purely intellectual exercise? Mathematics is only another term for reasoning from exact and complete data, and, in its simplest forms, it is the easiest of all reasoning: a far higher order of intellect is required where the data reasoned upon are inexact and incomplete, and where, in consequence, their respective values have to be weighed—where the element of *judgment* comes in. (Hence we frequently find great mathematicians most disappointing in their influence on the world's work.) Now, the mathematical faculty being only a special instance of the reasoning faculty, which beyond all doubt has, since the first dawn of civilisation, been increasing by the action of natural selection, and will continue so to increase, it follows of necessity that in its development natural selection has been the chief factor: other things being equal, the man with the best intellect has the best chance of being represented in posterity, for he stands the best chance of securing a healthy environment for his children, amongst whom the mortality will consequently be less than among the children of the unreflecting, the unreasoning. But Wallace has yet a further argument against the mathematical faculty being the outcome of natural selection: he urges the infrequency with which it is markedly developed. "Probably," he writes, "fewer than one in a hundred really possess it," whereas characters acquired by natural selection attain a certain level, the amount of variation from this mean level being only about one-fifth or one-sixth; "that is, if the value were taken at 100, the variations would reach from 80 to 120." The mathematical faculty, varying between much wider extremes, cannot therefore have arisen by natural selection. But to argue thus is to overlook the fact that among civilised and domesticated races of men and the lower animals natural variations are far more marked than among the savage and undomesticated; and further, I venture to assert that there is quite as much difference in physical as in intellectual powers among civilised peoples—as much difference, for example, between the best and the worst cricketer, lawn-tennis player, or billiard player in this country as between the best and the worst mathematician; and if this be so, Wallace's position derives no support from this argument.

The second conclusion we arrived at from a consideration of the respective development of the sense-perceptions of the savage and the civilised man was that the latter possesses many dormant faculties which are never, or at all events never completely, roused into life. That the acuteness of smell in the Red Indian is chiefly, if not entirely, the result of exercise is strongly suggested by what we know regarding the sense of touch: this in a civilised blind man is far keener than in the savage. We do not sufficiently realise what can be done by educating a faculty. Compare the mechanical proficiency of the accomplished pianist, or of the expert acrobat, with the clumsiness of the tyro in each of these forms of muscular activity; and although there are of course individual differences, yet, by dint of exercise, practically everybody can attain to very considerable proficiency in either the one or the other—a proficiency which to the individual who has never made the attempt seems impossible. (It will not be supposed that I am now speaking of anything but the mere muscular expertness of the musician.)

CHAPTER XIII.

SEXUAL INSTINCT IN MAN AND WOMAN COMPARED.

We have seen that, with one or two exceptions, the sexual passion is throughout the whole animal kingdom more strongly developed in the male than in the female—that, just as the special sexual function of the female is to provide a fit environment for the young being, so the special sexual function of the male is to seek out and impregnate the female, and that to this end he is endowed with the stronger sexual passion.

This being true of (practically) all animals below man, one would expect it to be true of him also. Such *à priori* conclusion requires, however, to be put to the test, and this I have done, so far as the nature of the investigation would allow.

On inquiry among a large number of medical men as to the relative strength of the sexual instinct in man and woman, I have been surprised to find the most divergent views prevailing. Nor is greater unanimity to be found among medical writings. Moreau, for instance, considers that men are more sexually inclined than women, while another author answers the question, "Estne femina viro salacior?" in the affirmative; indeed, one American writer comes to the conclusion—the terrible conclusion—that the human female is from an early age tortured with a sexual passion of such intensity that she must needs gratify it by unnatural means!

It is most important for the physician to be correctly informed on this question, because at many points it touches the pathology of the nervous system, but the difficulties in getting at the truth are many. Manifestly married women alone are available in the inquiry, and they only indirectly, for the physician is but rarely afforded the opportunity of himself broaching the question to them, and must for the most part content himself with the evidence gained through the husband. The conclusions set forth in this chapter rest almost entirely upon the evidence of married men attending as hospital out-patients. They apply, therefore—so far as they are correct, and I have taken great pains to make them so—to the poorer classes. How far they are true of those more luxuriously situated I cannot say.

The Sexual Instinct in Unmarried Women.—We may take it for granted that in practically all men desire comes with puberty, and continues in a greater or less degree so long as the testes remain active. In many cases it would seem to appear before puberty, but when this happens there is probably almost always some local irritation to account for it, such as a long prepuce, thread-worms, a stone in the bladder. Wherefore we may regard puberty as the normal period in the man for the first appearance of the sexual instinct. Is the like true of the human female? It is very difficult, though very desirous, to get at the truth in this matter, inasmuch as unappeased sexual craving, conscious or unconscious, is so frequently invoked by the physician to account for disordered nervous function in the unmarried woman. Of fifty-two married women from whom information was obtained as to the condition of the sexual instinct before marriage, it was said to be present in twelve and absent in forty. This probably does not represent the correct proportion, for in the latter number are included thirteen special cases in which the sexual instinct never appeared; nevertheless, there is not the slightest doubt that a large proportion of women do not experience the slightest desire before marriage. One is familiar, both in fiction and real life, with the girl who, happy in the admiration of many suitors, is content to live in the present, pushing off the question of actual marriage to the future; and it may confidently be asserted that sensuality in its grosser aspect enters not at all into the mind of a very large number of women when contemplating matrimony.

One must be careful not to misjudge conduct. The highly attractive woman finding herself in possession of charms which exercise a powerful influence over the other sex is prone to give free scope to their employment—to become coquettish. Now some make the very great mistake of supposing this to be the outcome and expression of a burning sexuality, but far from such being the case, it would probably be more correct to say that it goes along with sexual indifference—with unawakened sexual instincts. Where desire is, there coquetry—in the proper sense—cannot be; for if a woman naturally sensual is modest, she is apt to be on her guard lest her actions be misinterpreted, and this sexual consciousness robs her of that easy spontaneity which constitutes the chief charm of girlish coquetry; and if immodest, her conduct is pervaded with sensuality, when it is no longer entitled to be regarded as coquetry, whose essential feature is sexual unconsciousness. She that is sexually conscious is apt to read sexual meanings into words and acts the most innocent, and to this class belongs the woman who averts the face, is ever ready to blush, who through her sexual consciousness is as it were ultra modest, but who one day astonishes every one by taking to the streets.

Of the twelve cases in which desire was present before marriage it was said to have appeared in most with puberty. In two cases it was alleged not to have developed until a few years after puberty, while in three it was stated to have appeared before this epoch. In one of these it manifested itself some years before puberty, rising almost to nymphomania on the day preceding the first menstruation; the abnormal desire was here probably due to some local irritation, as the patient suffered from intense pruritus. The second of these three patients first noticed desire at the age of fourteen, but did not menstruate until two years afterwards. The third began to menstruate when fifteen years old, but had distinct desire one year before this.

The Sexual Instinct in the Married Woman.—In almost all the cases inquired into the desire was less in the woman than in the man. In only a few was it as strong, or stronger, and in most of them the husband was exceptionally indifferent.

Of the thirteen cases of married women in which there was complete absence of sexual feeling, five had been married for a period under two years, and, inasmuch as desire in woman may first appear some years after marriage, it would be wrong to conclude that it would never develop in these cases. Some of the other women, however, had been married several years without ever having experienced the slightest sexual feeling. Thus :—

Æt. 49.—Her husband and she went to school together. Has never had the slightest sexual instinct.

Æt. 39.—Has been sexually indifferent all her life.

What, it may be asked, are the motives to marry in such or indeed in most women? Affection, social custom, and the desire to be independent, rather than sexual gratification, are probably the chief. One of the thirteen women under consideration married for 'social purposes,' another 'because she was out of service.'

The sexual indifference of a large number of women until after the consummation of the marriage is well shown in those cases in which the husband is from the beginning of marriage impotent, and in which, consequently, connection never takes place. Quite recently a man aged forty-five came to the hospital for bronchitis, and his aspect suggesting that his sexual system was undeveloped, I examined his testicles and found them rudimentary. This man, if indeed he could be called such, had been married several years, but had never been able to consummate his marriage. Nevertheless, his wife and he lived together in perfect happiness, and they had adopted two children, to whom they were as father and mother. Cases of this kind are not so rare as one imagines. Occasionally, doubtless, the wife of the impotent man invokes the aid of the law to procure a divorce, but probably only a small proportion of women thus situated do this. Here be it noted that the impotent man differs from the woman devoid of sexual instinct, in that the one is incapable, while the other is capable (unless there be gross malformation) of the sexual act. There is, therefore, supposing the sexual instinct in the two sexes to be equal, far greater provocation in the case of a woman marrying an impotent man than in that of a man marrying a woman devoid of sexuality; but in spite of this we find the man in the latter case more apt to resent his lot than is the woman in the former case to resent hers.

There appears to be no constant relation between the intensity of the sexual instinct in woman and the capacity to bear children. How many, if any, of the women in whom there was complete sexual indifference were barren my notes do not say. Three of them, at all events, had children; and it must be known to most physicians that sexual desire is often very small in women who have large families. Barren women, on the other hand, may have strong sexual instinct—an observation as old as the days of Solomon.

Among those women in whom sexual desire was not aroused until after marriage, it remained dormant for periods ranging between days and years. In two or three cases congress was not allowed by the woman until some time after marriage; and in the case of one married couple of eight years' standing it had, owing to a dense annular hymen, never once been effected.

I now proceed to consider the influence of menstruation, pregnancy, lactation, and the climacteric upon the sexual instinct.

Menstruation.—The influence of menstruation upon desire has been alluded to by several writers. Thus, Haller writes, "Hinc vulgo nota eo tempore ad venerem proclivitas, etiam anatomico experimento confirmata, cum Riedlinus turgentem in menstruata clitoridem videret."[1] Emet[2] went so far as to attribute the monthly loss of blood in the human female to the social restrictions put upon the free indulgence of the sexual appetite, which he supposed to be normally increased every month. This monthly increase of desire was, according to him, accompanied by a turgid and erectile state of the generative organs, after the manner of the corpora cavernosa in the male. The erection, if not relieved by sexual intercourse, became, it was further supposed, so intense as to cause rupture of the distended vessels and hæmorrhage.

The French writers are foremost in attributing to menstruation a predominant influence in exciting desire. Thus, according to Tardieu,[3] nymphomania occurs chiefly during widowhood, and at the approach of the menstrual epochs. Stolz, Brierre de Boismont, A. Meyer, Guibout write in the same strain.[4] This last author maintains that a large number of widows and unmarried women are rendered miserable by their efforts to control their feelings at this time. The observations of Négrier[5] are interesting in this connection:—a considerable number of the women in his maternity wards at the Hôtel-Dieu d'Angers are pregnant by a single intercourse on the occasion of some public fête; and he declares that in practically all these cases he is able to fix the date of the single connection at a time close to a menstrual epoch. Icard[6] would appear to hold that there is always an increase in sexual desire at the menstrual epochs, and he cites a number of cases from various authors in which

[1] A note by A. Haller in his edition of Boerhaave's "Prælectiones Academiæ," Amstelaedami, 1744, vol. v. part ii. p. 58.

[2] See "La Femme pendant la Période menstruelle," p. 189. Par S. Icard. Paris, 1890.

[3] "Traité de Médecine légale des Maladies mentales," Paris, 1822.

[4] *Loc. cit.*, p. 191.

[5] "Recueils des Faits pour servir à l'Histoire des Ovaires," Paris, 1888, p. 83.

[6] *Op. cit.*, p. 188.

this supposed natural increase has passed its physiological limit.

Carpenter, in his "Human Physiology," writes: "There is good reason to believe that in the human being sexual feeling becomes stronger at the period of menstruation." Similarly Galabin: "There is an increase of sexual feeling in connection with the menstrual period. This is generally most marked after the flow, but may exist also during the flow, or just before its onset."[1] This author, like many others, believes that menstruation is analogous to the œstus or rut of animals, and that it is delicacy alone which prevents intercourse taking place at the time, "for there can be no doubt that an increase of sexual feeling does normally take place at the menstrual period as at that of the œstus."[2] Tait, on the other hand, denies that women have stronger desire at these epochs than at others, declaring that, on the contrary, they then experience a feeling of repugnance to the act.[3]

Such are the views of a few among many authors who have written on this subject. My own investigation tends to show that the influence of the menstrual epochs on desire has been somewhat exaggerated. In about one-third of my cases menstruation had no influence on sexual feeling; in the remaining two-thirds sexual feeling was influenced by menstruation, but by no means always in the same manner. These cases show that there may be an increase of sexual feeling before menstruation only, or after menstruation only; that there may be an increase both before and after the epoch; or both before, during, and after the epoch; finally, that there may be an increase during the flux without any alteration before or after it.

According to most authors, the commonest effect of menstruation on desire is to cause an increase of it before the flux. My notes bear out this view; the proportion of cases in which sexual feeling was increased before the

[1] "A Manual of Midwifery," by A. L. Galabin, 1886, p. 37.

[2] "Diseases of Women," 4th edit. p. 44.

[3] *Medical Times and Gazette*, 1884, vol. i. pp. 619-624.

flux to those in which it was increased after the flux being as 3 to 2.

When the sexual exaltation occurs before the periods, it may begin as long as one week before, or only just before; when after the epoch, however, it does not, as a rule, last for more than a day or two. In one case the increase was generally most marked on the second day after the flux.

Thus the influence of menstruation on sexual desire is very variable, and cannot be expressed in terms of a fixed and undeviating law, as many writers, notably the French would appear to assume.

While acknowledging the influence of menstruation on sexual feeling we must be careful not to exaggerate it. Nymphomania occurring at the epochs must be exceedingly rare. I have never seen a case. Icard has collected a number of such cases, and one is apt, after reading them, to assume that they are quite common; but it is unwise to pay undue attention to exceptional cases, when our object is to discover general laws.

Pregnancy.—The influence of pregnancy on sexual feeling has been variously stated by different authors, the general opinion being that it diminishes, or actually annuls, the instinct. My figures show that pregnancy, like menstruation, has a very variable influence in this respect. It is important in studying this subject to inquire into the condition of the sexual instinct at different periods of pregnancy; it is not sufficient to state in general terms that pregnancy increases or diminishes, or has no effect upon, sexual feeling, seeing that, as a matter of fact, it may have all these three effects in the same individual at different periods of the term.

The condition of the sexual instinct during pregnancy was ascertained with more or less accuracy in twenty-one cases. One of these is so remarkable, that I proceed to quote it at once; in this case sexual feeling is only experienced during pregnancy:

Æt. 31.—Has four children. Desire is, to all intents and purposes, absent, except during her pregnancies, when it is considerable. It begins directly she conceives, being a sure sign to her of pregnancy, and lasts till labour, after which it disappears.

In eight other cases desire was said to be augmented by pregnancy. In most of these the increase lasted during the first few months only; in one case, for instance, it was said to last till quickening occurred. In some, however, it lasted longer than this, and continued in a few throughout the whole term. The increase in all these cases was decided; in one it was very considerable.

Such augmentation of sexuality is remarkable seeing that in all mammalia other than man, the female resents the approach of the male during pregnancy. How far we are to regard it as morbid I cannot say. Pruritus vulvæ is common among pregnant woman, resulting, it would seem, from the mechanical congestion caused by the enlarged womb; whether a similar congestion occurs in the lower animals during pregnancy I do not know; but one would rather expect the upright position of woman to render her especially liable to it when pregnant, and pruritus, being frequently associated with increase of sexual feeling, it is possible that the tendency to sexual exaltation in pregnant women may be related to the upright position.

In five of the twenty-one cases, pregnancy was said to make no appreciable difference in desire; in three there was a diminution during pregnancy, and in four a complete disappearance. It may here be mentioned that Hippocrates regarded pregnancy as a cure for nymphomania.

Lactation.—In most of the cases inquired into, lactation caused a diminution or absence of desire; in no case an increase of it. It is somewhat strange that while pregnancy sometimes causes an augmentation of the sexual feeling, lactation should never do so, seeing that the nursing woman may conceive, while the pregnant woman—if we except those rare cases of superfœtation—never can. It must, however, be remembered that lactation is a far greater drain upon the body than pregnancy, since during it the mother has to nourish a much larger being than during pregnancy. Among the ill-nourished and over-worked poor, nursing is apt to be very exhausting; its effect on them being somewhat like that of prolonged suppuration. In such cases the infant, instead of feeding upon the surplus nourishment poured out from an unwontedly rich blood, plays the part of a parasite, taking that which should go to the building-up of maternal tissues, and the anæmic low condition thus engendered in the mother provokes leucorrhœa, which still further reduces her energies. Therefore, it is not surprising that in the poorer classes, among whom my inquiries were made, lactation should diminish or abolish desire; probably, however, it has a very similar effect upon those who are more favourably circumstanced.

The Climacteric.—Of the cases in which the influence of the climacteric on desire was ascertained there was a diminution in two-thirds. This diminution was in most cases gradual; in a few it was sudden. Among the remaining one-third either no alteration in desire was noticed, or there was an exaltation of it. This climacteric exaltation has been alluded to by many authors, and has been likened to the final flicker of a dying flame, and to the chant of the dying swan. In two or three cases observed by me the desire at the climacteric was said to be greater than it had ever been before. I am inclined to think that the exaltation is, for the most part, temporary, lasting for a few months only, or coming on in spasmodic bursts. Be this as it may, it is a matter of common observation that, at this time of life, women sometimes act very unfortunately.[1]

It is not uncommon for desire to continue some years

[1] Raciborski ("Traité de la Menstruation," p. 271) has some interesting remarks on this head. Also Gardanne, thus: "Cette passion souveraine —l'amour, et pour ainsi dire unique du sexe, semble reprendre une nouvelle force à l'époque de la ménopause pour s'eteindre bientôt. C'est alors surtout que la femme devra chercher à modérer cette passion qui peut décider un dérangement dans le système nerveux" ("Dissertation sur les Avis à donner aux Femmes," C. P. Gardanne, Paris, 1812). Mathieu and Roubaud, as quoted by Tilt ("Change of Life," London, 1857, p. 142) believe in the frequent occurrence of abnormal sexual excitement at the climacteric, thus justifying an old French saying which runs thus: "Le diable de 40 ans, si habile à tourmenter les femmes."

after sixty in woman, but when it becomes intense in old age the condition is always due to local disease, or to some morbid state of the nervous system, or to both. Erotic outbursts are occasionally seen in aged insane women, and I am told that these outbursts are much more common in old men than in old women. Thus, "in the case of a man erotic manifestations were very marked at eighty-two years. In the case of the female no case of such an age had occurred." I find, however, that instances of erotomania in women have been recorded as late as eighty-four years of age.[1]

One fact which strikes one forcibly in the preceding observations is the tendency for the sexual instinct in the woman to change from time to time: not only may it be temporarily altered, with menstruation, pregnancy, and lactation, but it may, I have now to add, disappear for months, or even years, to reappear again suddenly. Sometimes the disappearance dates from the birth of a child, as happened in no less than six of my cases.

Another fact may be re-emphasised here, namely, our inability to frame fixed undeviating laws regarding the sexual instinct in woman. Thus, it may first awaken *A* many years before puberty, *B* at puberty, *C* shortly after puberty, *D* at marriage, *E* some time after marriage; or it may never awaken, and this in fertile women. Then, as regards the influence of menstruation: *A*, there may be no alteration of desire in connection with menstruation; *B*, it may be increased before the period only; *C*, after the period only; *D*, both before and after the period; *E*, it may be exalted during the period in any of those cases just considered; *F*, finally it may be increased during the period only, not before or after. Again, pregnancy, lactation, and the climacteric show a similar fickleness as regards their influence on desire. Verily, there is truth in the adage, "Varium et mutabile semper femina."

The most important conclusion, however, which our inquiry

[1] Icard, *op. cit.* p. 203.

establishes is that the sexual instinct is very much less intense in woman than in man.[1]

We have seen how it has come about that the female of almost all animals is less eager than the male. Probably in no other animal is this disparity so marked as in man, for while men, on the whole, have very strong desire, many women display marked sexual coolness, and some are quite devoid of sexual feeling. The question, therefore, arises whether there are any special causes at work tending to diminish the sexuality in the human female. I believe there are.

In the case of the lower animals, as already observed,

[1] An eminent physician has kindly furnished me with his views on the subject of this chapter. They are, I am pleased to find, in harmony with the conclusions I have reached. "My experience," writes he, "which is only one among thousands, distinctly leads me to the conclusion that sexual unconsciousness is the normal and usual state of young unmarried women, unless where the mind has been operated upon by vicious companions of their own sex, and by a larger knowledge of the relations existing between married people, obtained through loose conversation with married sisters, and sometimes by coarse talk in the family circle. In the lower classes where the bar between the sexes is almost absent, owing to blunted feelings, absence of bedroom and other accommodation, the full knowledge of the sexual function must exist, but even amongst these actual desire is, I am sure, more frequently absent than present.

"Many women marry without for a moment realising what is likely to occur afterwards, and some I have known have resented as a gross indignity any approach to a marital embrace. In one case the woman—a young Jewess—the morning after her marriage telegraphed to her mother to bring her home at once as her husband had most grossly insulted her, and she was one of four sisters. In another case the bride offered the most vehement resistance for many days to her husband's approaches. In both these cases the women were most tenderly attached to their husbands before marriage. I could give you many instances more from my own professional experience, and no doubt other physicians, similarly placed, could do the same.

"I believe many married women only tolerate the embrace because of their strong affection for the husband. I have known several cases where a jealous wife has accused her husband of incontinence, because he had relaxed his attentions to her; and this not from desire, but from jealousy.

"To sum up. I consider sexual unconsciousness to be the natural condition of the female, and that, while the evolution of her sexual system some sort of sexual instinct in the female is absolutely necessary to the continuation of the species, for in their case no sexual congress is possible unless the female lends herself to the act, and this she almost certainly would not do unless prompted by sexual instinct. If, therefore, the female has not the necessary instinct to co-operate with the male in effecting sexual union, she will be unable to propagate her kind, and will leave no progeny to inherit the deficiency. Thus, in the case of the lower animals the instinct in the female is kept at a certain level. With the human species, however, the case is different. A woman having no desire whatever may yet be impregnated and conceive. Among barbarous peoples women have for ages been dealt with as cattle, and have had to yield to their masters. The possession of beauty by them rather than of sexual desire has led to their selection, and thus many women with defective sexual desire have borne children who in their turn have displayed the like deficiency. In other words, that active process of elimination, which Weismann terms panmixia, and which, according to him, is absolutely necessary to the

tends to make her seek and take more pleasure in the society of the male than the female, this behaviour is not influenced by desire. Of course, to this as to all general rules there are exceptions, but these exceptions are mainly the result of vicious environments and local bodily causes, both of which again are the outcome of our highly artificial state of society."

Ploss in his work on the natural history of woman comes to the same conclusion. According to him, "Das Weib ist im sexuellen Verkehr mit dem Manne mehr passive." (Ploss, "Das Weib in der Natur- und Völkerkunde," B. i. p. 240). And he goes on to observe, that, as one would naturally expect among primitive people, the love of the mother is stronger than that of the wife. The former is manifestly more necessary for the propagation of the race. The same author on a previous page (221) quotes authorities in support of the view that all over the world women are sexually more indifferent than men. Appun ("Unter den Tropen" Band ii. s. 425, 428), who was temporarily married, after the custom of the country, to a native Indian of Guyana, alludes to the sexual indifference of the Indian woman.

Acton's remarks on the comparative sexuality of man and woman, are almost in complete accord with my conclusions as above set forth; also Tait's.

maintenance of a certain character at its proper standard, is interfered with.

The same is true of civilised peoples. While scarcely any men marry without pronounced sexual desire, many women become wives, as we have seen, having little or none at all, and moreover, while absence of desire on the part of the man almost always goes along with impotency, a similar defect on the part of the woman but rarely implies sterility. It is even possible that an elimination of women having strong sexual instinct is taking place. This would follow if it could be proved (*a*) that the sexuality of prostitutes is on an average naturally greater than that of women who are not prostitutes, and (*b*) that, for equal numbers, the former class have fewer children than the latter. It is probable that these propositions are both correct, in which case we must conclude that one of the effects of prostitution on women as a class is to diminish their sexuality.

A few words may here be said on the physiological aspect of monogamy. I have already argued that man is essentially a polygamist. His present structure and conduct, his past history alike proclaim this. Are we, then, to conclude that monogamy is an evil institution, and that civilised man should revert to polygamy? Only those with a very perverted intelligence can doubt the answer. The barest acquaintance with the science of Sociology—to appeal to nothing higher—makes it manifest that monogamy is the only form of sexual tie compatible with social progress: the instincts of the man must bow down before the needs of the child.

Will this incongruity of polygamist instinct and monogamist necessity always exist? Assuredly not. At the present time man is not, so far as his sexual instincts are concerned, in perfect equilibrium with his circumstances. Social evolution continually requires of the social unit modes of conduct at variance with instinctive promptings. Nor is there anything peculiar in this. Organic evolution essentially consists in a continual adaptation of the individual to an ever-changing (in the direction of greater complexity) environment. Sometimes the environmental change is sudden, sometimes gradual; in proportion as the change is sudden, in that proportion is there a clashing, as it were, of the individual and his environment, this clashing—this want of equilibrium between the two—either leading to actual extinction or to a gradual restoration of the equilibrium. Thus, civilised man, the descendant of a long line of polygamous ancestors, finds himself with the polygamous instinct strong upon him, surrounded by powerful forces which make for monogamy, and there is doubtless in consequence gradually evolving in him a monogamous instinct. Those monogamously inclined evidently tend to leave a more numerous progeny to inherit a like inclination than the polygamously disposed, inasmuch as the latter are, on the whole, less likely to marry. It must be acknowledged, however, that many highly polygamous individuals do marry, and live in a state of polygamous monogamy.

That the equilibrium is tending to be established in this indirect way, there can be no doubt. Whether it is also being effected by direct means we cannot, of course, say, until the vexed question of the inheritability of acquired characters is settled; if such characters are inheritable, then we cannot doubt that the influence of a properly spent monogamous life tends to be inherited by the offspring.

The fact that the man is polygamous in nature harmonises with the fact that his sexual instinct is far stronger than the woman's. It follows from these facts that the amount of sexual intercourse which is physiological for the average man is, in a sense, excessive for the average woman; physiologically speaking, all congress after impregnation is redundant on her part, but not on the part of the man, because in his case each intercourse is potentially an impregnation. But although all intercourse after conception is redundant for the woman, yet, by a sort of accident, this redundant congress is not, on the whole, injurious to her, since the part which the woman plays in the sexual act is largely a passive one. If this were not the case—if sexual desire in the woman were absolutely essential to congress, and if each intercourse made physiological demands upon her as great as those made upon the man—then monogamy would assuredly be fatal to woman's health; she would needs suffer from sexual excess. On the other hand, if the woman were incapable of sexual connection beyond the limits originally imposed—*i.e.*, after conception—then probably the institution of monogamy had never been.

All the remarks in this chapter have been made for the purpose of leading up to the question, How far the non-appeasement of sexual craving leads to disease? Judging from medical writings, this question refers chiefly to the female sex. A large number of women never marry; some from choice, many from necessity. How far, it may be asked, is spinsterhood inimical to health? The exercise of a complex generative system, which would otherwise remain quiescent, must obviously affect the entire woman, and probably, on the whole, in a beneficial way; furthermore, the awakening of the maternal instinct, and the numerous duties connected with the care of children, give the woman a purpose in life which is otherwise often lacking. To this extent the unmarried woman probably suffers; but does her health suffer from unsatisfied sexual craving? An opinion widely prevails among medical writings that the unmarried woman does thus suffer. Thus, Sauvages [1] remarks, "Salacitas major, major ad hysteriam proclivitas;" similarly, P. Ægineta, that it is frequently observed "in juvenculis salicibus;" [2] and Laycock maintains that this "fact is so universally acknowledged, and so constantly corroborated by daily observation, that anything in the shape of proof is unnecessary." [3] Gowers is somewhat more guarded. "Continence," he writes, "has been supposed to be a cause of hysteria; but probably it is so only when it suddenly succeeds habitual indulgence, and

[1] "Nosologia Methodica," tom. ii. 4to. Amstelodami, 1768, i. p. 587.

[2] "De re Medica," lib. iii. cap. lxxi.

[3] "Nervous Diseases of Women," 1840, p. 9.

its influence is chiefly confined to the female sex."[1] Again, Pliny remarks, "Multa morborum genera primo coitu solvuntur."[2]

The conclusions arrived at in this chapter prepare us for the belief that the influence which unappeased sexual appetite in the woman plays in disease has been very much exaggerated. Some of the most eminent physicians of our time have expressed the opinion that no man is the worse for chaste celibacy, so far at least as it entails continence; and if this is true of men, it is, one would think, *à fortiori*, true of women.

[1] Gowers, *op. cit.* vol. ii. p. 906.

[2] Plinii Secundi, "Hist. Nat.," lib. xxviii. cap. x. Londini, 1826.

The following passage is worthy of quotation in this connection: "Ego nuper vocatus sum, nocte mediâ, ad curationem mulieris, quæ ab hystericâ suffocatione laborabat, et conciderat quasi mortua: eam inveni frigidiorem marmore; pulsus erat parvus, maritus aderat, de uxoris salute valde sollicitus. Bene est, dixi: Jussi ut rem cum uxore suâ haberet; rem habuit, indeque statim convaluit. Hollerii, "Omnia Opera Practica," Genevæ, 1635, de Morb. intern. lib. i. p. 511.

CHAPTER XIV.

INFLUENCE OF SEX ON SUICIDE—STATISTICS, CAUSES, MEANS.

SUICIDE, as the result of certain conditions of the nervous system, demands a brief notice.

Race has a decided effect upon the suicide-rate, quite independently of external conditions, such as climate, education, religion. This is proved by the fact that in countries populated by mixed races, the rate is found to vary for each race, and at the same time to correspond with the rate in the country to which it is native. Of 161 cases of suicide in New York during the year 1883, as many as seventy were Germans, for whom the rate is equally high in their own country. The suicide-rate among negroes, on the other hand, is low, both in their native lands and in other parts of the world.

The more developed the institutions of a country (*e.g.*, the more perfect the railway and telegraphic systems), and the higher the pressure under which men live, the greater is the suicide-rate; it is also distinctly increased by education; the rate for large towns is greater than for rural districts; for soldiers and sailors it is higher than for civilians; and among soldiers, it is higher for cavalry than for foot regiments.[1]

Throughout Europe, about three times as many males as

[1] For the above and many of the following facts I am indebted to W. Wynn Westcott's work on "Suicide." London, 1885.

females destroy themselves, as is shown by the following table,[1] giving the number of suicides in each sex per hundred :—

	Male suicides.		Female suicides.
France . . .	79	...	21
Italy . . .	80	...	20
Prussia . . .	82	...	18
Spain . . .	71	...	29
Saxony . . .	77	...	23
Russia . . .	80	...	20
Holland . .	78	...	22
Ireland . . .	78	...	22
Scotland . .	72	...	28
U. S. A. . .	79	...	20

Westcott explains this disproportion by the facts that upon the men falls chiefly the brunt of the struggle for existence, that the women can better adapt themselves to change of circumstance, and that they are more self-sacrificing.[2]

There can be no doubt that it is largely due to differences in the occupation of the two sexes, for those occupations "which by habit, physical and mental, bring women near to men," often increase very considerably the suicide-rate among women.[3] A writer in the *Journal of Mental Science*[4] believes that if the number of men and women who contemplate self-destruction could be ascertained, the disproportion would not be so great. "Many more women than men desire, or think they desire, but have not the courage to cause, their own death." My own opinion is similar, but not identical. I think it probable that the idea of suicide more frequently presents itself to the woman than to the man, because women so much more frequently suffer from the minor forms of melancholia, but I do not believe that the lack of courage acts as a deterrent with them. As a matter of fact men, being more egoistic, cling to life more tenaciously than women, as is shown by the far greater frequency with which they suffer from fear of death; and if women less often obey the promptings to self-destruction, it

[1] *Journal of Mental Science*, vol. xxxi. p. 567. [2] *Ibid.* p. 107.
[3] *Ibid.* p. 95. [4] *Ibid.* p. 218.

is rather because they are less impatient under trial, more resigned to their lot, more impressed with the awfulness of the crime, and with the sense of duty to those about them. I do not think that the element of courage or cowardice at any time plays a notable part in determining the conduct of the would-be suicide, suicide very rarely being a deliberate act. Rarely, if ever, does the self-murderer calmly, with Hamlet, consider both halves of the question, "To be, or not to be." So dominated is he with the idea of destroying himself, that it is quite impossible for him to weigh carefully the arguments for and against the act. He may, and often does, deliberate as to the means to be used, laying his plans so skilfully as to elude the most careful watch, but on the wisdom or unwisdom of the act he does not ponder; if he did, the strong probability is he would not commit it. And when, as the result of calm deliberation, he concludes that self-destruction is the only course open to him, and proceeds straightway to compass it, it is doubtful whether we should most pity him for his misfortune or admire him for his courage. The lunatic is manifestly incapable of weighing all the circumstances of his case, but the same is also true—and this we are apt to forget—of the individual whose mind is temporarily unhinged by some great shock. To the man overwhelmed by grief, for instance, it is quite impossible to see things in their right proportion, and consequently impossible to deliberate, in the proper sense of the word—that is to say, to weigh the arguments for and against the act that is suggested to him; for what weight can turn the scale against an overwhelming sorrow? It is for this reason that I believe the common verdict, "Suicide while in an unsound state of mind," is not merely humane, but eminently true.

I have said that the disproportion in the rate of suicide for the two sexes largely depends upon external circumstances. This is further shown by the fact that in some countries more women commit suicide than men. This, for instance, is the case in India, and is thus accounted for by

Surgeon-Major Kenneth M'Leod:[1] "The survival of the *Sati* feeling in the country, the lower social position of the women, their ignorance and want of education, render them more prone to commit suicide than men."

The influence of age on the suicide-rate in either sex is well shown in the following tables :[2]—

Ages.	Persons.	Males.	Females.
All ages	12.1	14.1	8.3
15	10.3	7.1	9.7
20	9.1	6.8	9.7
25	21.0	16.1	22.9
35	23.6	25.0	—
45	8.2	9.1	17.0
55	9.3	9.3	0.0
65	17.1	23.1	16.1
75	25.5	41.4	0.1

From this it would appear that in England, at all events, the rate of suicide between the ages of 15 and 25 is greater for women than for men. It will be observed that it is greater among women at the climacteric than at the corresponding age in men. This is as we should expect, for melancholia is common at the climacteric, as all writers agree. I would lay special stress on the great frequency with which women are at this time of life afflicted with a mental state on the borderland of genuine insanity. These cases, which one may see every day in a hospital out-patient department, afford most valuable material for the study of the slighter degrees of mental dissolution.

During the six years from 1883 to 1888 inclusive, 289 boys and girls committed suicide in Germany; and it will be seen from the following table, taken from the *Pall Mall Gazette*, that even in children suicide is much more common in the male than in the female, thus proving what we have

[1] "Statistics and Causes of Suicide in India:" *Journal of Mental Science*, vol. xxv. p. 64.

[2] Prepared by Mr. J. H. Shoveller, Somerset House: *Journal of Mental Science*, vol. xxxi. p. 218.

already had occasion to remark—that the nervous systems of the two sexes differ before puberty.

Motive of Suicide.	High Schools.		Elementary Schools.	
	Boys.	Girls.	Boys.	Girls.
Nervousness before examinations and after unsuccessful examinations . . .	15	—	1	—
Reasons connected with attendance at school	5	—	8	1
On account of quarrels with parents and teachers	2	—	—	—
Fear of punishment	1	1	45	23
After ill-treatment at home	1	—	9	3
After thwarted ambitions	11	—	7	1
Anger, obstinacy, &c.	2	—	6	—
Mental derangement	11	1	12	2
Physical defects	1	—	1	1
Religious mania	—	—	1	1
Unhappy love affairs	4	1	—	—
Moral depravity	1	—	5	1
Hypochondria	5	—	—	1
While playing	—	—	7	—
Other motives	3	—	2	—
Motives unknown	15	—	59	12
Total	77	3	163	46

The method of suicide depends largely upon opportunity. In poppy-growing districts poisoning by opium is common; in Russia, where the people spend much of their time indoors, and where the use of firearms is prohibited, hanging is the usual means; in the warm climate of Italy, where they live mostly out of doors and where firearms are permitted, shooting is the common method.

But although the presence of the means has a great influence upon the means adopted for self-murder, each sex has its preferences. Thus, drowning is the favourite method with women, while cutting the throat is comparatively rare among them. Throughout Europe hanging seems to be the method most employed by men.

It may be mentioned that Sunday is frequently chosen by women for committing suicide; men, on the other hand, avoid this day.

In regard to the causes of suicide in the two sexes, it is very difficult, from the published tables on the subject, to derive any general conclusions. Overwork, and the high tension resulting from the struggle for existence, naturally operate more potently with men. Domestic worries, above all, the death of children, influence women chiefly; as also remorse and shame. Pregnancy, the puerperal state, and lactation are also recognised causes in women.

CHAPTER XV.

THE COMPARATIVE NERVOUS PLASTICITY OF THE SEXES.

Mental Adaptability.—The adaptability of woman has been frequently remarked upon, but so far as I know, it has never been asserted that women are *physically* more adaptable than men ; it is essentially an adaptability to the varying *mental* environment that is alluded to. When, *e.g.*, circumstances lift the woman into a higher social scale, she is said to adapt herself much more readily to the altered conditions of life than would a man under similar circumstances ; and it is notorious how readily maid-servants pick up the ways of their mistresses, how they come to speak in the same tone of voice and to use the same language.[1]

I have said in a former chapter that we must distinguish between two kinds of mental adaptability. There is, first, the adaptability to new surroundings of a more or less permanent nature, as on moving to a new neighbourhood or

[1] In this connection one recalls Tennyson's charming little poem (founded on fact) in which a peasant girl, when translated to the home of the great Lord of Burleigh, droops and dies, because her power of adaptation is *not* equal to the strain upon it.

> " And her gentle mind was such
> That she grew a noble lady,
> And the people loved her much.
> But a trouble weighed upon her,
> And perplexed her, night and morn,
> With the burthen of an honour
> Unto which she was not born."

entering upon an entirely different mode of life. The superiority of women over men in this respect may perhaps in some cases be explained by their greater resignation, but whatever its explanation, it is of some importance to the physician, for upon it depends in a measure the fact that women are, on the whole, better patients than men; they more readily fall in with, or adapt themselves to, the conditions prescribed for them, such, for instance, as prolonged rest, demanding, as it may, a revolution in the whole manner of living. This, however, is not the only cause of the peculiar amenability of the woman to treatment involving rest; it is chiefly the result of her anabolic habit. When I say that women are better patients than men, I am, of course, speaking generally. Self-indulgent, luxurious women are often bad enough patients.[1]

The second form of mental adaptability is ordinarily known as *tact*. It is the capacity to modify conduct in response to rapid changes in the social environment. Now it is proverbial that women are more tactful than men, a circumstance depending apparently upon two characteristics especially feminine:—

(*a*) A quick perception, which enables its possessor to grasp a situation readily.

(*b*) A non-egoistic tendency. The man being more self-absorbed than the woman is often less alive than she to what

[1] H. R. Storer, in giving the mortality of women in asylums as nine per cent. less than that of men, quotes the following explanation: "May it not be that the woman, whose occupations are essentially sedentary, and whose habits more quiet, can accommodate herself better than man to the uniform system and routine of an asylum?" ("The Causation, Course, and Treatment of Reflex Insanity in Women," H. R. Storer, M.D., Boston, 1871.) The writer refers to that passivity, that anabolic tendency, which belongs to woman in common with almost all female animals. His explanation may in part account for the undoubted facts that more men die in asylums than women, and that more women recover than men. But it is only a partial explanation, for, in the first place, in the best-regulated asylums the men are allowed considerable liberty of action, and secondly, the forms of insanity which affect men are on the whole of a more fatal and incurable kind than those affecting women, men suffering more than women from gross organic lesions of the nervous system.

is going on around. The tact of an individual is, other things being equal, in inverse proportion to his egoism. The very egoistic are apt to be singularly devoid of tact, and to be perpetually saying and doing the most ridiculous or offensive things. How can any one absorbed in self make that nice study of his surroundings necessary for fit conduct? How can he be, at one and the same time, chiefly subjective and chiefly objective? When one is performing a surgical operation or contemplating a difficult move on the chess-board, it certainly would not do to indulge in an egoistic train of thought, and yet many social moves (if one may so put it) require quite as accurate a study of complex conditions as either of these cases.

The subject of tact is not of merely theoretical interest, as will be granted when it is remembered how necessary this quality is to the physician and the nurse. Perhaps no one is more severely scrutinised than the doctor, especially when called in as a comparative stranger to give his opinion on a difficult case: if he fail to grasp the situation, he may destroy all his chances of usefulness. So much indeed does professional success depend upon tact, that we sometimes see an able man completely outstripped by one of inferior skill and, it may be, less scrupulous character, because the one has, while the other has not, this valuable quality.

Woman's tact is one of her prime qualifications for nursing, and it need scarcely be said how valuable a quality this is in a nurse who has charge of a nervous case.

Artfulness, Cunning.—The natural tact of woman may degenerate into artfulness and cunning. "Of all animals," observes the philosophical Laycock, "woman has the most acute faculties." What courage is to the man, such, in his view, is astuteness to the woman; and he compares the cunning of the hysterical and insane woman with the artfulness displayed by animals in choosing a nest for the deposit of their eggs and young, and in protecting their offspring. It is well known that theft, murder, and arson, may be committed by young women with such consummate adroitness as to defy detection. The impulse to thieve, kleptomania as it is called, seems to develop with peculiar frequency in pregnant women, and I suggest that it may perhaps be connected with the necessity of providing adequate food for the young. It is more difficult to account for the destructive tendency manifested by certain hysterical or insane women—*e.g.*, the impulse to murder or to burn—unless we suppose it also to be a reversion—in this case to the primordial instinct to get rid of everything hurtful to the offspring.

Nervous Plasticity and Rigidity. — The superiority of woman over man in the first of the two kinds of adaptability just alluded to, that, namely, to more or less lasting changes in the social environment, though in some degree accounted for by her more resigned and passive nature, yet suggests that she is mentally the more plastic of the two. It may, for instance, be argued that the peculiar readiness with which the woman casts off old, and takes on new, habits when moved from a lower into a higher social sphere, implies that she is nervously more plastic than the man. I now purpose to treat briefly of this question of the comparative nervous plasticity of the sexes, though I fear my remarks will, from the nature of the case, be of a highly speculative nature.

In attempting to decide how far a nervous system is plastic or rigid, it is needful to discover how far it displays its activities by instinctive and automatic acts, and how far by the higher operations of reason. For in proportion as it inclines in the former direction, in that proportion is it rigid, and (speaking of the human race only) in that proportion do we find a tendency to drift into habits, to be ultra-methodical, conventional, bigoted, imitative (as distinguished from original), and finally, perhaps, to display fixity and limitation in the character of the diseases by which it is attacked; while in proportion as it is plastic, in that proportion will it be free from the above proclivities, and, probably, in that proportion too, will it display fickleness and variability in the nature of its disorders.

As regards the tendency to form habits, it will be shown in Part III. that the more an individual is the creature of habit, the more does he approach the instinct-led organism. The latter is tied down to a narrow, stereotyped plan of action; the environment is comparatively simple and stable from one generation to another, and the nervous organisation is hereditarily capable (by means of simple instinct) of adjusting the individual to it independently of any marked acquisition, little or no nervous plasticity, enabling the organism to profit by experience, being required.[1] The centres are—to use Hughlings Jackson's term—rigidly 'organised,' and capable in only a limited degree of being moulded.

As the scale is ascended, however, the environment becomes more complex and unstable, and a simple, stereotyped, rigidly 'organised' nervous system is no longer adequate for the purposes of adjustment; a higher degree of nervous plasticity becomes necessary, allowing the nerve-centres to adjust the organism to a complex and ever-varying environment. Viewing the matter from the psychical side, we say the adjustment is effected by means of reason, or, rather, by intellect. Experiences are stored up and reasoned upon, and the more the individual is able to store up experiences, the better he is able to use them as guides for his conduct, the higher is the order of his intellect. Now, it is the highest-level nerve-centres which constitute the 'physical substratum of mind' (H. Jackson), and these centres are the most plastic, the most unorganised, while the centres in the lower levels become progressively more organised, stereotyped, rigid, unmouldable. It therefore follows that in proportion as an individual adjusts himself to his environment by intellectual means, in that degree is he nervously plastic, while in proportion as the adjustment is effected through the lower centres, to that extent is he nervously rigid.

All sane human beings have to use their intellect in adjusting themselves to their environment; but some use it

[1] I am now speaking of the lowest forms of instinct-led brutes—of such as are little guided by reason.

in a far greater degree than others, and among the least intellectual we find a strong tendency for acts which were in the first instance intelligent to become to all intents and purposes instinctive, or simply reflex; we note, in short, a tendency in the nervous system to become rigid—*for the plastic material to set.* So long as the act which has ceased to be distinctly voluntary is performed with any degree of consciousness, it may be likened to one of the higher instincts, but when all consciousness has departed from it, it becomes purely reflex or automatic; and an act which becomes automatic, as distinguished from one which is innately automatic, is termed a habit. The acquisition of such reflex actions (or habits) implies of course an ability of the lower centres to become organised, a plasticity on their part; but an excessive tendency to such organisation implies also rigidity, for when they have become definitely moulded or set, they resist attempts at remoulding. Although, therefore, the nervous system of man is not capable—like that of the instinct-led brutes[1]—of automatically adjusting him to his environment by powers inherited and in no sense acquired (except in the case of such vital acts as respiration); yet to a large extent it becomes so *by acquisition*—it is capable, *i.e.*, of being so moulded that it shall prompt acts which differ from instinctive acts only in so far as they are not innate.

From the above it follows that the more readily an individual acquires habits, the more rigid is his nervous system and the more does its condition approach to that of the purely instinct-led organism. The ultra-methodical man is generally under the domination of habit; he is obviously to a large degree instinctive, and we should consequently not expect to find such an one highly intellectual, the disposition to slip back into the ancestral instinctive state assuredly indicating a close relation to that state. This *à*

[1] I use the term "purely instinct-led organism" for convenience. As a matter of fact, there are very few animal organisms wholly incapable of acquiring new nervous powers, and an organism which can acquire these cannot be rightly described as purely instinctive.

priori conclusion is borne out by my experience, and I find I am not alone in the opinion. Darwin observes that some relation seems to exist "between a low degree of intelligence and a strong tendency to the formation of fixed, though not inherited, habits; for, as a sagacious physician remarked to me, persons who are slightly imbecile tend to act in everything by routine or habit, and they are rendered much happier if this is encouraged."[1]

So far I have spoken only of habits of the body, but there are of course habits of mind as well, and the tendency to become automatic manifests itself as much in this direction as in the other. In fact, he who readily acquires bodily habits also readily acquires mental habits—displays a rigidity of thought as of well as action—the nerve-currents keeping, to use a common metaphor, in certain well-worn channels. The most perfect intellects remain plastic to the end; the inferior show an early disposition towards rigidity; and we shall generally find that those who retain till advanced age the bodily nimbleness and pliancy of youth retain also its mental pliancy; while those who become prematurely senile in body, and display in their movements, in their arteries, and in other textures of the body, the peculiar rigidity of age, show a corresponding rigidity of thought. Just, in fact, as some jellies and cements 'set' more readily than others, so likewise do some nervous systems; and it is an interesting and instructive task to note the variability of different individuals in this respect. Sometimes the condition comes on with startling rapidity—the individual is said to be 'formed' in his habits. Quite recently I heard the merits of the professorial staff of a certain college discussed, and accidentally elicited a fact of interest in this connection. It appears that a young professor attracted, when first appointed, a large and enthusiastic class by his liberal and suggestive teaching; gradually, however, the attendance diminished, and after a few years became very sparse. Asking the cause, I found he had become 'faddy.' Two or three 'fads' had, as it were, enthralled his thoughts, and these

[1] "Descent of Man," p. 68.

he aired on every occasion. No longer able to take a broad and impartial survey of things, he had already 'set,' and so ended all hopes of greatness for him.

The innate tendency to form mental habits, to lapse towards the instinctive condition, or, what comes to the same thing, to become nervously rigid, expresses itself in the following mental peculiarities. Broadly, there is mental inferiority, a want of mental width and grasp. Coming to details, we find this inferiority expressing itself in a *lack of originality*, and a corresponding disposition to *imitativeness and conventionality*. The individual falls quite naturally and unquestioningly into the manners and customs of his community, no matter how absurd these may be, and so far as his social habits are concerned, he becomes little more than a reflex automaton. He likewise shows a marked tendency to *bigotry*[1]—in itself a strong indication of intellectual inferiority. The bigot is held bound by certain beliefs; to any other possibility than that which these allow he is absolutely blind, and his blindness argues a feeble power of conceiving any contingencies but those habitually present to his mind—in short, a deficiency of reasoning faculty.

I do not say that there is any fixed relation between bigotry and intellectual capacity—that the two stand exactly in inverse ratio to one another. A highly intellectual individual may be very bigoted, while one of ordinary ability may keep his mind free and open on all doubtful questions. This paradox probably depends chiefly upon the fact that the one has, while the other has not, strong feeling. Whatever be the true psychological nature of belief, there can be no doubt that the element of feeling enters largely into it. When a man holds obstinately by a false belief, we may be quite sure that that belief is strongly backed up by feeling.

[1] I am aware that the term 'bigot' is of doubtful derivation, and rather apt to be narrowed down in its application to persons blindly and obstinately attached to a *religious* creed or party—"obstinate devotees to a creed" is Skeat's definition; but as I am here using it in a broader sense I may perhaps be allowed to give its meaning as defined by Wedgwood—viz.: "a person unreasonably attached to particular opinions, and not having his mind open to any argument in opposition."

Feelings, we know, command thoughts—*i.e.*, tend to call up thoughts in harmony with them—and therefore when a man of strong feeling holds a false belief, he is intellectually at a disadvantage; (chained down by his feeling to the one standpoint his belief allows him, his mental horizon is restricted, and he can look at everything from the one point of view only.) In order that a man may be able to preserve an open mind on doubtful questions it is absolutely necessary that his education should be carried out in a broad and scientific spirit—a truth on which no one has so forcibly insisted as Herbert Spencer. So great is the influence of real education—*i.e.*, the drawing out of all the faculties—in removing bigotry, that we may see men of great natural talent, but of deficient training, holding firmly by beliefs the absurdity of which is clearly perceived by others who are far less gifted, but have had superior educational advantages; and inasmuch as the test of efficiency is by results, there are many who would accord to the latter a higher intellectual rank than the former.

That bigotry tends to go with mental inferiority is shown in many different ways. It will suffice if we notice two only. The fixed belief of the bigot is closely related to, if not identical with, the delusion of the insane; he holds it with such tenacity that, no matter how irrefutable the arguments advanced against it, they are powerless to convince him that he is wrong. Now I fail to recognise any radical difference between such a belief and a delusion. He who can see things as they are is said to have a clear vision—the 'clear-seeing eye,' as Carlyle would say—whether they be the things of the concrete world, or those belonging to the complex workings of human society; but if by reason of imperfect vision (due to a defective lens, to a prejudice inborn or acquired, or to other unfavourable media), they are blurred or distorted, their proportions misrepresented, their relations falsified, then is the man deluded; he has not clear sight and insight, he mistakes the false for the true, the semblance for the reality: he cannot rightly interpret phenomena; and whereas the candid, open-minded man may be convinced of his error, may have his vision corrected (in which case the false belief does not constitute a delusion in the ordinary sense of the word), such a man is actually unable to see the falseness of his conclusions, though that falseness be demonstrated to him; he is deluded, as we tacitly acknowledge in such common expressions as 'poor deluded mortal.'

A second argument in support of the assertion that bigotry is a mark of intellectual inferiority is equally conclusive. The test of a belief, as Bain insists, is its influence as a motive to action: if an individual declares he holds a certain belief, but does not act up to it, we know very well that it cannot be strong.[1] If, therefore, a man obstinately holds a number of false beliefs—and the bigot does—he will often be led astray; for his inability to be reasoned out of them places him at a disadvantage in adjusting himself to outer conditions—curtails, in fact, the degree of correspondence between him and his environment. His intellect not being allowed its proper range, his acts tend to become instinctive, and this, as we said before, denotes low intellectuality.

I may illustrate these remarks by reference to two business men, both of whom are in the habit of speculating. The one is comparatively uncultured, but as a speculator he is exceptionally successful, and his success, so far as I am able to judge, is in a large measure due to the fact that he is ever ready to modify his beliefs when good reasons for doing so present themselves; when he finds he has committed an error of judgment, he acknowledges it at once, and acts upon the new light he has received. The other has a carefully cultivated intellect, but, unfortunately for himself, he is very bigoted — in vulgar language, 'pig-headed.' Having formed an opinion on a certain stock, and acted on that opinion, he sticks to it through thick and thin, no matter how glaring the evidence against it. He is therefore highly unsuccessful in business. As showing how a

[1] Unless, as in the case of the drunkard, he act in spite of his belief, as when leading an intemperate life.

man's acts are influenced by his temperament, I may add that he is of a melancholy turn, and that *he always speculates for a loss!* Through his jaundiced eyes everything seems to be going to the bad.

Of these two the former has the better balanced, and in one sense the higher order of mind, seeing that 'the degree of life varies with the correspondence,' and that he is the better able to place himself in correspondence with his environment, of seeing things as they are, and of adjusting his acts accordingly.

Let us now briefly inquire how far the two sexes differ as regards their tendency to be ultra-methodical, conventional, imitative, and bigoted.

Woman, as on the whole the intellectual inferior, we should expect to display a greater tendency towards all these characteristics than the man, and I think there is little doubt that experience justifies the expectation, though how far this is due to nurture and how far to nature it is not easy to determine. She is unquestionably more conventional, more a creature of social routine, than the man, partly no doubt because the limitations of her life give a significance to trifles, but partly also because she puts more of the element of feeling into all she does, and holds by social conventionalities as articles of faith. For the same reasons she is more disposed to bigotry, her excess of feeling making her very tenacious of her beliefs, which nevertheless are uncorrected by any severe intellectual discipline, or by a wide view of life. In imitativeness and lack of originality, again, she stands conspicuously first; indeed, it is essentially in this particular that the masculine intellect shows its superiority over the feminine. As to the tendency to fall into habits and to be ultra-methodical, probably nurture, not nature, is the chief determining influence, and usually the woman's surroundings are more calculated to foster it than the man's; but the man shows an equal disposition to fixity of habit when circumstances favour its development, as is well exemplified by the 'rigidity' of the confirmed old bachelor.

The poor woman (of large towns at least) can scarcely be charged with excess of method. Of method, indeed, in the proper sense of the word, she usually has none; we find, however, its absence notwithstanding, that her activities are to a large extent habitual.

A few words may here be said on the conservative tendency in matters political and social that goes along with the characteristics under consideration. An individual who displays any one of them (and he who displays one generally displays all) resents any alteration in the standing order of things. He, more readily than a person of opposite proclivities, falls in with existing conditions, and he lacks, moreover, the originality which would suggest a departure from them. Now, inasmuch as these several characteristics are on the whole more marked in women then in men, we are not surprised to find them incline to conservatism in politics: the enfranchisement of women would almost certainly increase the strength of the Conservative party.[1] And a further reason for expecting the woman to be more conservative than the man is that throughout, practically, the entire animal kingdom the female is more conservative than the male, the latter far more readily than the female taking on new characters. Thus, as Brooks observes, the male takes the lead in organic evolution.

The general conclusion, then, we have reached as to the relative nervous plasticity of the two sexes is that, though possibly women are mentally more adaptable than men,

[1] This remark is not written, and must not be taken, in a partisan spirit. Of the truth of the above statement there can be no doubt. It does not, however, by any means follow that therefore conservatism is a thing to be abjured. No reasonable person can doubt the advisability—nay, necessity—of a strong conservative element in every system of government, at any rate of popular government. The same necessity is displayed throughout the entire organic world. It is embodied in the great principle of heredity, which is essentially conservative, reproducing the parent, or parents, in the offspring. Organic evolution would be impossible without such conservatism, and the like is true of social and political evolution.

more tactful, and more readily reconciled to and at home amid new surroundings, the nervous system of man is more plastic than that of woman, in the latter the nerve-centres showing a greater tendency to become 'organised,' stereotyped, rigid.

We have now to ask how far these remarks on nervous plasticity and rigidity apply to diseases of the nervous system—no easy question. Nevertheless, we may be quite sure that the attempt to find an answer is a worthy one, and not chimerical. Who can doubt that the ultra-methodical, imitative bigot will show a proclivity to a class of nervous disorders different from that to which the plastic and original genius is liable? The degree to which an individual is free from the above attributes marks his level of mental evolution, and upon this depends, in a very large measure, the class of nervous disorders to which he is liable. The cultivated man does not suffer from the same disorders as the uncultivated, and it is, of course, in the diseases of the mind that the differences will be most observed. But were I to attempt to treat of this subject adequately, I should travel beyond the proper limits of my task. I shall therefore only touch upon it very briefly.

It is to be expected that an individual displaying a tendency to contract bodily habits will be more liable to become the victim of functional nervous diseases, and less able to shake them off, than the nervously plastic individual, seeing that such disorders are in fact pathological habits.

A tendency to imitativeness probably renders the individual manifesting it more liable than others to the 'infective neuroses.' I have alluded to this subject on a former page.

The individual of bigoted diposition is prone to contract fixed ideas, and to become the victim of delusions.

The above tendencies are all in the direction of rigidity; the opposite condition of plasticity probably predisposes the individual to variability in morbid nervous manifestations. We should therefore look for a wider variability in the nature of the nervous disorders of men than of women, and this conclusion derives further support from the fact that throughout the animal kingdom the male is more variable than the female; whence also we may conclude that not only in his nervous, but in all other disorders, the man is the more variable of the two.

CHAPTER XVI.

THE RELATIVE CLANNISHNESS OF MEN AND WOMEN.

I HAVE pointed out in Part I. that while clannishness is a well-marked characteristic of the male sex, it is but little developed in the female. This survival, as I take it to be, of the primeval tribal instinct, shows itself very early in life. Any one who has observed boys knows how, by a natural impulse, they unite in bands; their very games—*e.g.*, cricket and football—are based on the principle of *taking sides*, that is, forming rival associations. Only the other day I was struck with the manner in which a number of small boys ran across a field at some distance below where I was standing, apparently without aim, simply drawn together by an inherent cohesive force. You may call it gregarious instinct, or what you will; and, indeed, it seems to have something in common with the instinct that will make a whole flock of sheep follow the leader, even to the length of jumping over an obstacle held in the way when there is no necessity in each individual case. But it is remarkable that this instinct is not so strongly developed in girls; they seldom, if ever, combine for any common object of work or amusement. This difference in the two sexes is well illustrated by the behaviour of each at school. A boys' school is not unlike a primitive tribe of men; and just as among primitive communities the various tribes regard one another in the light of natural enemies, so do neighbouring boys' schools regard one another; and so keen becomes their rivalry, that in championing their own school all little personal animosities and jealousies among the boys are quickly forgotten, and outwardly they present a united front. I could relate many amusing anecdotes in support of this statement, but most people can recollect such for themselves. In girls' schools, on the other hand, the clannish spirit is, I am told, much feebler, and the attitude towards neighbouring schools is usually one of complete indifference.

Now, I would point out that this instinct in the boy is something more than mere gregariousness. Gregariousness would never give that strong feeling of pride in his own school, or 'set,' which is so marked in a boy—that *esprit de corps*, as we term it, which makes him subordinate private interests to the good of the organisation of which he is a member, that loyalty which in the man Burke calls "the unbought grace of life, the cheap defence of nations;" and I believe that the reason why it is so strongly developed in him, and so slightly in the girl, is because it is a survival from earlier times, when the males constantly combined in expeditions, aggressive or defensive, as the case might be, and where therefore fidelity to each other and to the interests of the tribe of which each formed a part was essential to safety and to success. For it is noticeable that while gregariousness is an attribute common to humanity, *esprit de corps* is not a characteristic that is usually highly developed in women; a woman's loyalty and devotion where her affections are involved cannot be called in question, but the indictment against her, that she is "deficient in loyalty to impersonal ties," in "care for the honour of the body" of which she is a member—be it family, school, or country—is, I observe, not altogether repudiated by even such a warm supporter of the cause of women as Mrs. William Grey, the well-known educationalist. Nor can we wonder at this deficiency when we reflect that women have, not only in the far past but up to the present time, been cut off from membership of any corporate body, social or political, and there has therefore been nothing to foster in them the virtues pertaining thereto. Clannishness, in the narrower sense of loyalty to the family of which the individual is a member, is by no means wanting among women, as George Eliot, in portraying the Dobsons and the Tullivers did not fail to recognise; but as among boys and girls, so among men and women, the feeling, in the wider sense in which I am speaking of it, is strongest among the former. Who ever heard of women's clubs, women's craft-guilds, women's trades-unions until quite recently?[1]

I know that it is objected by some that women show themselves unfit for organisation and co-operation by their failure to live together even in small numbers without considerable friction; but I venture to doubt whether it has been proved that in this respect they compare so very unfavourably with men. Before we can judge fairly in the matter we must subject each to the same environment; we must not draw a parallel between the case of women, restricted to the narrow sphere of domestic life, with its trivial interests and its consequently petty rivalries and jealousies—a sphere where the selfishness inherent in the individual cannot fail to be often aroused into antagonism, and yet where close intercourse prevents that antagonism being forgotten or ignored—and the case of men, whose daily lives are spent in a wider world, in which, though there is keen competition, there is not that intimate association of man with man which leads each to feel uncomfortably the angularities in his neighbour's character Experience, I think, goes to show that where men are subjected to conditions similar to those of women, their conduct is much the same; at any rate, if we may believe the accounts of the state of things in the monasteries of the Middle Ages, or, to come down to our own times, of the relations subsisting between the old men in almshouses, or in workhouse wards, the male sex does not gain much by the comparison. Any

[1] I make a reservation here, for, owing to the rapid progress of women to the front within the last quarter of a century, such organisations are no longer unknown; but they were until the present day, which is all my argument requires.

difference which may, in this respect, exist between the sexes is, I believe, fully accounted for by the difference in their environments, and if so, my previous argument on this head is strengthened, rather than the *inherent* capacity of women for co-operation disproved. The modern movement in the direction of women's organisations establishes this conclusion as a fact.

The way in which men and women differ in respect of clannishness is shown again by the behaviour of villagers. During the intervals of work the men will be seen in groups, loitering about corners, or gathering together at some recognised meeting-place. The women, on the other hand, rarely collect in any number; nor do I think that this is merely because their domestic duties tie them to the house, or because they are less associated in their work, although these no doubt are factors in the case.

Again, among the married well-to-do, we find that, as a rule, the men get on better together than their wives. Occasionally the rivalries entailed by the struggle for existence interfere with a healthy intimacy among the men; but usually when estrangement occurs, it is found that the women are the cause. I have it on the authority of the captain of an Atlantic liner that the women on board are the chief disturbers of social harmony among the passengers. All start, for the most part, good friends, but the women soon break up into cliques, and through their influence on the men the latter are set by the ears.

The foregoing considerations raise some questions of pathological interest. No one can doubt that there should be a commingling of the sexes, for each supplements and at the same time modifies the other, each is the complement of the other; and as the woman's past has debarred her from attaining to much that man has already acquired, the commingling is probably more necessary to her than to him: faults and deficiencies induced by an unfavourable environment of enormous duration need to be removed. We all know that the only son of a weak, indulgent mother is often a 'milksop,' but are we equally ready to recognise how much a girl suffers, physically and mentally, from want of the wholesome, invigorating companionship of boys? A girl who has many brothers may be a 'tomboy' in the intermediate stage between childhood and womanhood, but though she may therefore lack certain feminine graces, she will undoubtedly gain in nervous strength, and since good physical health is the only firm basis of all her subsequent attainments, the temporary loss is more than counterbalanced by the subsequent gain.

And as with the young, so with adults. The man deprived of the softening, refining companionship of the woman is apt to become brutalised, or at best coarse, and wanting in the tenderness which alone ennobles his superior strength; the woman, deprived of contact with the invigorating, manly element, tends to have her weaknesses exaggerated, and hence to deteriorate both in body and in mind.

CHAPTER XVII.

THE MONTHLY RHYTHM.

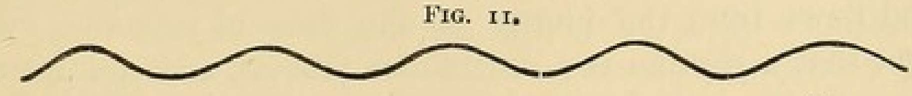
During one period of her life the female of the human species passes through a monthly rhythm, and it is by no means certain that the male is exempt from a similar cyclic change.

This monthly rhythm is spoken of as *menstruation.* The term menstruation, however, as ordinarily understood, does not convey a correct notion of the process. It is taken as signifying a series of phenomena of a more or less local character, extending over several days, and reappearing with greater or less regularity every twenty-eight days. This, implying, as it does, that the rhythm is in abeyance during the intervals of the flux, is an altogether too restricted conception of the menstruation process, and it should at once be discarded. It rests, in fact, upon a quite erroneous notion of what a rhythm really is. A cycle or rhythm is not an interrupted, but a continuous process, a rise to a climax and a fall, ever repeating themselves, like the ebb and flow of the tidal wave, and it should therefore be diagrammatically represented, not by a broken, but by a continuous undulating line. Thus : Fig. 10 illustrates the view of menstruation generally held :

Fig. 10.

Fig. 11, the process as it actually occurs :

Fig. 11.



A little consideration will show that the conception of menstruation as a continuous process must be the correct one. There must be an unbroken line of causation: to assume otherwise would be to assume that changes may occur independently of any cause. My meaning may be illustrated by a reference to the rhythms of the heavenly bodies. Instance the motion of the moon round the earth. The nature of this movement depends upon the distance of the two bodies from each other and from the sun, their relative masses, the position of their orbits, and the rate of movement primarily impressed upon each. These may be said to constitute the 'material conditions.' Now, if we fix upon any one point of the lunar cycle, say, the period of 'full moon,' we may regard the material conditions then obtaining as constituting the cause of the material conditions immediately succeeding; these new conditions as the cause of the next; these, again, of the following; and so on until the point is reached at which we started, the clue to the true nature of a rhythm being—so it appears to me—that the last change in it shall be capable of setting up the first again.

It is obvious that which shall be called the first and which the last phase is settled entirely arbitrarily, that we cannot take any point in the cyclical series, and say, this and no other is the beginning of the cycle. In considering rhythms, however, it is convenient to fix upon some one point as the first in the series of changes, and we generally choose one which stands out prominently from the others. Thus, in studying the rhythms of the heavenly bodies, we fix upon such periods as those of new moon, meteoric storms, and the appearance of comets, because at these periods the rhythms strikingly manifest themselves to us; nor do we in such cases fail to recognise that there is an unbroken chain of causation.

Thus also should it be with the rhythm of menstruation. But while we fix upon that period of the rhythm at which blood flows from the uterus as the date of reckoning, we forget that a rhythm is a continuous process, and are apt to assume that there is a cessation of the cyclical changes between each period of flux. I do not wish to imply that a rhythm is a perfectly equable and uniform process. Such is far from being the case: a certain section of each cycle may be occupied by changes more striking than occur at other parts of the cycle, as the beat of the heart and menstruation itself, as well as many of the astronomical cycles show.

These considerations as to the true nature of the menstrual rhythm are borne out by observation.[1] It often happens that a woman some days before the menstrual flux—it may be a week or even longer—experiences a series of symptoms indicative of its approach. In the same, or in other cases, peculiar symptoms may be experienced for as long a time after. Now, supposing the 'period' to last one week, and symptoms to be experienced one week before and one week after it, we have distinct proof of the continuity of the rhythm during three out of the four weeks. The following facts are of interest in this connection. Galabin points out[2] that for some days before the flow the breasts are apt to become firm, or even painfully hard, or to be seized with violent neuralgic pains; that a disposition to constipation frequently occurs; that the ovaries have been found tender and swollen in cases of hernia of these organs; and that soft uterine fibroids, which vary considerably in size throughout the entire menstrual cycle, are then greatest.

The observations of Jacobi and Stephenson, on the temperature, pulse, and excretion of urea, point in the same direction. Thus Mary Putman Jacobi writes:[3] "We find

[1] The views expressed in this chapter have been held by me for some years. Since the outline of it was sketched I have found that Goodman ("The Cyclical Theory of Menstruation," *The American Journal of Obstetrics*, 1878, p. 673), Jacobi ("On the Question of Rest for Women during Menstruation"), and Stephenson (*American Journal of Obstetrics*, p. 287, 1882), have expressed similar opinions, and I have incorporated their observations into it, with a reference to the author in each case in which this is done.

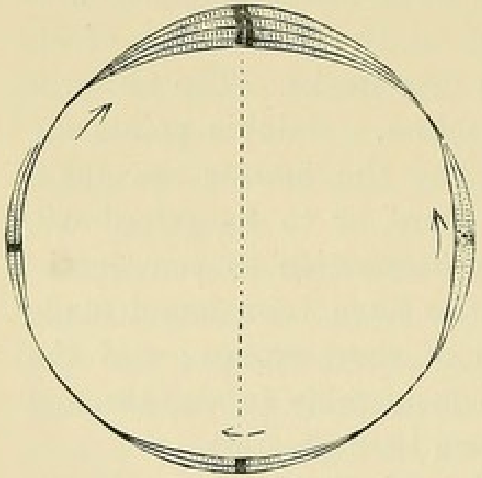
[2] See "Diseases of Women," 4th edit., pp. 45, 46; also, "A Manual of Midwifery," pp. 38, 39.

[3] *Loc. cit.*, p. 162, quoted by Stephenson.

that in the majority of cases the excretion of urea is increased during the few days preceding menstruation over that of the intermenstrual periods; that it decreases during the menstrual flow, and is at its minimum just afterwards; that the pulse shows no uniform variation, but that the temperature rises just before the menstruation, to fall during the flow, but at this time rarely reaching the point of the intermenstrual period. Finally, that the sphygmographic trace shows a constantly increasing rise of arterial tension from a minimum point reached just after menstruation to a maximum point just before, but rapidly lessened during the menstrual flow."

The observations of Stephenson do not entirely accord with those of Jacobi. They point, however, to the conclusion that, not only is there a monthly cycle as regards the excretion of urea, the temperature, and the arterial tension, but as regards the pulse also.[1]

FIG. 12.



Cullen maintained that the pulse increases in rate at the approach of the periods, and that women are then more sensitive to cold.[2]

We may therefore conclude that the menstrual rhythm intimately involves the entire body.

Laycock taught that the menstrual cycle was made up of four minor cycles, each of a week's duration; that the woman started upon a cycle at the beginning of every seven days, menstruation (so called) beginning with every fourth minor cycle. This view is diagrammatically represented in figs. 12 and 13.

I have met with the records of a considerable number of neuroses recurring regularly every week, and have seen a

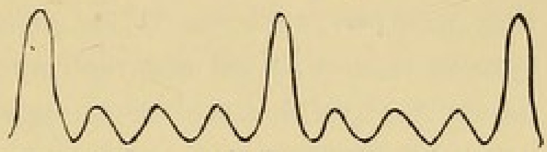
[1] I have discussed the purport of the monthly changes in arterial tension in another work. See "Flushing and Blushing," pp. 106–109.

[2] Quoted by Brierre de Boismont, "De la Menstruation," Paris, 1842.

few, but I have not yet been able to satisfy myself of the correctness of Laycock's contention.

The fact that menstruation is not an interrupted, but a continuous process, that the woman during her reproductive life is always menstruating, just as the moon is always changing, is of some practical importance. One of the peculiarities of nervousness is the tendency which the subject of it displays to vary in health from time to time without obvious cause. How are we to explain these fluctuations? Bouts of nervousness are no doubt frequently determined by obscure environmental conditions (*e.g.*, atmospheric and telluric), but they often, I believe, depend upon the peculiar bodily conditions obtaining at some period, or periods, of the menstrual cycle. These conditions are most common about the date of the flux, recurring commonly just before, during, and after it; but they may occur at any point of the cycle, seeing that the menstrual rhythm is continuous. Thus we can account for those cases of monthly neuroses recurring during the intervals of the flux, and I cannot but think that many aberrations of nervous health, even though they be not rhythmical, may yet be connected with the menstrual cycle.

FIG. 13.



We have now to consider the cause of the rhythm. There can be little doubt that ultimately it depends upon the nervous system, which, far and wide, is implicated in it. It is not difficult to conceive of a rhythmically pulsating menstrual centre, similar to that which causes the heartbeat, the wave-length being in the one case represented by twenty-eight days, and in the other by about one second. The difference in the two wave-lengths must not blind us to the possibility of the nervous processes underlying each being of fundamentally the same nature. It is not so great —nothing like so great—as the difference between the wave-lengths of a deep musical note and of the violet ray of the spectrum. In the latter case the ether vibrates at the rate of over 700 million million times a second, while in the former the atmospheric pulsations may be only fifty times a second.[1]

It may be that there is no menstrual centre, in the sense of a limited patch of tissue so constituted as to pass spontaneously through a monthly rhythm; quite conceivably the entire nervous system may spontaneously pass through such a cycle of change. Supposing, however, the rhythm to be initiated in a comparatively limited portion of the nervous system, it is yet manifest that the whole system is implicated secondarily; for, as we have seen, the monthly rhythm involves changes in the pulse-rate, blood-pressure, temperature, and urea-excretions, and it is practically impossible to get a modification in any one of these without some secondary modification, however slight, of the entire body. This result must follow from the physiological interdependence of the various parts of the body. The changes in temperature, pulse-rate, blood-pressure, and urea-excretion do not, in short, constitute the entire range of cyclical changes. Modifications in any one of these readily lend themselves to observation, but there must be innumerable other cyclical changes of a less discoverable nature, and hence there can be little doubt that the entire nervous system passes through a monthly rhythm.

But without attempting here to decide how far the menstrual centre is localised, and how far the rhythm is a primary function of a large part of the nervous system, let us briefly inquire into the causes of the local phenomena which occur during the so-called ‘menstrual period.’

And, first, what are these local phenomena? All we can say certainly is, that they consist of a discharge of blood, mucus, and epithelial débris from the mucous membrane of the fundus uteri, and sometimes, at least, of the rupture of a Graafian vesicle and the passage of an ovum

[1] The ratio between the cardiac and the menstrual rhythm is as 1 to $2\frac{1}{2}$ million (about); that of a low sound vibration to the vibration of the violet ray of the spectrum as 1 to 84 million million (about).

from the genital canal. So many careful observers have of late denied that ovulation is a necessary concomitant of the menstrual flux, that we must, for the present at least, reject the till recently almost universal opinion. In regard to the exact changes which take place in the uterine mucous membrane in connection with the flux, opinion is also still much divided. The view that the entire membrane is shed is in the very highest degree improbable. It is as unlikely that so complex a tissue as a mucous membrane, with its glands, blood-vessels, nerves, and lymphatics, should be capable of completely regenerating itself after exfoliation as that the skin should after being torn off. I am aware that J. Williams, one of the chief supporters of this view, regards the superficial muscular fibres of the inner uterine wall as constituting the muscularis mucosæ, in which case the so-called uterine mucous membrane would consist of a mucosa only; but this assumption scarcely renders the hypothesis more tenable, and I venture to give in my adhesion to the opinion that very little organic change takes place in the uterine mucous membrane during the period of the flux, such change being limited to capillary rupture, and, perhaps, to slight shedding of the superficial cells.

How, we have now to ask, are these local changes brought about? The uterine flux can only be effected in one of two ways, or by these combined:—(*a*) By a modification in the capillary blood-pressure, causing rupture of the capillary wall; or (*b*), by primary degeneration, causing similar rupture; or (*c*), finally, by both of these. I am inclined to think that modifications of capillary blood-pressure play the most important part in inducing the uterine flux. This pressure may be most effectually increased by—(1) Contraction of all the systemic arteries save those supplying the uterine mucous membrane; by (2) a dilatation of these latter; by (3) a contraction of the venules into which the blood-capillaries of the uterine mucous membrane pass. In consequence of contraction of the systemic arteries, the pressure in them rises; hence the pressure in the uterine arteries goes up, and these vessels being dilated, and affording a minimum resistance to the onflowing blood, there is a further rise of pressure in the uterine capillaries; finally, the venules of the latter being contracted, and the blood unable to escape freely from the capillaries into them, all the conditions necessary for a high capillary blood-pressure obtain, and there can be little doubt that if this is sufficiently high it may induce rupture of the capillary wall. Whether the venules are contracted or not is purely a matter of theory; but that the systemic arteries are contracted, and the uterine arteries dilated, in connection with the menstrual flux, can hardly be questioned. The former is attested by the rise of systemic blood-pressure which heralds the flow; the latter, by the swelling of the ovaries and uterus at the same time.[1] Wherefore we may regard it as proven that the capillary blood-pressure in the uterine mucous membrane is increased some days before the flux, and we may assume that this high pressure, persisting for several days, eventually leads to capillary rupture and to the escape of blood. It is probable that the arterioles supplying the uterine mucous membrane are more dilated than those supplying the muscular portion, otherwise rupture would occur in the latter also. Rupture having once occurred, blood tends to escape for some time, and there being no longer need for a high systemic arterial pressure, the arteries necessarily relax, the pressure again falling.[2]

The second method in which the capillary rupture which leads to the uterine flux is brought about may be by a primary degenerative change wrought through nerve-agency;

[1] No one would for a moment suggest that this swelling is due to passive congestion.

[2] I must here point out that in the work previously alluded to, and in which I set forward a similar theory (p. 106), I have assumed that the systemic blood-pressure is heightened *during* the flux instead of *before* it, for it used to be taught that the radial pulse increases in tension during the flow. Such, however, as we now know, not being the case, I have had to modify my theory to suit the facts. The student familiar with the physiology of blood-pressure—a subject, by the way, on which much misapprehension exists—will be able to fill in for himself the above outline.

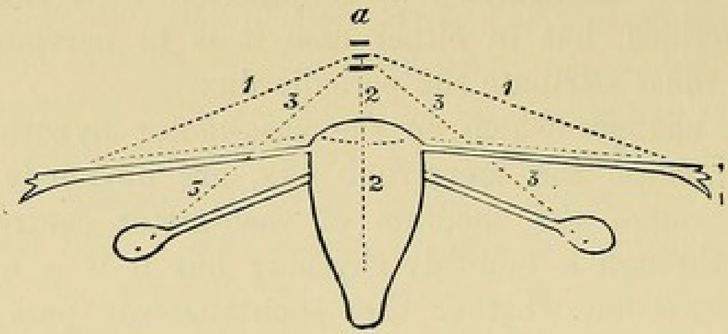
possibly such change acts in conjunction with the method just described, but in either case it is to nervous agency that we must attribute the periodic flux.

Those changes which, on the vaso-motor hypothesis just sketched, cause the menstrual flux, are obviously brought about through the medium of vaso-motor centres, these passing through a monthly rhythm; but it is a matter of pure speculation whether they spontaneously pass through this rhythm (in the same sense, *i.e.*, as the respiratory centres pulsate spontaneously), or are secondarily affected by a menstrual centre.

Assuming that a primary trophic change in the capillaries of the uterine mucous membrane is a factor in the production of the flux, it is obvious that the nervous mechanism affecting such change must act in co-ordination with the vaso-motor centres involved in the rhythm. There must also be some nervous mechanism regulating the discharge of ova, acting in conjunction with other menstrual nervous mechanisms, for whether ovulation is a necessary accompaniment of the menstrual flux or not, it seems certain that it occurs more frequently during the 'periods' than during the intervals. It therefore follows that we may assume the existence of three such nervous menstrual mechanisms—one leading to a local increase of capillary blood-pressure, another to capillary degeneration, and a third to ovulation. These mechanisms are, I suggest, situated outside the ovaries and uterus. From them fibres pass to these organs, those to the uterus passing chiefly along the Fallopian tubes, but some few going to it directly. This hypothesis enables us to explain the following facts:—1, That the periodic flow continues in the great majority of cases after the removal of the ovaries; 2, that it generally ceases after the tubes have been removed; 3, that, in rare cases, it continues after removal of both ovaries and tubes.

This supposition may be diagrammatically represented thus:—

FIG. 14.



a. Menstrually pulsating centre.
1. Fibres passing from it to the uterus along the Fallopian tubes.
2. Fibres passing from it to the uterus directly.
3. Fibres passing from it to the ovaries.[1]

[1] A view that in the past has been widely accepted is that the stimulus exciting the menstrual flux comes from the ovaries, but the fact that the flux continues in the vast majority of cases after the ovaries have been removed shows that this cannot be the case, and that the stimulus initiating ovulation (which generally accompanies the flux), alike with that which starts the flux, must come from some co-ordinated mechanisms situated outside the ovaries and uterus alike. But although the old view is untenable, the presence of ovaries is necessary to the development of the capacity to menstruate, using the term in its usual sense, for if these are removed in early life, the individual never menstruates. The presence of the ovaries, like the presence of testicles, leads to the development of certain characters, and checks the development of others.

CHAPTER XVIII.

THE MONTHLY RHYTHM (*continued*)—PUBERTY—THE CLIMACTERIC—PREGNANCY—LACTATION.

Puberty and the Climacteric.—The two great epochs of the woman's life are those of puberty and the climacteric, the former marking the beginning, the latter the end of reproductive life. They are both of some considerable duration. Puberty begins some time before the appearance of the first menstrual flux, and lasts for some time after its regular and orderly establishment; the climacteric begins some time before the customary climacteric irregularities in the flux, and lasts an appreciable time after its permanent cessation.

It is most important to bear in mind that puberty and the climacteric are not cotemporaneous with the periods of pubertal and climacteric irregularities in the menstrual flux. A wave of nervous irritability starts at about ten and continues till about sixteen, and a similar wave starts at about thirty-six and continues till about fifty. Of course, I speak of averages. The waves may be of much shorter duration than this, and they may occur earlier or later than the times mentioned; for instance, the climacteric wave may not begin till forty, and may continue till past sixty.[1]

Pregnancy and Lactation.—It is well known that during

[1] I do not purpose to give the evidence on which the above statements are made, nor do I here attempt to indicate the character of the neuroses which are apt to occur at the two epochs.

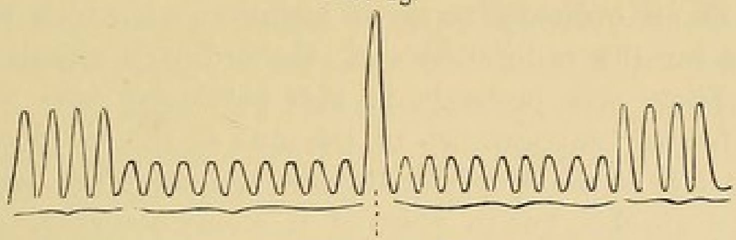
pregnancy and lactation the menstrual flux, for the most part, ceases. It must not, however, be thought from this that the menstrual rhythm is then suspended. If the condition of the pregnant or nursing woman be carefully studied at the times at which the flux would have occurred but for the pregnancy or nursing, evidences of the rhythm may be detected. Distinct contractions, for instance, may be observed at these times during pregnancy, such contractions being the analogues of those which attend the ordinary menstrual periods (and which have then for their object the expulsion of the effused blood), and being indeed sometimes so violent as to constitute a veritable uterine colic, or spasmodic dysmenorrhœa. The uterine contractions accompanying the pregnancy-periods (as we may call them) culminate at the tenth period (*i.e.*, at the tenth lunar month) in the pains of labour ; from which it is manifest that an ordinary menstrual epoch may be likened to a miniature labour.

During lactation, as during pregnancy, careful inquiry will disclose similar suppressed periods.

Wherefore, clearly, during pregnancy and lactation, the menstrual rhythm continues, but it changes in its manifestations, and the most obtrusive change is the cessation of the uterine flux, though there are also other modifications.

The exact nature of these has not yet been worked out —how far, for instance, the rhythm in the pulse or urea-excretion is affected. This much, however, may be said certainly : the nervous irritability which attends a suppressed pregnancy- or lactation-period is much less marked than during an ordinary menstrual period. Thus a woman who has been wont to suffer from headache, drowsiness, gloom, and so forth, at her ordinary periods, rarely suffers from these in the same degree at the pregnancy- and lactation-periods. The like is true of such serious neuroses as megrim, epilepsy, or asthma, which, when they follow a menstrual periodicity, may be temporarily checked altogether during pregnancy, and, I believe, also, lactation. The menstrual rhythm during pregnancy and lactation is therefore markedly fainter than the ordinary rhythm. Regarding the rhythm as a wave, this may be graphically expressed by saying that the height of the wave during pregnancy and lactation is diminished; as in the accompanying diagram:

Fig. 15.



But though the menstrual wave is then lower than during other periods of reproductive life, let us not overlook its presence, or we shall often be puzzled by phenomena perfectly capable of interpretation. I have frequently been able to trace neurotic outbursts to the nervous erethism obtaining at such suppressed periods. As an instance I may quote the following case, and as opportunity for a very careful study of all the particulars was afforded, I can guarantee the strictest accuracy:

A woman, *æt.* 27, married, nursing a child three months old, the supply of milk beginning to fail, was one day while in perfect health seized with a severe attack of painful dyspepsia. Could assign no cause for the seizure; had scarcely ever suffered from dyspepsia before; had made no departure from the routine carefully mapped out for her during her period of nursing; but had eaten well, slept well, taken her usual cold bath and exercise, and was, until the time of the seizure, a very type of healthy womanhood. There had been no decided alteration in the atmospheric and telluric conditions. What, then, had determined this attack? Here was a case worthy of careful investigation, and I felt convinced that there was some very decided cause at work. Knowing the influence of the suppressed lactation-periods on the nervous system, I inquired after the exact age of the infant, and discovered that it was three lunar months and one day old. I accordingly diagnosed the case as menstrual dyspepsia; and determined to make a careful study of the patient's condition at the subsequent lactation-periods. *Exactly twenty-eight days after this dyspeptic attack* (which, by the way, only lasted a day or two), *the patient menstruated in the ordinary way*, and continued to do so subsequently. The diagnosis was thus confirmed, and indeed amplified. The premature failure of the milk supply was probably attended by a condition of body obtaining at the end of an ordinary term of lactation, at which time the conditions for the re-induction of the ordinary menstrual flux prevail. There was probably in this particular case a strong tendency for the reappearance of the flux at the third month—*i.e.*, at the date of the dyspeptic attack—and there was, as it were, an attempt at this, but in place of it there occurred, for some reason or other, an erratic evolution of energy in connection with the nervous system ruling over the digestive organs.

We may now consider the influence, on nervous health, of pregnancy and lactation, independently of the menstrual rhythm. And first as to pregnancy. Every tissue of the body is modified by it, so that the pregnant woman must be regarded as an entirely altered being. The nervous system, notably, is affected, becoming highly irritable, and thus a nervously disposed woman is doubly nervous when pregnant—headache, palpitation, nervous dyspepsia, fainting, alterations in the spirits and temper, and other such symptoms being then, as every one knows, particularly apt to show themselves. On the other hand, pregnancy sometimes brings with it a general improvement in nervous health. Thus Montgomery, after having remarked upon the tendency to irritability of temper during pregnancy, writes:[1]—

"I have known the effect produced to be the reverse of this, and a decided amelioration to take place in the temper, as we sometimes also see happen in the exercise of the bodily functions during pregnancy. A gentleman once informed me that, being inflicted with a stepmother naturally more disposed to practise the *fortiter in re* than to adopt the *suaviter in modo*, he and all the household had learned, from experience, to hail with joyful anticipations the lady's pregnancy as a period when clouds and storms were immediately exchanged for sunshine and quietness."

I do not purpose to enter into a detailed description of

[1] "An Exposition of the Signs and Symptoms of Pregnancy," p. 33.

the condition of the nervous system during pregnancy,[1] but a brief mention may be made of certain modifications in instinct which are then apt to occur. Although instinct plays a very restricted part in the conduct of the human race, in matters pertaining to reproduction one would rather expect a survival. Yet even the most elementary sexual instincts, as now developed, are imperfect, as Sir James Paget has observed. Moreover, as every doctor is only too painfully aware, instinct is practically no guide to the mother in the matter of bringing up her children, and this the young mother acknowledges by abandoning herself to the advice of others. Among the poor this is chiefly tendered by old women, who are supposed to act from experience, but who really follow tradition, and tradition—in this, as in many another case, rooted in ignorance—is found sadly wanting. The position of woman, all but totally abandoned by instinct as a guide in the proper rearing of her offspring, is a most curious one, and not less remarkable is the survival of so many children, considering the wretched treatment they receive.[2]

Occasionally primitive instincts connected with reproduction may be observed during pregnancy. As an example we may take the longing which the pregnant woman is apt to experience for peculiar foods—a suggestion we owe to Laycock. Some of these longings are essentially morbid; others, however, point to physiological needs. Thus, a woman during one pregnancy devoured a very large quantity of chalk in the shape of a tooth-powder; she could scarcely ever go to her bedroom without taking some. A similar instance of erratic instinct, according to Laycock, is the peculiar cunning of some hysterically disposed women, which he believes to be related to that displayed by many

[1] Montgomery's work, already quoted, may be consulted with advantage on this subject.

[2] Unfortunately, many survive with health permanently crippled. I have stated elsewhere, and I repeat it here, for I do not think it can be too often insisted upon, that practically all children's diseases are due to neglect; in other words, if children were brought up properly, they would scarcely ever be ill.

of the lower animals in their choice of nests, or hiding-places, and in the protection of their young.

Secondly, as regards lactation. This period is fruitful of nervousness in many women, owing, no doubt, to the serious drain the body then suffers. Poor women feel this especially, readily becoming thin and anæmic ; but women, rich or poor, vary much in the extent to which nursing tells upon them. Some, presumably unduly katabolic, are unable to bear the strain for any length of time, no matter how carefully they are fed, nor what pains are taken to secure for them healthy surroundings. Others, however, actually grow stout while nursing, and are never so well as then.

There are not, so far as I know, any forms of nervousness peculiar to this period. The symptoms—*e.g.*, neuralgia, the infra-mammary pain, depression of spirits (passing, it may be, into actual melancholia), giddiness, palpitation, lassitude, flushing, indigestion, and so forth—are such as tend to show themselves whenever the nutrition of the body is impaired.

CHAPTER XIX.

THE ANTE-PUBERTAL AND POST-CLIMACTERIC MENSTRUAL RHYTHMS.

WE have now to consider whether the menstrual rhythm is confined to the period of reproductive life. Is there evidence of such a rhythm before puberty or after the climacteric?

Ante-Pubertal Rhythm.—It is quite possible that the menstrual rhythm manifests itself before puberty. The larger conception of menstruation put forward in this work—the conception of the process, not as of a mere local change lasting a few days, but as of a cycle continuing through the whole month, and involving the entire body—naturally suggests that the rhythm may exist before puberty, and indeed leads one to ask whether it may not begin with the first moments of life; whether, in fact, the female organism does not from the very beginning of life throb menstrually. All my attempts at investigating this question have hitherto failed, and I can merely indicate the method followed, in the hope that others may take it up with better success. A number of mothers were asked to keep a diary of the health of their daughters before puberty. It was thought that if any monthly rhythm occurred during this period it would in this way be rendered evident. Unfortunately, in no single case was I able to get my plan followed out; notes would be taken for a few days and then neglected for a day, or even several days, and most of the mothers got tired of making observations after a few weeks. Hence the investigation fell through.

The Post-Climacteric Menstrual Rhythm.—The opinion is somewhat widely held that the menstrual cycle ends with the climacteric.[1] Careful inquiry, however, shows that in, at all events, a large proportion of cases it continues during post-climacteric life. Thus, in one hundred women (the first hundred in my list) past the climacteric, and for the most part under sixty years of age, I obtained fair evidence of a monthly manifestation in forty-two, doubtful evidence in ten, no evidence in forty-eight.

This important subject has not received the attention it deserves. Among the writers I have consulted, Canabis is the first to touch upon it. "I have seen," he writes, "women who, ten or twelve years after the cessation of the period, continue to experience local congestion and pressure in the uterus, with divers other symptoms accompanying menstruation. In such cases, it seems to me that the general changes which are wont to follow upon the permanent cessation of the flux are less evident than in others, the woman unhappily remaining in all respects woman even into old age."[2]

Béclard, in his essay on the Climacteric,[3] cites the case of a post-climacteric manifestation; and Gravis, writing on the same subject,[4] observes that women frequently experience every month, for six or twelve months after the cessation, the symptoms which attended actual menstruation.

Brierre de Boismont[5] detected a post-climacteric periodicity in 11 out of 180 women. In two of his cases pains

[1] In this chapter I shall, for convenience, regard the climacteric as ending with the permanent cessation of the menstrual flux, so that the term "post-climacteric" will refer to the period of life after this cessation.

[2] Quoted by L. H. Docé ("Dissertation sur la Cessation des Menstrues," Paris, 1831). This same passage is subsequently quoted by Brierre de Boismont ("De la Menstruation," Paris, 1842).

[3] Paris, 1862. [4] Paris, 1813.

[5] "De la Menstruation."

in the stomach occurred every month for two years. In another case, colic and weight in the uterus occurred monthly for years. He does not specify in the other eight cases the nature of the monthly manifestation.

Tilt[1] gives a Table of 53 "monthly occurrences after cessation," observed by him among 500 women (*i.e.*, 10 per cent.), a much larger proportion than that given by Brierre de Boismont. Thus:

Nature of Occurrence.	No. of Women.
Lumbo-abdominal pains	15
Leucorrhœa	12
Headache and pseudo-narcotism	7
Diarrhœa	5
Entorrhagia	2
Bleeding piles	1
Hysterical symptoms	2
Hysterical oppression or asthma	2
Great depression of strength	1
Sweats	2
Dyspepsia	1
Stomatitis	1
Swelled gums	1
Swelled legs for three days	1
	53

This Table leads to the belief that each of the above symptoms, occurring as a monthly manifestation, occurs by itself and to the exclusion of the others. Such, however, is not the case. (A similar defect is observable in others of Tilt's Tables.)

I do not wish to lay undue stress on the figures I have given as the results of my own investigations, for it is very difficult to get a reliable account of symptoms from women of the poorer classes, untrained to note things accurately, and it was solely among these that my observations were made. Far, however, from believing that the proportion I have given is too high, I think it falls short of the mark; I incline, indeed, to the belief that the menstrual rhythm

[1] "The Change of Life," p. 55. London, 1857.

continues in all women after the permanent cessation of the flux.

"Why then," it may be asked, "do we fail to get a history of monthly rhythm in every woman after the climacteric?" In answering this question, let us remember that a periodic symptom, unless of a distinctly obtrusive character, is very likely to be overlooked. Women who have been wont to experience, with the menstrual flux, such marked symptoms as backache and visceral pain, will scarcely fail to recognise their true nature, if these continue to recur every month after the climacteric. Upon inquiry, such women will say: "I feel every month as if I were going to be unwell." Similarly, if a woman in post-climacteric life suffers from a monthly recurrence of megrim, swelling of varicose veins, or other pronounced symptoms which she has learnt to associate with the menstrual epochs, the obvious connection will not be lost upon her. When, however, the post-climacteric menstrual symptoms are unobtrusive, they are very apt to be unrecognised. In a fair proportion of cases the symptoms which attend the menstrual flux itself are slight —nay, not infrequently they are practically absent; what wonder, then, that in such cases they should pass unobserved when the loss of blood—to the woman the one evidence of menstruation—no longer takes place? We have seen that the entire body is involved in the menstrual rhythm—that the vaso-motor system, the pulse, the body temperature, the secretions, are all implicated, and it is only by careful inquiry into these and other particulars that the truth can be got at; but until some one by laborious investigation into a large number of cases—say a thousand—fails to obtain proofs of a post-climacteric menstrual cycle in a tolerably large proportion, we may fairly assume, on the strength of such evidence as we have already, that it occurs in all.

In those cases in which I failed to obtain definite evidence of a post-climacteric rhythm, several of the patients told me that they felt much worse "at times," but they could not say whether these times corresponded with menstrual periods;

others fancied that they were worse every month; others, again, declared they had definite symptoms "about every month." None of these doubtful cases are included in my list of post-climacteric manifestations. I may remark that among those who experienced monthly manifestations after the climacteric, two or three asserted that the manifestations occurred on the same day, or days, of every month. Such cases, if they actually exist, can only be explained on the theory of expectant attention.

Assuming that the menstrual rhythm continues after the cessation of the local flux, we have now to ask: How long does it continue? Does it persist till death, or does it gradually wear out?

There can be no doubt that the rhythm becomes less and less pronounced as time goes on. This is proved by the fact that the cases in which one is able to get evidence of it become fewer and fewer with each decade. Thus, of 121 cases observed by me of post-climacteric monthly manifestations in which the date of the last menstrual period was noticed, in

68	the length	of time	since the	last flux was	5	years.
31	"	"	"	"	5–10	"
10	"	"	"	"	10–15	"
9	"	"	"	"	15–20	"
2	"	"	"	"	20–25	"
1	"	"	"	"	25–30	"
121						

The decline in the number of cases with advancing years is not, it will be observed, uniform for each quinquennium. This is doubtless due to the limited number of cases analysed, and to the difficulty of obtaining accurate answers from the patients. The irregularity in the decline is better brought out by the following table:—

Time since Cessation.	No. of cases presenting Post-climacteric Manifestations.		Time since Cessation.	No. of cases presenting Post-climacteric Manifestations.	
1 year and under.	13	68	16 years.	1	9
2 years	14		17 ,,	1	
3 ,,	18		18 ,,	2	
4 ,,	11		19 ,,	3	
5 ,,	12		20 ,,	2	
6 ,,	10	31	21 ,,	1	2
7 ,,	7		22 ,,	1	
8 ,,	3		23 ,,	0	
9 ,,	6		24 ,,	0	
10 ,,	5		25 ,,	0	
11 ,,	2	10	26 ,,	0	1
12 ,,	4		27 ,,	0	
13 ,,	3		28 ,,	0	
14 ,,	1		29 ,,	1	
15 ,,	0		30 ,,	0	

Out of 117 cases of post-climacteric manifestations in which I noted the ages of the patients, in

12	the patients	were	between	40	and	45	years of age
27	,,	,,	,,	45	,,	50	,,
28	,,	,,	,,	50	,,	55	,,
23	,,	,,	,,	55	,,	60	,,
16	,,	,,	,,	60	,,	65	,,
8	,,	,,	,,	65	,,	70	,,
3	,,	,,	,,	70	,,	75	,,
117							

The comparatively small number of cases between 40 and 45 is partly due to the fact that a large number of women do not pass the climacteric until after 45, and partly to the fact that I for the most part neglected to inquire after the rhythm in women under this age. Most of the cases inquired into were those of women over 50. Hence also, I think, the greater number of manifestations between 50 and 55 than between 45 and 50. In spite, however, of these apparent anomalies, resulting from imperfection in my data, the figures in the main clearly show that the rhythm becomes less and less pronounced with increasing years; otherwise the cases presenting monthly manifestations would not decline so rapidly as they do after 55, and this even when due allowance is made for the diminution in the number of persons living in each successive quinquennium.

We may therefore conclude that, so far as the monthly manifestation of the post-climacteric menstrual rhythm is concerned, it diminishes with advancing years, but whether the rhythm itself completely ceases in course of time, or always persists until death, it is at present impossible to say.

The post-climacteric monthly manifestations in any given individual are for the most part like those which have been wont to attend the actual flux in that individual. As a rule they are less pronounced, but sometimes they are actually more marked and more distressing, as the following cases show :—

Æt. 49. Three years since the last flux. Suffers every month from headache, flushes, backache, depression of spirits, and loss of memory. Is quite sure that she is far more troubled at these times than she used to be during her 'periods.' "Had an easy change."

Æt. 66. No flux for nineteen years. Used to suffer during her 'periods' from itching of the head, distension of varicose veins, and swelling of the legs. She still experiences these symptoms every month. The legs, however, now not only swell, but become red (as if attacked with erysipelas) and itch. The itching is relieved by the application of vinegar and water.

The most distressing feature in the monthly manifestations occurring after the climacteric is extreme nervousness. This, a legacy from the climacteric period, obtains notably in the first years after it, and very often the attacks of nervousness are determined by the monthly epochs. Of the many and varied phenomena which go to make up climacteric nervousness, it will be enough here to refer to headache, flushing, tremor, giddiness, palpitation, depression of spirits, and the tendency to start on the slightest provocation. Happy the woman who passes the climacteric without suffering from any of these! These symptoms, notably headache and flushing, are very apt to accompany the monthly epochs of late reproductive life, and it is not therefore surprising that they should continue as part of the post-climacteric monthly manifestations. As a matter of fact, they may then be so distressing as to render these later epochs more trying than the ordinary 'periods.'

In explanation of the discomfort so frequently experienced at the post-climacteric epochs, it must be borne in mind that the whole body has then to accommodate itself to new conditions; blood being no longer periodically lost, the vaso-motor action is apt to be erratic, and the entire organism to suffer through it.

I now proceed to analyse my cases of post-climacteric monthly manifestations, 125 in all. The figures I shall give must not be taken to indicate the relative frequency with which the various symptoms recorded actually occur, but merely the number of times I have noted them down —a very different matter. The frequency with which a particular symptom is noted depends very largely upon whether or not the investigator has been on the look-out for that symptom; and this, again, is determined by a previous knowledge of the symptoms which are apt to occur, and knowledge in the present instance is, unfortunately, limited, owing to the scanty literature on the subject. It is, moreover, at the best, very difficult to obtain accurate information from the class of people (chiefly hospital patients) upon whom I have had to depend for my data, and with so many considerations tending to vitiate the evidence I have gathered, I should not here analyse the cases were it not that I may thereby help others who may wish to work on the same subject.

A *vicarious menstrual flow* was noted in three cases. *Leucorrhœa* was also mentioned in three.

Pain other than headache or backache was noted in thirty cases. The most common pains were those peculiar to ordinary menstruation. Such were described as 'forcing' or 'bearing down,' or as 'sharp, cutting' pains in the stomach.

In five or six cases they were undoubtedly dyspeptic; in two or three, doubtfully so, as when the pain occurred in the right hypochondrium. In one case the patient complained of 'pains all over.'

In seven cases the pains involved the legs, as so frequently happens in connection with the menstrual flux. In two of these there was well-marked cramp. Thus:

Æt. 50. Five years since cessation of the flux. Every month has internal pains like labour pains. Also pains in the calves, accompanied by a 'doubling up' of the toes. Sometimes the fingers are similarly doubled up. The former, but not the latter, symptom used to occur with ordinary menstruation. There is also vertical headache—as if some one were beating her head with a hammer—and soreness of the scalp.

Æt. 52. No flux for $1\frac{1}{3}$ year. At the monthly times still feels pain in the calves of the legs and back of the thighs (as was her wont during the menstrual flux), and "the back of the foot is bent on to the leg" (?) She used, during menstruation, to suffer from coldness in the calves, but not, as now, from contraction.

The following cases may also be quoted here:

Æt. 45. Nothing for three years. Every month has pain in the right leg, which is permanently swollen. Has for years been able to foretell the approach of the epoch by this symptom. Also suffers every month from flushing, tightness of the chest, and general weakness.

Æt. 48. Nothing for three months. Every month has headache, pigmentation round the eyes, and drowsiness; also pain in the stomach, which seems cold; she feels as if she "had been beaten with a stick" round the lower abdomen and front of the thighs.

In the other cases in which pain was referred to the lower extremities, it was felt in the thighs only, either in front or behind, and in one case in the right thigh alone.

Backache was complained of in 26 cases. It frequently occurred in connection with some of the above pains, and in many instances was like that which was wont to herald or accompany ordinary menstruation.

Headache is probably a much more frequent attendant on the post-climacteric epochs than on ordinary menstruation, since I noted it in 31 out of the 125 cases—*i.e.*, in one-fourth of the total number. It is probably of the same nature in either case, and after the climacteric is, like the flushes to be presently alluded to, a legacy from that period. The typical climacteric headache is vertical, and accompanied by a feeling of weight and soreness. Some of the post-climacteric menstrual headaches were described as 'violent' and 'terrible;' in some instances the pain was of the nature of megrim; in a few it was distinctly neuralgic, being sharp and localised. The following case is interesting :—

Æt. 54. Nothing for six years. Has a headache every month. Suffered similarly during her menstrual epochs, the headache being then attended by an "eruption of small blisters, as in chicken-pox." No such eruption accompanies the headache now.

Stupor—Sleepiness.—Periodic post-climacteric headache is apt to be accompanied by other disagreeable feelings in the head, and these may occur monthly without the distinct headache. Thus, one patient suffered every month from 'lightness in the head;' another felt 'stupid and bewildered;' two or three simply complained of 'feeling stupid.' This should not surprise us, seeing that a stupefied condition is frequent during ordinary menstruation. Distinct sleepiness was noted in three cases, two of which are appended :—

Æt. (?) Post-climacteric. Every month feels heavy, dull, and sleepy. Flushes and has pains at the bottom of the back.

Æt. 52. Nothing for $3\frac{3}{4}$ years. Every month has pains in the back and thighs, and is very nervous. Suffers then also from sleepiness, as was her wont during her ordinary menstrual epochs.

Emotional Manifestations were noticed in 13 cases. The emotional alteration expressed itself, in most instances, as lowness of spirits, at all times one of the commonest manifestations of nervousness in women. This mental depression is generally most pronounced in the morning, and is usually associated with irritability of temper and a tendency to start at the slightest noise. In a woman, 58 years old, in whom the menstrual flux had ceased for eighteen years, a suicidal tendency manifested itself every month for the first ten years after cessation, disappearing then suddenly.

Nervousness was mentioned in four cases, but no doubt it occurred much more frequently. By 'nervousness' the patient generally means a tendency to start on the least occasion and to tremble. One woman "could not bear anything to move"; another "jumped at the slightest noise." Tremor was noted in four cases, but this number must fall far short of the actual number of times it occurred as a monthly manifestation.

Giddiness.—Special mention of 'giddiness' or 'dizziness' was made in 23 cases. It is a common climacteric symptom, and, like all such, is apt to occur as a post-climacteric menstrual manifestation. It may occur as part of some general nerve-storm, such as flushing, or independently.

Flushes were noted in 42 cases, or in one-third the total number. They sometimes accompany the ordinary menstrual epochs, but certainly not in this large proportion. We may therefore conclude that the post-climacteric menstrual flushes are handed down from the climacteric. I have treated of flushes at length elsewhere, and there is therefore no need to say anything more about them here.

Indigestion was mentioned in 18 cases, the most frequent symptoms noted being nausea (in ten cases) and flatulence (in three cases). One case of monthly diarrhœa was noted. I feel convinced that many of the bouts of nervous dyspepsia which women complain of after the climacteric are determined by the post-climacteric epochs. In the two following cases dyspeptic pain was pronounced :—

Æt. 59. Flux disappeared ten years ago. Can generally detect the time of the periods by a pain between the shoulders, "as if the joints were being parted." Has pain also in the right side of the chest, and abdominal distension.

Æt. 46. Nothing for one year. Has violent gastralgia every month. Suffers also at these times from tremor and mental depression.

Pigmentation.—During ordinary menstruation pigment is often deposited round the eyes. A disposition to this was noticed in four of my cases of post-climacteric manifestations.

Asthenopia.—There was evidence of monthly asthenopia in at least two cases. This symptom is known to be common at the climacteric, occurring in the majority of women of the poorer classes. It must be carefully distinguished from presbyopia. The latter is permanent, and continues to increase from year to year. The former is temporary only.

Pruritus.—Irritation of the skin was mentioned in three cases; some doubt, however, attaches to two of them. This symptom, like so many of those above mentioned, is also not uncommon at the climacteric. It is generally, I think, urticarial.

The following cases cannot well be classified under special heads. They are of interest, showing as they do—what has already been frequently insisted upon—that menstruation involves all the bodily processes.

Æt. 43. Nothing four years. Has lupus on the face. This breaks out every month, healing in the intervals. She has noticed this chiefly since the change.

Æt. 56. Nothing twelve years. Purpuric spots come out every month, though in a less degree than formerly.

Æt. 59. Nothing seven years. Has a chronic open abscess. This gets worse every month.

Æt. 54. Nothing three years. Suffers from rheumatism. The pains in the joints are worse every month.

Æt. 49. Nothing $4\frac{1}{2}$ years. Has pains in the joints every month.

Æt. 49. Nothing three years. Suffers from incontinence of urine every month.

Æt. 61. Nothing fifteen years. Every month, for four or five years after the cessation of the flux, the varicose veins in the left leg used to swell.

Æt. 57. Nothing nine years. Every month cough comes on, causing her to feel as if she were going to be choked.

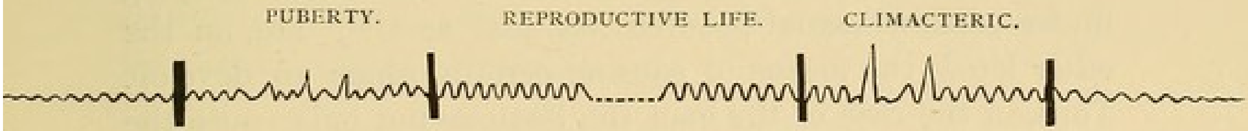
Æt. 50. Nothing twelve years. Every month has rawness on the chest, with cough.

Æt. 48. Nothing nine years. Suffers every month from cough and profuse expectoration.

We are now in a position to take a wider view of menstruation than that usually accepted. We have seen that it is continuous throughout the whole of reproductive life; that it does not cease with the climacteric, but continues, certainly in some women, and possibly in all, till the end of life; and that it may begin with the beginning of life and continue throughout ante-pubertal life. Hence we may, provisionally at least, regard the human female as a monthly-pulsating organism, the pulsation beginning with life and continuing till death.

This view of menstruation may be diagrammatically represented as follows:

Fig. 16.



In the next chapter I shall proceed to enlarge our conception of menstruation still further.

CHAPTER XX.

IS THE MENSTRUAL RHYTHM PECULIAR TO THE FEMALE SEX?

WHETHER or not the male sex passes through a menstrual rhythm, similar to that of the female, it is not yet possible to say. The question, though well worthy of investigation, has, so far as I know, never received it. Each sex, as Darwin was so careful to insist, contains many of the potentialities of the opposite sex, which potentialities become actualities upon the removal of the ovaries or testicles; clearly, therefore, these organs are the means of keeping under certain sexual peculiarities, just as they are, on the other hand, the means of causing certain others to develop. Thus, in the case of the man, the testicles not only cause the development of certain masculine characters, but prevent certain feminine characters from developing. Now the fact that each sex is to a large extent potentially the opposite sex, raises the question whether the male sex may not, like the female, pass through a menstrual rhythm, not so marked indeed as that characteristic of the woman, but though of a subdued, yet of a similar kind.

To this suggestion it will no doubt be replied that menstruation is ultimately dependent upon the presence of ovaries—seeing that, although the monthly flux generally continues after the removal of the ovaries in reproductive life, it never appears if they are removed in early life, thus showing that these organs are necessary to its development. But these remarks, be it noted, apply only to menstruation, as ordinarily understood, and not to that wider conception of the process as a continuous monthly cycle, whereof ovulation and hæmorrhagic flux are but incidents.

I now proceed to cite a few passages I have met with in favour of the view that the man, like the woman, passes through a monthly cycle.

The first case is quoted from Brierre de Boismont. I give it for what it is worth.

"A young man, says Hoin, had an ulcer on his index-finger which broke out anew every month. The origin was this. The finger had been slightly wounded, and while it was in this condition, the young man made a vaginal examination during a menstrual period. As a result there appeared on the finger a vesicle, and then a pustule, which subsequently healed. The same phenomenon occurred every month. Lordat argues from this case that the tendency to pass through periodical changes may be transmitted by contact "(!) (Brierre de Boismont, "De la Menstruation," p. 136).

Gall saw a certain resemblance between the hæmorrhoidal and the menstrual flux. The following case is interesting in this connection :

"G. C. *æt.* 45, entered the Hôtel Dieu under Dupuytren for an infirmity common in his family. His grandfather and his brother had had hæmorrhoids ; and his son had commenced to suffer from them at the age of 19. The flux, which at first occurred at very irregular intervals, became periodical. C. became subject to a veritable menstruation, which occurred regularly every month. It lasted two or three days, and was heralded by many symptoms, such as general malaise and painful swelling of the hæmorrhoids."

I am acquainted with a case very similar to the above. The patient had for more than twenty years experienced a monthly hæmorrhoidal flux, preceded by distinct symptoms ; and, what is most remarkable, at the age of 60 he experienced several of the symptoms characteristic of the climacteric in women, the flux becoming irregular for some months. This case is more fully described elsewhere.[1]

Chopart cites the curious case of a soldier, *æt.* 19, who had a monthly discharge of bloody urine, accompanied by all the symptoms characteristic of the menstrual flux. Rayer mentions two similar cases, one of a butcher at Sedan, "whose infirmity becoming known, inspired such just disgust that no one would purchase meat from him."[2]

With the view of ascertaining the experience of other members of the profession on this subject, I wrote the following letter to the *Lancet :*

SIRS,—The possibility of men undergoing a monthly rhythm similar to that which women undergo is worth considering. I suggest the following as a provisional hypothesis : Both sexes of the human species pass through a monthly rhythm, which begins in the embryo, and continues till death. There is no need to state here the grounds on which I have framed this hypothesis. That a monthly rhythm occurs in woman independently of so-called menstruation is manifest ; for such a rhythm is easily detected during pregnancy and lactation, and after the climacteric. But does any similar rhythm occur in the male sex, or in girls before puberty ?

I am anxious to obtain information bearing upon this question, and venture to ask if any of your readers will give me the advantage of their experience. I may remark that a careful study of the periodicities of disease, notably of periodical neuroses and hæmorrhages, seems to me most likely to throw light on the question.

In reply, Mr. Duke, of St. Thomas's Hospital, and Mr. M. E. Paul, of the London Hospital, both sufferers from migraine, kindly gave me their personal experience in the matter. One of these gentlemen was of opinion that his attacks occurred every month if he was under considerable mental strain, but he was sure that "the rhythm was upset by any such disturbing cause as a slight attack of typhoid."

[1] "Flushing and Morbid Blushing," p. 110.

[2] Russell Reynolds, "System of Medicine," article by William Roberts, vol. v. p. 457.

During a subsequent six months he kept a record of his megrim phenomena; they were then, however, very irregular, both in character and in time.

The other wrote:—"I am very subject to migraine, which is a family neurosis. Some time ago, when I was working unusually hard, the attacks became more severe and more frequent than usual, and I thought it would be worth while to chronicle the dates, in order to see whether they, as I suspected, corresponded to the menstrual periods." The following are the dates of the attacks as chronicled by him:—

Intervals.				
—	...	August 27, 1888	...	moderate
21	...	September 17, 1888	...	moderate
29	...	October 16, 1888	...	moderate
43	...	November 28, 1888	...	extremely severe
17	...	December 15, 1888	...	moderate
25	...	January 9, 1889	...	severe
27	...	February 5, 1889	...	moderate
26	...	March 3, 1889	...	moderate
24	...	March 27, 1889	...	very mild
15	...	April 11, 1889	...	very severe
27	...	May 8, 1889	...	very severe
19	...	May 27, 1889	...	mild
26	...	June 16, 1889 / June 22, 1889	...	mild, lasted six days
18	...	July 10, 1889	...	very mild
25	...	August 4, 1889	...	severe

I do not think there is evidence of regular periodicity in this case. I have met with two or three migrainous patients who have thought they have detected a monthly periodicity in their attacks, but mere impressions are of no scientific value.

Dr. Koster made a study, extending over many years, of the periodicities manifested by the insane. He observed the periodicities in mania, melancholia, epilepsy, and other forms of recurrent insanity, and claims to have detected regular intervals even in chronic insanity. He affirms that the length of the intervals, as measured by days, is generally divisible by seven, and that this is true of male as well as female patients. Koster's observations bear out Laycock's view that the monthly cycle is made up of four minor cycles, and they at least suggest that the man may pass through a monthly cycle similar to that of the woman.[1] In this connection, I may mention the case of a gentleman (one of the migrainous cases quoted) who had an attack of urticaria on three successive Tuesdays, and may further refer the reader to a study of periodical psychoses by E. Mendel.

The possibility of the man's experiencing a monthly rhythm naturally raises the question whether he, like the woman, passes through a climacteric. On this I can say nothing. Sir Henry Halford has described a condition which he terms the climacteric disease, occurring in men between fifty and seventy-five years of age,[3] but he draws no analogy between this and the climacteric of women.

If the view be accepted that the man, like the woman, passes through a monthly cycle, we may still further enlarge our conception of menstruation. We may regard the human being—both male and female—as the subject of a monthly pulsation which begins with the beginning of life, and continues till death; and menstruation, as ordinarily understood, *i.e.*, the monthly flux (and monthly ovulation ?) —as a reproductive function which has, in the case of the human female, become engrafted accidentally, so to speak, upon this primordial rhythm.

[1] "Ueber die Gesetze der Periodischen Irreseins und Verwandter, Nervenzustände," von D. Koster, Bonn, 1882.

[2] *Allgemeine Zeitschrift f. Psychiatrie*, Bd. xliv. Heft 6, S. 617, 664.

[3] "Essays and Orations," London, 1831.

PART III.

PSYCHO-PHYSIOLOGICAL.

CHAPTER I.

THE FEELINGS—THE INTELLECT.

"SCARCELY can we name a morbid affection in which some feeling or function of the mind is not concurrently engaged. No physician can rightly fulfil his duties without an adequate knowledge of, and constant regard to, these important relations." Thus writes Sir Henry Holland,[1] and his remarks apply with particular force to disorders of the nervous system, for in it take place those physical changes which underlie the phenomena of mind, and in the functional disorders of the nervous system the mind is accordingly very apt to become involved. A knowledge of certain psycho-physiological facts is, then, essential to the physician, but it is above all necessary to him in the study of the differences in nervous organisation of man and woman. I therefore devote a considerable portion of this work to the subject.

Mind is divided by modern philosophers into the Feelings, the Intellect, and the Will. In this chapter we shall chiefly consider the Feelings, touching only very briefly on the subject of the Intellect. The Will can be more conveniently treated of in a separate chapter.

The Feelings consist of the simple sensations, as sight,

[1] "Medical Notes and Reflections," by Henry Holland, F.R.S. London, 1852.

touch, taste, the sense of repletion; and of those more complex sensations called emotions. The Intellect, or the thinking part of mind, embraces the relations of feelings to one another. It is, be it noted, something quite distinct from mere feeling; theoretically, an individual may be capable of a vast number of different sensations and yet quite incapable of thought. In order to think, the mind must be able (1) to reproduce sensations, and (2) to detect, (*a*) likeness, (*b*) unlikeness, between them. Consciousness of resemblance between sensations; consciousness of their differences; retentiveness of them; these are the three attributes of intellect. We can conceive of an individual capable of experiencing an infinite number of sensations, and yet quite powerless to recall them, or to recognise their resemblances and differences. Such an one would be the creature of the moment; for him there would be no past and no future. And in truth he could be ranked as an 'individual' only in the corporeal sense—as possessing, that is, an individual body; mental individuality there would be none, no 'ego' capable of recognising a series of mental states as belonging to itself. We may liken such an individual to a colony of unicellular organisms each of which, we will suppose, is capable of sensation, but lives for a moment only. Viewed as a whole, the colony would experience a number of sensations, but they would be disconnected, there would be no mental individuality of the whole colony, no power capable of unifying the various sensations under one ego—no intellect.

In order that the successive mental states which run parallel with certain physical changes in the cortex shall thus be unified, the mind must manifestly be capable of memory. This, it must be observed, includes two of the three intellectual attributes—to wit, the power of calling up past mental states (=retentiveness), and the further power of recognising them when called up, of detecting, that is to say, likeness between the present and the past (=consciousness of resemblance). Let us not confound these two. The planetary systems in the course of their revolutions are continually reproducing past physical states; moreover, the seed or egg grows into the likeness of the parent forms. Now granting, as all the most enlightened psychologists now do, that the same mental state is always accompanied by a corresponding physical state of the cortex, we have no difficulty in explaining the mere reproduction of a past mental state or series of mental states. If a planetary system is capable of reproducing past physical states, why not the molecules of the brain? And if the physical state of the brain is reproduced, so too must be the mental state corresponding to it. I have little doubt that the reproduction in each case falls under the same laws. But the mere reproduction of a past physical state and corresponding mental state is not memory,[1] for memory includes the power of recognising that the mental state (or states) thus re-induced has (or have) been before experienced by the individual; there must be a consciousness of similarity between the present and the past. The insane individual often fails to assimilate the two; he sees a face he has often seen before, but does not recognise it; he has no consciousness of agreement between the present and the past. Similarly, in the incoherent thought of the maniac, we may be quite sure that past mental states are being continually re-induced, though only partially recognised, and therefore imperfectly remembered.

Wherefore it is evident that without retentiveness and without consciousness of resemblance thought is impossible.

[1] Sir James Paget speaks of the memory of the body as distinguished from that of the mind. The tissue constituting a scar has, according to him, a memory, for the healthy tissue which has been converted into scar tissue preserves its altered state till the end of life, and the like is true of the blood which has been modified by a specific fever. But neither of these examples is an instance of memory in the proper sense. True memory implies the re-induction of a past state, and in the instances given there is no such re-induction, but simply a permanent alteration. Of course a permanent alteration of ganglionic structure underlies true memory—only in this way can the re-induction of a past state become possible, but there is an essential difference between the permanent alteration in virtue of which re-induction becomes possible, and the re-induction itself.

A moment's reflection will make it also evident that consciousness of unlikeness among sensations is further necessary to thought, for without it all sensations would appear the same.

We see therefore that, setting aside the consideration of the Will for the present (and Will, as we shall find, introduces no new elements), mind consists of simple sensations and of a power capable of bringing these otherwise disconnected sensations under the cognition of one ego, this power—the intellect, as it is termed—resolving itself into three separate functions. Although perhaps not strictly allowable, we shall find it conduce to clearness of conception if we regard the intellect as an independent entity, capable of cognising, of arranging, and of re-arranging the various sensations, somewhat in the same way as a builder does his bricks, mortar, and other building materials. We may in this sense speak of the sensations as the *materials of thought*.

Seeing, then, what an important part sensations play in the phenomena of mind, it is necessary for us at the outset to inquire into the physical conditions which underlie them.

The entire body, if we except such semi-vitalised tissues as cartilage, is furnished with sensory nerves. These nerves pass upwards, to end in the sensory ganglia of the cortex, the ganglia collectively constituting what we may term, for convenience, the sensorium.[1] They are divided

[1] In his "Physiology of Mind" (1876) Maudsley places the sensorium commune — a term of his own coining — below the cerebral cortex. Similarly, Carpenter, Spencer, and others, writing at a period when we were almost totally ignorant of the functions of the different portions of the brain, regarded certain masses of grey matter situated below the hemispheres as sensory. In the light of more recent physiology, however, there can be no doubt that the sensorium, or nervous material constituting the physical substratum of sensation, is situated in the cortex. On removal of the cerebral hemispheres, all vertebrates but the very highest remain capable of many and complex co-ordinate movements. Not only can they walk, fly, swim, as the case may be, but they even avoid obstacles in their path ; a fish will turn aside from an object in front of it,

by Herbert Spencer into the *epiperipheral*—those which originate in the skin, the special sense-organs, and the voluntary muscles; and the *entoperipheral*—those which have their origin in the various internal organs.

These two systems of sensory nerves are so fashioned at their peripheries as to respond readily to appropriate stimuli.

a frog will jump over an obstruction in its way. (In these instances the sight reflex system responds to reflected ether-waves.) Hence such animals when decapitated have been thought to possess a conscious intelligence, the existence of consciousness in them being also suggested by the fact that they manifest, when further injured, all the outward signs of pain. There can be little question, however, that these muscular actions are essentially reflex, and independent of consciousness. It is open of course to any one to assert that the grey matter at the base of the brain, or indeed the tissues of the body generally, are endowed with consciousness, but a little reflection will show that such consciousness (if it can be so termed correctly) is very different from the consciousness belonging to the ego. In order to continuous consciousness, intellect is, as we have seen, necessary: without it sensations must be disconnected. Now the unifying of such isolated sensations—the bringing them together under one ego—takes place almost certainly in the cortex cerebri (and cerebelli). Therefore, whether other parts of the body do or do not possess the capacity for consciousness, they cannot, being destitute of intellect, have any continuous consciousness like that belonging to the ego. And we may, I think, be quite certain that in hemi-anæsthesia, resulting from a lesion of the posterior third of the hind limb of the internal capsule, the side destitute of sensation is not only destitute of it so far as the ego is concerned, but is incapable of itself suffering pain when injured. These considerations relieve us from the terrible conclusion which might otherwise force itself upon us, that our bodies are capable of suffering, unknown to ourselves!

Because the cortex contains the structures which unify the several sensations into the ego, it does not follow that those animals which are destitute of a cerebral cortex possess no such unifying structure, and that they are therefore destitute of an ego, unconscious, *i.e.*, in the ordinary sense of the word. It is probable that with every successive development of higher nervous structures, occurring in the course of evolution, these unifying structures are pushed higher and higher up, so that they always occupy the supreme portion of the nervous system.

Among the writers who maintain that consciousness accompanies the activities of other parts of the nervous system than the cortex cerebri, are H. Lewes, Herzen, and Cleland. Thus Lewes taught that after division of a nerve the part of the body supplied by the peripheral portion of that nerve had an independent consciousness of its own. Similarly, Herzen

Thus the optic nerves expand into the retinæ, structures capable of being excited by certain of the ether-waves; the olfactory nerves, into the so-called Schneiderian membrane, capable of responding to the stimuli of odoriferous substances; the cutaneous nerves, into certain end-organs which are responsive to less subtle contact, as well as to the delicate stimulus of heat rays; while the sensory nerves of the muscles and of the viscera terminate in ways fitting them to respond to yet other forms of stimuli, such as pressure and chemical irritation.

Hence the sensorium, with its sensory nerves and nerve-endings, is made up of a number of separate and more or less independent systems: the sight, touch, olfactory, heart, lung, hepatic, gastric, generative, and other systems.

By the action of forces striking upon the exterior of the body, and of others operating from within, molecular vibrations, or 'nerve impulses,' are made to travel up the sensory nerves, and to impinge upon the sensorial ganglia.[1] These are driven into a peculiar molecular perturbation, and thereupon a sensation forces itself upon consciousness. All sensations arise in this way. It should be noted, in passing,

maintained that consciousness belonged to the spinal cord, and Professor Cleland, that the "seat" of consciousness may "extend along the nerves." C. Mercier rightly protests against our speaking of the "seat" of consciousness, and of consciousness being a "function" of nervous activity (see *Journal of Mental Science*, vol. xxix. p. 501).

For myself I consider the views of Hughlings Jackson as to the physical substratum of consciousness the most philosophical yet put forth. This physician regards the nervous system as made up of various affero-efferent centres arranged in different levels, each higher level having evolved out of the one immediately below it, and the *highest affero-efferent level constituting the physical substratum of consciousness.* Note that according to this view the efferent or motor ganglia in the highest level, as well as the afferent, or, as some would say, sensory ganglia, form the material substratum of consciousuess.

[1] 'Sensorial ganglia.' This is a convenient term, but the reader must be careful not to confound *sensorial* with *sensori.* The ganglia which constitute the physical substratum of consciousness, or, as we may conveniently term them, the 'sensorial' ganglia, probably consist of the highest sensori-motor (=affero-efferent) ganglia.

that of the several agents which by thus acting upon the sensory nerve-endings induce consciousness, we can know nothing directly, for they are outside consciousness. We are apt to assume that all the sensations which are referred to external objects have a corresponding objective (concrete) reality—that so, independently of mind, they exist as they appear to us: that light, for instance, exists outside ourselves as a certain *brightness.* But brightness is a sensation, and no more exists independently of us than does the taste of salt. Ether-waves striking against the retinæ give rise to the sensation of light; salt applied to the palate gives rise to the sensation of taste. This truth, which the slightest reflection will render manifest, is further brought home to us by the fact that there is no undeviating correspondence between the external agent and the resulting consciousness. It is probable that no two individuals are affected in exactly the same way by the same agent. A mass of matter which seems heavy to a child, to a man appears light; a taste or smell pleasant to one individual is nauseous to another. We shudder at the mire in which the swine revels; we pity the beasts for their low instincts; but who shall say that those smells and tastes which delight us are not loathsome to them, and that, had they the necessary intelligence, they would not condemn what to them seem our disgusting proclivities?

The manner in which forces acting upon sensory nerve-endings excite the different sensations may be rendered more easy of conception by analogy. Each sensory system, consisting of its central ganglia, nerves, and nerve-endings, may be likened to some one class of instruments in an orchestra—the sight sensory system, say, to the violins, the touch sensory system to the flutes, and so forth, the forces acting upon the nerve-endings being represented by the players. During waking hours it is as though the full band were playing, the sensorium being then vibrated from every direction; during dreamless sleep the instruments have become dumb, for though the players are still at work—though, that is, the impulses still stream in from many directions—the conditions necessary to consciousness do not obtain, no sensation is produced.

Let us suppose a healthy individual, who has been thoroughly refreshed by food and rest, to be strolling in the country on a sunny summer's morning. The orchestra—to continue our analogy—will be playing a full harmony; the retinæ will be stimulated by the diffused light and by the light reflected from the objects around; the Schneiderian membrane, by odoriferous impalpable substances, wafted from the trees and flowers; the auditory nerves, by the atmosphere set a-trembling by many different forms of animal life, by the rustle of the trees, the grass, the corn; the nerves of the skin, by the heat vibrations emanating from the sun, by the contact of the clothes, and by the gentle breeze. Further, the healthy action of the muscles and motor ganglia, with their stores of pent-up energy, of the heart pumping the blood through the body, of the lungs stimulated by the invigorating air, of the digestive organs busy with their normal functions, will all add their quota to the sum of the sensations yielded by the sensorium—all will help to swell the harmonious chords. The individual in question may not be able to resolve the harmony into its several constituents, any more than one who is unskilled in the art may be able to analyse a chord of music. The analysis can only be effected by observing each factor separately, by successively directing the mental eye, that is, to different points of the mental horizon; otherwise there is but a dim consciousness of separate and independent sensations.

The vague, undefined sensations derived from the viscera (heart, lungs, and so forth), from the muscles, and from the general surface of the skin, constitute the feeling of well-being, or the reverse. It is said that an individual ought not to be conscious that he has a body; by which it is meant that the bodily functions should be carried on so easily and harmoniously that the attendant sensations shall not obtrude themselves upon the mental eye. When the heart is felt to beat, or there is obtrusive consciousness of sensation in the abdomen, there is abnormal action. This same truth is implied in the vulgarism, "I have a head on me" (when intended to indicate a headache), the implication being, of course, that the individual should not be continually and poignantly conscious of the fact.

But although the healthy individual does not at every moment precisely realise his many bodily feelings, it would be a mistake to suppose that during his conscious life he is ever entirely without them. Were it possible suddenly to paralyse some of the bodily sensations—the visceral, for instance—there would at once be a great void in his consciousness: it would be as though the subdued and voluminous accompaniment to which the melody (=thought) is set were struck out of the band. The ego, in fact, at any one moment is made up of thoughts, of emotions (which, as we shall presently see, are the feelings attendant upon thought), and of bodily feelings, the two latter constituting the background of the former. Thus, a narrow stream of clear ideas flows in the midst of an ocean of consciousness, which, as it expands outwards, becomes vaguer and vaguer, until it is gradually lost in the realm of unconsciousness.

CHAPTER II.

THE PRIMORDIAL UNIT OF CONSCIOUSNESS—THE COMPOUNDING OF THIS INTO SENSATIONS—AND OF SENSATIONS INTO PERCEPTIONS AND CONCEPTIONS—THE COMPARATIVE INTELLECTUALITY OF THE VARIOUS SENSATIONS.

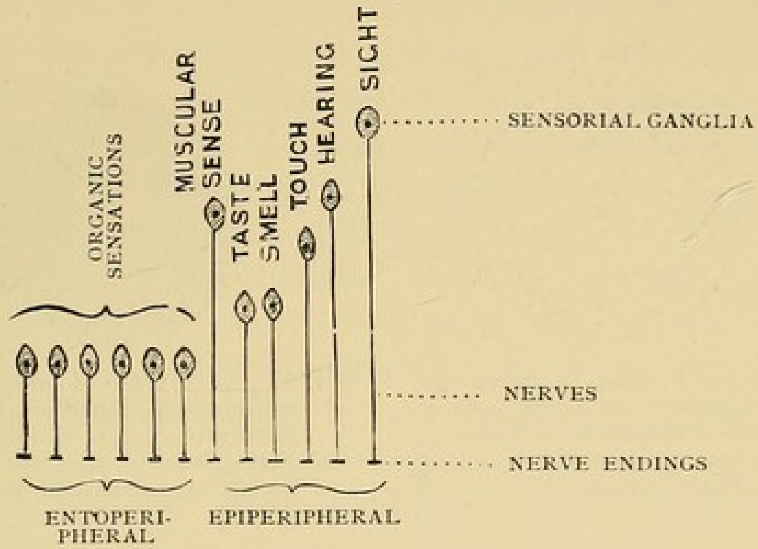
HAVING inquired into the genesis of sensation, we must now consider how the several sensations belonging to the mind can be termed the materials of thought.

All our ideas are built up of sensations. What the atom is to the material universe, what the letter is to the language, what a single vibration of the atmosphere is in music —such is sensation in the domain of mind. We may arrange the various sensory systems in a scale according to the intellectuality of the sensations belonging to them—according to the part which each plays in the processes of thought— the intellectual value in every case being readily determined by the extent to which the sensation possesses the three several attributes of the intellect: how far, namely, it is capable of being reproduced, and of being contrasted with, or likened to, others. Applying these tests, we may arrange the scale as in Fig. 17:[1]—

[1] The muscular sensations are divided into the purely organic, such as pain, and the intellectual, those, viz., which are generally referred to under the muscular sense. By these we gauge the extent of a voluntary contraction. The organic muscular sensations are certainly peripherally excited, but whether the more intellectual muscular sense is also, or whether it is centrally initiated, is not yet determined.

The epiperipheral sensations are far more intellectual than the entoperipheral or organic. Taking the most intellectual system of sensation, that of sight, and comparing

FIG. 17.



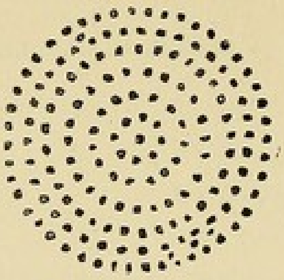
it with any visceral system of sensation, that connected with the alimentary canal, for instance, we find, in the first place, that the former sensations are capable of being readily and vividly recalled; the latter, only with great difficulty, if at all. We moreover find that the former are mapped out into a vast number of separate sensations, sharply limiting one another both in time and space, and capable of being cognised as like or unlike, and of combining and recombining in an infinite number of different ways; whereas the latter are not only not thus sharply limited in space and time, but they are also not mapped out into definite and clear-cut sensations, and therefore when modifications occur these are only vaguely cognised as like and unlike. Herbert Spencer expresses this difference by saying that the "relational element" is great in the one case, small in the other. With regard to sight sensations, he writes:[1] "The multitudinous states of consciousness yielded by vision are above all others sharp in their mutual limitations. . . . . Some of the feelings *simulta-*

[1] "Principles of Psychology," vol. i. pp. 169, 170.

neously limit one another,[1] and some with equal distinctness *successively* limit one another."[2]

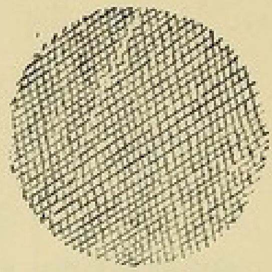
These differences between the intellectual and the non-intellectual sensory systems may be diagrammatically repre-presented as follows :—

FIG. 18.



Relations in space of *intellectual* sensations—*e.g.*, sight. *Simultaneous* limitations of a number of separate sensations (=sharp limitation in space).

FIG. 19.



Relations in space of *organic* sensations—*e.g.*, repletion. *Diffused feeling*—*i.e.*, no simultaneous limitations of separate sensations (=no sharp limitation in space).

FIG. 20.

Relations in time of sight sensations. Interrupted feeling—*i.e.*, *successive* limitations of separate sensations, each sensation beginning and ending sharply.

FIG. 21.

Relations in time of organic sensations. *Continuous feeling*—*i.e.*, no successive limitations of separate sensations.

Thus the organic sensations are sluggish and diffused—we might almost say amorphous; unlike the intellectual, they cannot rapidly combine with other sensations (whether of the same or of different sensory systems) so as to constitute thought; they merely form a blurred background of sensation on which thought is, as it were, impressed.

[1] *I.e.*, they have definite relations in space. When we look at a wide panorama those limitations of individual sensations caused by the rays of light reflected from different objects, and the focussing of the rays upon the retina, are to be reckoned by the thousand.

[2] *I.e.*, they have definite relations in time, that is to say, each sight sensation is clearly mapped off from the following one. The relation in time is, however, much more definite in the case of sound than of sight.

Now we shall find that in proportion as a sense is intellectual, in that proportion is the element of *feeling* in it small. So small, indeed, is it in the most intellectual sensations, that some philosophers have thought that these consist of states of consciousness quite distinct from feeling. There can be no doubt, however, that there is no essential difference between the most and the least intellectual sensation in this respect; it is merely a difference in degree, and this difference in degree is, as we shall now see, only what we might from the nature of the case expect.

The intensity of the stimulus being the same, the quantity or mass of feeling is in direct proportion to the extent of peripheral expansion stimulated. Thus the element of feeling in sight-sensation is necessarily small, owing to the limited area of the retinal expansions, and in this connection it must be remembered that only a part of the limited area of each retina is fitted to receive distinct impressions—to wit, the yellow spot. The same remarks apply to the other intellectual sensations—those of sound, smell, taste, touch. (In regard to the latter, it is hardly necessary to remind the reader that it is only limited portions of the skin which subserve intellectual touch-sensations—viz., the tips of the fingers.)

The non-intellectual sensations, on the other hand, result from the stimulation of a large area of peripheral nerve-expansion. Instance the feeling of warmth or of repletion; in the one case a large surface of skin, in the other an extensive area of mucous membrane, is stimulated.

The explanation of these facts is not far to seek. If only a few nerve-fibres are vibrated, the quantity of feeling induced is of necessity small, just as is the quantity of sound when only a few violin strings are struck; and as when the number of the strings is multiplied the volume of sound swells, so too when thousands and tens of thousands of nerve-fibres are vibrated does the quantity of feeling correspondingly increase. But of course there may be *acute* feeling from agitation of a limited area; an intense, as distinguished from a massive, feeling. When, for instance, a small portion of any peripheral expanse is violently stimulated, as the retina by the full blaze of a tropical sun, or the gall-duct by the passage of a stone, there is intense but not massive feeling, just as there is intense but not massive sound produced by the violent scraping of a single violin string. Wherefore the element of feeling may be predominant in a limited area of sensory expanse if only the stimulus be sufficiently violent.

That the degree of feeling in those intellectual sensations which constitute the materials of thought is necessarily small, might be established on *à priori* grounds. In the first place, the intellectual sensory systems are, as we have just noticed, incapable of yielding a large mass of feeling, owing to the small size of their peripheries; and, in the second place, were they at any one moment to yield all the mass of feeling of which they are capable, thought would be impossible. To make this more clear, let us again take the most intellectual sensory system—sight. How is it possible to get rapid compoundings and recompoundings of vibrations (corresponding to the compoundings and recompoundings of sensations entering into thought processes) when the entire sight-sensorial area is vibrating? Yet this will be necessary in order to obtain anything approaching to a fulness of sight-feeling. When an individual looks intently at the unclouded sun, he experiences the largest possible quantity of sight-feeling, and consequently he will not, as Herbert Spencer observes, be able to call up any pictures of the past; for, since mental pictures are reproduced by a repetition, on a fainter scale, of those cortical processes which occurred when the objects of the picture were actually beheld, and since in this instance all the sight-centres are in a state of active vibration, these latter can no more take on those past states necessary to the recall of a picture, than can a harp give music when all its strings are struck together. It therefore follows that when the sensations yielded by an intellectual sensory system approach to any degree of *massiveness,* they can no longer subserve an intellectual process.

It is also clear that when intellectual sensations are *intense* they are powerless as thought factors. We have seen that an intense feeling is generally due to the violent stimulation of a limited area. Now all the peripheral expansions of the intellectual sensory systems are limited in area, so that a violent stimulation of the entire peripheral expanse of any one of them would lead to intensity of feeling—*e.g.*, a strong light, a powerful smell, a loud noise, and as matter of fact, our knowledge of intense intellectual sensations is practically confined to those induced by the stimulation of each entire peripheral expanse. In these cases the central vibrations are, owing to the intricate connections of the central ganglia, not limited to the ganglia belonging to any one system, but affect a large proportion, and perhaps even all of them. Were, however, such a central limitation possible, then, in all probability, the unaffected ganglia would be capable of taking on those vibrations necessary to thought.

The stimulation, on the other hand, of an extensive non-intellectual sensory area, though causing a large quantity of feeling, does not necessarily interfere with thought. If gentle, it but produces a kind of background for thought; but if the perturbation be violent, the intellectual processes may be decidedly affected, as in the acute feelings connected with dyspepsia, or the more violent emotions. Further, if only a small area of a non-intellectual centre be acutely agitated, thought may go on unimpeded. Thus, during intense organic pain—*e.g.*, toothache—the thinking powers may be exceedingly active; but when the feeling is both massive and acute, thought becomes difficult, probably because the intellectual senses are sympathetically involved in the perturbation.[1]

I have several times alluded to the compounding and recompounding of sensations which take place in thought,

[1] On the relation between feeling and thought, see Herbert Spencer, *op. cit.*, vol. i. §§ 209–211. The author here considers the relation from a merely psychological standpoint.

but there are good grounds for believing that, just as the different chemical atoms are themselves compounded of a primordial unit of matter, so likewise are the different sensations compounded of a primordial unit of consciousness, "and that all the unlikenesses among our feelings result from unlike modes of integration of this ultimate unit."[1] The ultimate unit itself, Mr. Spencer believes to be "something of the same order as that which we call a nervous shock."[2]

By the compounding of sensations, perceptions and conceptions are formed. The following table illustrates their relation to one another :—

Simple nerve-shock, or ultimate unit of consciousness

Sensation

Perception Conception

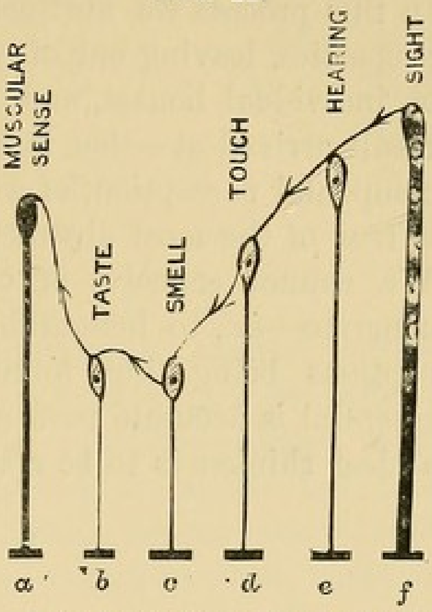
Perception.—Whether we regard sensations as the ultimate units of consciousness, or as themselves compounded of one primordial unit, there can be no doubt that all our perceptions are compounded of sensation—that sensation is the unit of perception. When an individual experiences a sensation, but does not consciously refer it to some part of his body, or to the external world, he is said to be in a purely

[1] Herbert Spencer, *op. cit.*, vol. i. § 60.

[2] There can be little doubt that the different sound sensations are all compounded of a common unit of consciousness. If a body be struck at a rate not exceeding sixteen times a second, a number of individual noises or shocks are heard ; but if the rate of percussion exceed this number, the separate shocks are merged into a continuous state of consciousness. This continuous consciousness undergoes a gradual alteration as the rate of percussion is increased, the sound altering in 'pitch,' as we say, and it may still further be modified by the induction of secondary fainter nerve shocks, thus altering in 'timbre.' We have therefore, argues Spencer, distinct evidence that the different simple sound sensations—sensations apparently undecomposable—are in reality caused by the compounding in various ways of this ultimate unit of consciousness. The author then proceeds to argue with much force that all sensations are analogously compounded.

subjective state; he is then, so far as that sensation is concerned, unconscious of any external world; but directly the sensation becomes objective—*i.e.*, is referred to the world outside himself—he is said to perceive it. A perception may arise from a simple sensation, as when we hear the note of a tuning-fork; or it may be compounded of several individual sensations. Thus, when we perceive an orange, our perception is made up of certain sight sensations caused by the direct stimulation of the sight centres *plus* a number of other sensations which, by virtue of the retentive power of the mind, cluster round these primary ones—viz., taste, odour, resistance—all of which we know by past experience to belong to the orange. Wherefore we may say that a compound perception consists of a chord of sensations (see Fig. 22). But it is a chord played as an *arpeggio*; the various sensations do not blend into one; each stands out more or less prominently, and passes rapidly across the mental field, just as do the several compound notes of a musical chord when rapidly struck in succession. What is true of an actual perception is also true of a remembered perception or image.

FIG. 22.



This figure shows the mode in which the sensorium is agitated in the perception of an orange. The notes struck are *a*, *b*, *c*, *d*, *f*; *f*, represented broader than the others, is actually struck (by the ether waves); *a*, *b*, *c*, *d* are not agitated by external agents, but are secondarily vibrated from *f*; the fainter agitation being represented by the lighter lines used; *a* is both actually and ideally excited.[1]

[1] The active contraction of the irides and ciliary muscles plays a considerable part in enabling us to judge of the size and distance of the orange. The sensations thus yielded belong to the muscular sense, and whether they be of central or peripheral origin, it is clear that they will, in the case in point, be actual, not ideal. Therefore I have drawn *a* somewhat broader than *b*, *c*, and *d*. All those muscular sensations, however, from which our knowledge of solidity is largely derived, will be ideal (= remembered). Therefore, as stated above, *a* is both actually and ideally excited.

Conception.—Conceptions, in like manner, are compounded of sensations. When we look at a particular house we have a 'perception' of it, and when we remember it we are said to have an image of it; but when the mind takes cognisance, not of one, but of all houses, then we form a 'conception.' In this process we abstract from all houses their common properties, leaving out of view distinguishing characteristics of individual houses, and it is therefore manifest that the result arrived at—that is, the conception—consists, like the compound perception, of a chord of sensations. The same is true of the most abstract conceptions, as honour, justice. We cannot conceive of these except in reference to the concrete—*i.e.*, to honourable action, fair dealing. All conceptions being thus founded on perception, we see how essential is accurate perception to clear conception. To be a clear thinker is to be a careful observer.

CHAPTER III.

THE EMOTIONS.

THUS far we have dealt with sensations excited epiperipherally and entoperipherally. We have now to consider the 'centrally initiated' feelings or emotions—those which result, not from mere peripheral stimulation, but from initiatory intellectual processes. Pride, anger, sorrow, come essentially under this head.[1] The emotions thus centrally initiated are, like perceptions and conceptions, compounded of simple sensations.

Widely different views are held regarding the nature of the feelings which constitute the emotions. Some authorities maintain that there is nothing specific in them, that they are simply the feelings of pleasure and of pain attendant on different trains of thought; that the emotion of benevolence, for instance, is neither more nor less than a simple feeling of pleasure attending the contemplation of a benevolent act,[2] and that neither has any further specific character. There are others who go so far as to assert, on the other hand, that emotions are as many and as various as ideas.

We have seen that all our conceptions and perceptions (except the most simple) are chords of sensations, but that such intellectual sensations, in consequence of their being limited in mass, and lacking intensity, may not be recog-

[1] Some of the emotions are highly complex; instance the feeling of love. *Vide* H. Spencer, "The Principles of Psychology," vol. i. p. 487.

[2] Maudsley, "Physiology of Mind," 1879, p. 360.

nised as such. The element of *feeling* being apparently absent from them, they are apt to be regarded as quite distinct from and independent of intellect. This element is in some intellectual processes more pronounced than in others. We have little difficulty in recognising it in the perception of a brilliant autumnal landscape: wherefore the artist speaks of the "feeling for"—form and colour. It is less easy to detect the element of feeling involved in the actual working out of a knotty mathematical problem apart from the secondary feelings, such as interest, excited by it. Nevertheless, in no intellectual process is it entirely absent, and we may follow Maudsley in regarding every idea as accompanied by a greater or less amount of feeling.

The feelings which actually enter into and constitute the materials of thought must, however, be distinguished from those superadded feelings which are called the emotions. The latter may be divided into two classes:[1] (1) those feelings which are not distinctly referred to different parts of the body; (2) those which are. To the first class the expression 'feelings of the mind' appropriately applies. In the emotion of pride the 'mental' feeling is the chief—perhaps the sole—element; whereas in a violent outburst of anger the bodily element is predominant, the whole body, even to the tips of the fingers, being in some cases permeated by feeling. In all the most intellectual emotions—*e.g.*, those connected with right doing, those, namely, which cannot occur except in relation to a complex train of thought—the element of bodily feeling is comparatively small; but in the less intellectual emotions, as gloom or joy, it is very pronounced. In some cases we can detach, as it were, the intellectual from the bodily element in the feeling. "A

[1] There are many difficulties in the way of classifying the emotions. The following is a psychological classification :—

1. The personal emotions: those that have sole reference to the individual who experiences them.

2. The sympathetic emotions: those evoked by the contemplation of the sufferings and emotions of others.

3. The highly complex feelings termed sentiments, such as the love of truth, beauty, virtue, liberty.

painful emotion," says Bain,[1] "may be deprived of its pain"[1] (=feeling of the mind), "and yet leave us in a state of excitement" (which is very largely a bodily feeling), "and still oftener, a pleasurable emotion may cease as delight, but not as feeling." Similarly, a person may, after suddenly waking from a perturbing dream, find his whole body full, as it were, of emotional excitement, while he is quite unable to correctly interpret the feeling. The intellectual has been severed from the mere bodily element.

When we say that a person is emotional, we do not mean that he is capable of a large variety of emotions, but rather that his emotions are more full of feeling—that the feelings entering into them are either more massive or more acute—than in an unemotional individual. In all such cases it will be found that the feelings are very largely referred to the body—to the skin, and above all to the viscera—and therefore the emotions must take their origin in the sensory centres pertaining to these parts. This indeed follows from what has been said as to the nature of a massive feeling. Massive feeling can only originate in the agitation of a large sensorial area, and such an area is afforded by the sensorial centres belonging to the general surface of the body, and to the capacious viscera.

Although the emotionality of an individual depends upon the mass, and still more upon the intensity, of the feelings entering into the emotions, a highly intellectual man may, as Bain observes, have strong emotions without "being possessed of them to the same degree as one of feeble intellect," his self-control being greater. I believe, however, that the quantity of the feeling is probably, and the intensity certainly, not in these cases so great as in the case of those possessing less control, for when an emotion has been starved, or, by long self-discipline, become obedient to the will, it tends to atrophy. A beautiful landscape, or the reading of good poetry, could in Darwin's latter days excite no glow of æsthetic emotion,

[1] "Mental and Moral Science," p. 217. London, 1881.

although in youth he was distinctly susceptible to their influence.

Inasmuch as the visceral feelings occupy such a large place in the emotions, it is possible that the various viscera exert, through their sensory nerves, specific influences upon the emotional nature; and in fact attempts have been made to discover these several influences by observing the effects produced upon the mind when one or another viscus is diseased. Here, however, a manifest difficulty presents itself, for we cannot easily determine how much of the observed emotional state is due to the excitation of the afferent visceral nerves, and how much to the effect, on the sensorium, of blood altered by the visceral disorder.

This raises a question of some interest. If the visceral feelings enter so largely into the emotions, is it not probable that—other things being equal—the emotionality of the individual will be in direct proportion to the extent of his visceral feeling? Now woman, being endowed with a more complex and extensive generative system than man, necessarily possesses a relatively larger visceral nerve expansion, and hence the quantity of visceral feeling will be greater in her than in man. It has been now definitely shown that during pregnancy a growth of the peripheral sensory system belonging to the generative organs takes place; and it is clear that such development must of itself tend to increase the mere organic feeling, and thus, if the above view be correct, to augment the emotionality at this period; but such peripheral growth can only play a minor part in causing the emotional exaltation at this time.

I do not purpose here to locate the various bodily feelings which enter into the emotions. It is, however, worth while pointing out that the emotional feelings referable to the thorax are said[1] to be experienced more on the left than on the right. The left side of the thorax is a most interesting region to us. Many nerve-storms take their origin in the sensorial region proper to this part, in that which we may term the vagal sensorial region. Thus, the aura of the

[1] *Journal of Psychological Medicine*, 1852, p. 224.

epileptic and hysterical fit often rises here, as well as many minor nerve-storms, passing up to the left side of the chest to the throat, and there stopping, or else continuing its course to the head. When a flush starts in the chest it sometimes involves the left side only. In only one case, and that exceptional in many particulars, have I known it to involve the right side only.

We have seen that the emotions are intimately bound up with the intellect, being provoked rather by thought than by peripheral irritation, and that we may therefore, with Spencer, regard them as being " centrally initiated." They may, nevertheless, undoubtedly be excited by peripheral irritation; for since peripheral irritation may set up a definite train of thought (as when impressions are made upon the special sense-organs) any emotions following on the thought thus raised are in a sense peripherally initiated, in spite of the intervention of an intellectual process between the peripheral irritation and the emotion. In some cases, however, there is no such intervention. No doubt, very highly evolved emotions—as, for instance, those called forth by a stirring poem—are always secondary to thought; but it is not necessarily so with the more simple and coarser emotions, and especially not with those which are largely constituted of bodily feeling, such as brute anger and fear. These may occur independently of any previous intellectual process. Thus, bodily pain may excite an outburst of anger, and a joyful or a gloomy mood come over us without our knowing the reason why. At puberty, moreover, vague and obscure emotions come into being, which are certainly antecedent to any intellectual processes, for the individual may be quite ignorant of their meaning. They are in some degree due to peripheral impressions ascending from the organs of generation, but also (and we must not, as Maudsley appears to do, neglect this fact) to a contemporaneous central development. The whole sensory generative system undergoes development at this period. To use our former figure, not only is an extended keyboard (an increased peripheral expanse) added to the system, but an additional series of strings (development of sensorial ganglia) as well; wherefore a fresh series of chords may now be struck, and a fuller harmony obtained.

That despondency may arise primarily—*i.e.*, without any previous intellectual process—is well known to the physician. The woman whose nervous system is weak is very apt to suffer from low spirits, and she will then burst out into fits of crying without any obvious cause; when thus debilitated she is also very irritable and prone to violent outbreaks of anger. This same irritability—this proneness to anger—is sometimes amusingly shown in gout, when the patient will, as it were, be on the look-out for some object on which to vent his wrath, much as a hungry man seeks by eating to appease his appetite. Doubtless in many cases the paroxysm of rage is excited by a thought, but certainly not invariably.

I do not purpose to treat in any detail of the influence upon the emotions of the general visceral disorders: I shall merely touch very briefly upon those exerted by the generative organs and the digestive system.

Conditions of the generative organs are certainly most potent in this respect, and of these none more so than menstrual irregularity. Provided menstruation be regular, a person may suffer from ovarian cyst, uterine fibroid, or any of the graver disorders of the sexual system, without any emotional disturbance whatever; on the other hand, the slightest menstrual disturbance is apt to be accompanied by disordered emotion, and serious disturbance almost always is. In these cases it is, however, difficult to determine whether emotional alteration is solely due to irregularities in the flux, or whether such irregularities, and the attendant emotional state, are not both the results of an abnormal state of the nervous system. That mere irregularity in the flux itself plays some part in the production of the emotional and other symptoms accompanying it, I have no doubt, the effects being probably due to disordered vaso-motor action.

As regards the influence of the digestive organs upon the emotions we may instance the various forms of dyspepsia. The forms of dyspepsia, but especially those which are attended by flatulence, or which involve the liver, have been known from ancient times to be frequently accompanied by mental depression. " Why is it," forcibly asks R. W. Burnet,[1] "that patients with flatulent distension of the colon are utterly dejected, while one with lumbago is howling every time he moves, and then laughing with himself for crying out ? " The explanation probably lies in the fact that the visceral sensations enter more largely into the emotion of gloom than the sensations belonging to muscles and ligaments ; it is, however, not unlikely that some of the emotional effect in these cases is due to the circulation of vitiated blood in the sensorium.

Disease is essentially a process of dissolution, and in this dissolution[2] characters belonging to a past ancestral age are frequently revealed, the individual in fact reverting. The emotions which occur as symptoms of disease are therefore, as we should expect, for the most part of a primitive kind. Thus we frequently find emotions like fear and anger, which we have in common with the brutes, accompanying the slighter disorders of the nervous system. In this connection one calls to mind the condition of a hungry man jaded with a hard day's work ; until refreshed by food and drink he is apt to be irritable, to break out wrathfully, and this irritability is no doubt related to the savageness of the hungry animal, a condition of mind often necessary to the successful struggle for food. The more complex emotions of vanity and love of power belong to a higher phase of evolution ; but even they are comparatively rudimentary, neither being possessed in a high degree by the finest intellects ; albeit, the thirst for fame has been described as " the last infirmity of noble minds." Like all the cruder emotions, they are essentially egoistic, they have no relation to the happiness or well-being of

[1] *Lancet*, vol. ii. 1880, p. 931.

[2] " Causation of Disease," chap. xii. part i.

others. Now, a predominance of egoism is a marked characteristic of that era in evolution when the social organism was primitive, when men but faintly recognised their moral obligations, and when therefore selfish emotions were all-powerful. The man of inferior intellectual power is incapable of being modest, for modesty assumes a capacity for abstraction of no mean order, the capacity to adequately gauge one's own littleness; and thus we find the highest intellect going hand in hand with the deepest humility. That love of power is a very primitive emotion is shown by the fact that it is most pronounced in savage man. Boys also have an instinctive tendency to bully at school, the access of joy they experience in overcoming one weaker than themselves being the love of power in its rudimentary form; it is only as individual evolution proceeds that the tendency distinctly atrophies. Since, then, vanity and the cruder emotions arising out of the sense of power are clearly comparatively primitive emotions, we may expect to see them—by a process of reversion—manifested in diseases of the nervous system. The former is, as we know, ludicrously developed in general paralysis of the insane, and is frequently met with in other forms of insanity; it is also probably a common accompaniment of hysteria.

These considerations lead to the conclusion that all the characteristic emotions of disease are essentially egoistic, and the conclusion is borne out by fact. The egoism of the hypochondriac is, as we have already noticed, proverbial; on his mental stage the patient himself plays the leading part. In insanity the non-egoistic or altruistic emotions may be observed to disappear in the inverse order of their evolution, leaving the wretched victim absorbed in self, a stranger to all those finer emotions which bind man to man.

The mental dissolution observable in disorders of the nervous system may not only manifest itself by the exaggeration of some particular emotion or emotions, but also by a general exaltation of the emotional being, for in primitive man, as in the child, the emotional side of mind is strong. As evolution proceeds, the emotions come more under control. In our own country a marked change in this respect has taken place even within recent years; the literature of the last century, and of the early portion of the present, represents men and women as giving way to passionate feeling much more readily than they do now. Similarly, the influence of rhetoric in exciting emotion is less than formerly. It was remarked, when the Parnell Commission was sitting, that the audience of Sir Charles Russell was far less impressionable than that of Burke and Sheridan in an earlier great State trial. Self-control has come to be regarded as a *sine quâ non* of good breeding.

The emotional capacity varies in different individuals; not only are women as a class more emotional than men, but the various races of man differ widely in this respect, and there are, moreover, individual differences irrespective of either sex or race. Some there are ever ready to be stirred into emotion, while others are habitually stolid and unimpressionable. Further, the same individual differs from time to time. Most people are liable to occasional irritability of temper, and he is indeed fortunate who is always in good spirits. This variability in emotionality is most marked in the child; his moods vary from moment to moment, tears and laughter rapidly alternating; in the adult they are more stable, but in nervousness they tend to become unstable, the individual reverting to the condition obtaining not only in his own childhood, but in the childhood of his race.

That the emotional side of our being depends primarily upon inherited constitution there can be no doubt, but much also depends upon education. The native Irishman is far more emotional than the Irishman born and bred in this country. The like is true of the French. A French lady who had married an English officer became so reserved in manner that whenever she travelled in France she was taken for an Englishwoman.

CHAPTER IV.

INFLUENCE OF THE FEELINGS ON THE THOUGHTS—PLEASURABLE AND PAINFUL FEELINGS.

It is here advisable to consider briefly the influence of the feelings on the thoughts. Simple sensations do not exert a marked effect on the current of thought ; if painful, and especially if acutely painful, or of long duration, they tend to interrupt a steady train of reasoning, but in a healthy individual they have little influence in this respect. With the nervous, and notably with the hypochondriacal, however, any simple sensation is wont to attract, and even absorb, the attention.

The emotions influence thought much more powerfully. Secondary to thought, for the most part, in origin, an emotion, no matter what its source, has a tendency to excite a chain of thought in harmony with itself: in sorrow the thoughts run in mournful grooves: in joy they turn upon pleasant topics. It is, indeed, very difficult, while under strong emotion, to direct the thoughts from the object exciting it, and, be it noted, an outburst of emotion differs from a sensation in that it persists some time after the exciting cause has been removed. The prick of a pin causes only momentary pain, but the anger which that same prick may provoke continues after the pain has subsided. Not only have the emotions, therefore, a stronger influence over the thoughts than the simple sensations, but their influence is of longer duration.

Inasmuch as a train of thought calls forth its appropriate emotions, and an emotion excites its appropriate train of thought, it follows that an emotion and the thought consequent on it tend each to perpetuate the other—a fact of some therapeutical importance.

Feelings, whether they consist of simple sensations or of emotions, observe in their development a regular sequence of rise, culmination, and decline. After an outburst of emotion or a paroxysm of pain the nervous centres underlying these feelings are for a time incapacitated from taking on the physical state necessary to a repetition of the manifestation. Such temporary incapacity is observed after all violent nervous actions, after all the so-called nerve-storms. In neuralgia it may last a few minutes only, in megrim several weeks. "After a storm comes a calm"; and just as the lightning destroys the conditions that gave it birth, so likewise does the explosion of nerve-centres destroy the conditions necessary to such explosion. There follows a period of rest, during which the centres recoup themselves for a subsequent explosion; and inasmuch as the period necessary to this tends in each case to be the same, the explosion often recurs rhythmically.

Hitherto we have divided the feelings into the simple sensations and the emotions. They may also be divided into the pleasurable and the painful, for though some no doubt are negative in character—*i.e.*, neither the one nor the other; we may set these aside as unimportant. Pleasure and pain are the two great springs of conscious action, the one prompting to the performance, the other to the avoidance, of those acts which produce it. Individuals vary greatly in their capacities for either; some are undoubtedly much more susceptible to pain than others, and probably such are also much more responsive to pleasurable excitement. Certain primitive peoples, for instance, mutilate themselves without apparent suffering, but in such cases the body is no doubt rendered temporarily insentient by the influence of the mind. This varying capacity for pleasure and pain subserves, as we shall see in the next chapter, an important physiological purpose. I have not been able to determine whether men or women are the more susceptible to pain, but probably the latter. And yet women would appear to bear pain better than men. "We all know," writes Sir Edward Sieveking, "the fortitude exhibited by those who, though more fragile in form and constitution, appear, in times demanding a moral effort, to bear pain better than the sons of Adam; and yet these sons, using their prerogative of power, have made it a by-word to bear pain like a woman. It would almost seem as if she were trained, by the many minor aches she is subject to, to the endurance of great suffering; they certainly contribute not a little towards rendering her the sympathising comforter, whose very look is a healing balm in the dark day of weariness and pain." [1] Here let me observe how important it is to distinguish between susceptibility to pain and the power to bear it, and that since we cannot in any given instance measure the intensity of a pain, we can seldom, or never, rightly speak of one person bearing pain better than another. An operation which may cause very slight pain to one, may in another give rise to excruciating agony.[2]

[1] *Medical Times and Gazette*, 1854, p. 157.

[2] "A wolf or a fox," writes Mr. Romanes, "will sustain the severest kinds of physical suffering without giving utterance to a sound, while a dog will scream when any one accidentally treads upon its toes. This contrast is strikingly analogous to that which obtains between savage and civilised man; the North American Indian, and even the Hindoo, will endure without a moan an amount of physical pain—or, at least, bodily injury—which would produce vehement expressions of suffering from a European. And doubtless the explanation is in both cases the same—namely, that refinement of life engenders refinement of nervous organisation, which renders nervous lesions more intolerable" ("Animal Intelligence," p. 486). Mr. C. Lloyd Morgan, however, points out, in reference to this passage, that the "American Indian and the Hindoo have a stoic ideal, which does not influence the average European. On the other hand, the dog, from his association with man, has learnt more and more to give expression to his feelings in barks, whines, and yelpings. To howl at every little pain would do a wolf no good, but rather advertise him to his enemies" ("Animal Life and Intelligence," p. 402). None can doubt that there is much force in these arguments. Nevertheless, it is equally certain that individuals differ vastly in their sensitiveness to pain. I have heard a

Our chief duty as physicians is to interpret pain, in whatsoever shape, whether it be mere discomfort, or acute agony, of the body, or some painful feeling of the mind,[1] the latter usually far the more agonising of the two—"sharper than a serpent's tooth." "Every pain," says Hilton,[2] "has its distinct and pregnant signification, if we will but carefully search for it." Sometimes the search is a most difficult one, for a pain in one part may indicate disease in quite another, and, moreover, very many pains even to this day have not been correctly interpreted, *e.g.*, the infra-mammary pain. Space, however, will not permit of an adequate consideration of it here, and I must therefore refer the reader to other works, notably to Hilton's "Rest and Pain," and to an excellent article by Dr. Ross in the tenth number of *Brain*.

Much of human unhappiness is due to a discordant mental environment, and it is the moral rather than the medical adviser who must deal with it; still, the duty of the physician often trenches upon that of the divine. The goal of each is the production of happiness; each therefore ultimately has to do with mind. To us falls primarily the duty of keeping the body healthy, and the feelings connected with it pleasurable, but we have also to influence the mind of our patient in other ways; besides attacking it indirectly through the body, we must attack it directly by communion of mind with mind, by moral suasion. Although no examination is held in this branch of therapeutics and no gold medal conferred, it is nevertheless one of the most important, and certainly one of the most

man declare that he enjoyed having his teeth stopped; and most people must know how much less sensitive to pain is the navvy than those engaged in indoor occupations. In regard to the capacity of the Fakir to endure violent pain, I venture to suggest that it would be more accurate to speak of his capacity to render his body insentient. It is not that he bears the pain with fortitude, but rather that by an effort of will he annuls the sensibility of his centres.

[1] "Human happiness," observes Bain, "must ever be the point of convergence of all the sciences."

[2] "Rest and Pain."

difficult, branches of curative medicine. And for this reason in order to be a good physician it is above all necessary to be in sympathy with the patient. Nothing will so surely lead to a wise treatment as sympathy, and especially is this needed in the various functional disorders of the nervous system. The notion that the patient has nothing the matter with him is fatal to all interest in the case, and consequently to the proper understanding of it; for these insidious forms of disease demand that close and sympathetic attention which only real interest will excite. Let me not be misunderstood. I do not mean that the physician should take upon himself all the burden of his patient's miseries—such a course would defeat its own ends—but simply that he should recognise in him a human being like himself, and actually suffering; not regard him as a more or less troublesome 'case.' Nor do I wish to advocate a maudlin sympathy: that will only make the hysteric patient ten times worse, and it certainly will not better the condition of the less depraved class of neurotics. Among poor, hard-working married women, to many of whom life is one long struggle, hysteria is, in my experience, a rare disorder, but most of them—practically all of them—suffer at some time or another from serious nervousness. At such times a kind word, even a kind tone of voice, is sometimes sufficient to cause an outburst of tears, a result obviously most undesirable, for besides the physical exhaustion that may follow, there is also the danger of injury to the self-respect of the patient whose control has momentarily given way before a stranger; and thus the physician, while letting his real interest in the case be felt, has to exercise a wise discretion in his expression of it.

CHAPTER V.

THE FEELINGS CONSIDERED AS ACTIVE FORCES—THE PHYSICAL SUBSTRATUM OF CONSCIOUSNESS.

In the last chapters we dealt with the genesis of the feelings. These we divided into simple sensations, and into sensations compounded into emotions. We saw, moreover, that sensations enter largely into intellectual processes, even the most abstract conceptions being really compounded of them, though the quantity of feeling contained in these is so small as to escape attention.

In this and the following chapters we shall consider the feelings as active forces; in their capacity, namely, to effect change in different parts of the body—in the muscles, glands, and other structures. The primary and essential purpose of every mental operation is some action upon the body; or, as Goethe has it, "the end of all thought is action," mind having evolved for the purpose of placing the animal organism in harmony with its environment, of enabling it to shape its external course in accordance with ever-changing and increasingly complex surroundings.

In considering the different modes in which mind affects body, it is necessary to have clear notions as to what constitutes the physical basis, or 'anatomical substratum' of mind. We have to ask, In what part of the body do those changes occur which are the physical accompaniments of mind? Evidence from many sides converges to the conclusion that, with every series of mental states, there runs a parallel physical series. Now the question has naturally been asked, Is either series the cause of the other? Does the mental series cause the physical series, as spiritualism assumes, or the physical the mental, as the materialist asserts? To which the reply is—neither. Our only safe course is to regard the two series as two different sides of the same thing (the monistic hypothesis), and therefore, it will be obviously incorrect to speak of the influence of the mind upon the body, for this would imply that the non-material acts upon the material. We must rather speak of the influence of the physical correlations of mind upon the body.[1] Accommodating our nomenclature, then, to this view, where do these physical correlatives occur, and how are they able to affect the body? It is quite clear that 'the anatomical substratum of mind' is placed in very direct and definite connections with various parts of the body, since many regions are affected, and in manifold definite ways, during different mental states. Thus the muscles are

[1] The monistic hypothesis, as above stated, assumes that the physical correlation of consciousness (the neuroses of Huxley) and the conscious manifestations themselves (psychoses) are different aspects of the same thing, like the convex and concave sides of a curved surface. If such is the case, it would appear to follow that inanimate matter is endowed with consciousness, a supposition that is derided by the opponents of the monistic theory, and indeed the notion that the food we eat is conscious and supplies the psychical ingredients of each ego is sufficiently startling. But, as pointed out by C. Lloyd Morgan in his masterly chapter on mental evolution ("Animal Life and Intelligence," p. 464), the monistic theory does not imply the existence of consciousness—as we understand the word—in connection with inanimate nature. This lucid thinker assumes a noumenon—*i.e.*, a something behind all phenomena. Phenomena are manifestations of this noumenon and are of two orders, the *kinetic* and the *metakinetic*. *Kinesis* is a manifestation of physical energy, *metakinesis* a mental manifestation. The one never occurs without the other: every kinetic change is accompanied by a metakinetic change. Parallel with the evolution of neural kinesis (in animal organisms) there has been an evolution of metakinesis, but it is only when a certain stage of evolution has been reached that metakinesis attains to the dignity of consciousness as we understand it. Nevertheless, the metakinesis of inanimate matter is essentially of the same nature as the metakinesis of a Shakespeare's brain. Morgan sums up his view as follows:—He assumes "first, that there is a noumenal system of 'things in themselves' of which all phenomena,

definitely influenced by the *will*, the viscera and blood-vessels by the *emotions;* and it is well known that any one part of the body may be distinctly affected by concentrating the attention—by fixing the mental eye, so to say, upon it.

Hitherto the best answer to this question has been given by Hughlings Jackson. It is consonant with the principles laid down by our great philosopher, Herbert Spencer, and it enables us to explain satisfactorily the mode in which mind (or, as we must say, its physical correlative) is able to act upon the body.

Hughlings Jackson regards the nervous system as made up of different levels. Each level consists of sensory and motor centres—*i.e.*, of centres which receive impulses from below, and centres which transmit impulses down towards the periphery; thus the nervous system consists of a series of sensori-motor arcs. The lowest arcs consist of the lowest centres and of the ordinary afferent and efferent nerves; the next higher arcs, of the next higher centres and of fibres passing up to them from the lowest centres, and down again to the same; and so on to the highest arcs. Thus each of the higher levels is evolved out of the one next below it, and is capable of producing all the changes in the lower level, plus something more. It *is* the lower level 'raised to a higher power'; so that stimulation of each higher level produces increasingly complex results.

Now the lowest level of all is directly evolved out of the non-nervous tissues or 'parts of the body.' The sensory nerve-ending, the sensory (or afferent) nerve-fibre, the cell or cells directly connected therewith in the cord, the motor, (or efferent) nerve-fibre, the motor end-plate, and the muscle

whether kinetic or metakinetic, are manifestations. Secondly, that whenever in the curve of noumenal sequences kinetic manifestations (convexities) appear, there appear also concomitant metakinetic manifestations (concavities). Thirdly, that when kinetic manifestations assume the integrated and co-ordinated complexity of the nerve-processes in certain ganglia of the human brain, the metakinetic manifestations assume the integrated and co-ordinated complexity of human consciousness. Fourthly, that what is called 'mental evolution' is the metakinetic aspect of what is called brain or inter-neural evolution" (*Ibid.* p. 470).

fibre *constitute one continuous strand of protoplasm.* It is now known that every active cell in the body (=all the body cells except those of the semi-vitalised connective tissues) receives a nerve-twig. Hence a complex organism may from one point of view be regarded as a highly complicated nervous system, at the efferent periphery of which are attached so many non-nervous cells, the protoplasm of which, however, is directly continuous with the nervous tissue. The sensory, or afferent nerves are, moreover, abundantly distributed throughout the body, and place the non-nervous parts of the body in afferent connection with the lowest level of centres. Wherefore it is evident that the lowest level of nerve-centres is in very direct connection with the parts of the body, and capable of effecting profound changes therein. In the language of Hughlings Jackson, this lowest level 'represents' indirectly (though most nearly directly) the parts of the body; and each higher level, having evolved out of the level next below, represents those parts with increasing indirectness, the highest level of all representing them most indirectly; from which it is further evident that this highest level also is (ultimately) evolved out of the parts of the body, and in direct protoplasmic connection therewith.

It is this *highest level of sensory and motor centres which constitutes the material substratum of mind;* and therefore it is manifest that those nervous agitations which are the physical correlatives of mentation are capable of affecting in many and diverse ways all the parts of the body. Thus we are able, in a manner, to explain 'how mind acts upon body.'

Be it observed that the terms 'sensory' and 'motor' here signify afferent and efferent. The physical changes which underlie mentation are not, according to Hughlings Jackson, confined to the highest sensory (afferent) centres alone, as the writings of modern experimental physiologists would seem to imply, but occur in the highest motor (efferent) centres also, and this contention of Jackson is certainly justified *à priori.* With which observation I dismiss the subject.

It is probable that during ordinary calm and easy mentation the nervous agitation is confined to the highest sensori-motor level; but that with intenser mentation (as in strong emotion, or in an act of will, or while 'thinking aloud,') there is a correspondingly intenser agitation of this level, and a consequent overflow of nerve-force from it, or rather from the highest motor ganglia of it, into the motor ganglia of the lower levels and thence to the periphery; in which case the mentation is accompanied by distinct bodily manifestations. Thus, if we accept Jackson's hypothesis, it is clear that we have at our disposal a means by which we may localise the anatomical substratum of mind, or, to put it more accurately, by which we may indicate the nervous arrangements implicated in the different kinds of mentation. We have merely to observe the physical accompaniments of each form of mentation, and the physical correlatives of each form must involve those nervous arrangements of the highest levels which represent the parts of the body involved in the manifestation. Instance an emotion—say, the emotion of anger. We observe the cast of the features, the attitude of the body, the visceral and vascular changes (both of which are profound), and we conclude that the physical correlatives of that emotion involve nervous arrangements in the highest level representing the blood-vessels, viscera, and certain muscles. In calm and equable emotion, when the nervous agitation is practically confined to the highest level, no bodily manifestations occur.

In a similar manner we may indicate the nervous arrangements involved in reasoning. Whatever be the truth in regard to the simplest forms,[1] there can be no doubt that a

[1] That the simple forms of reasoning may be carried on without the use of words is proved by the fact that dumb animals are capable of them, but, unlike certain well-known writers, I have no doubt that even complex reasoning may be independent of language. Certainly an individual can frequently see his way to a conclusion without formulating in language, spoken or unspoken, the several links of the reasoning. It may, however, be argued that he could do not do this without having first learnt language, and that the use of words is unconsciously involved in the process.

continuous and complex train of reasoning is impossible without the use of words. What, then, are the nervous arrangements involved in the purely intellectual process of reasoning, or in any form of complex *thought?* They are those which represent the parts involved in language—those nervous arrangements of the highest level, sufficiently strong agitation of which leads to the thinking or speaking of the words expressive of the thought. Some people habitually speak their thoughts aloud, and almost every one must have observed the tendency to the half-suppressed action of the articulatory muscles during thought, especially during concentrated thought. In such cases there is an overflow from the nervous arrangements in the higher levels which does not occur in calm and easy mentation.

A fact strongly supporting Jackson's hypothesis is the tendency of an idea to act itself out. I wish to lay particular stress upon this point, because it enables us to give a rational explanation of the action of the will and of the nervous arrangements implicated therein. The tendency alluded to is shown in many ways. Thus an individual looking over a cliff frequently has the act of precipitation so forcibly suggested to him, that self-restraint is necessary to prevent him from throwing himself over; and if he be weak-willed he may be powerless to resist the impulse. Similarly, in watching the approach of a train, the idea of crossing the line when it is close at hand is apt to occur to the mind, and may prompt the act. Instances like these show that the *idea of the act is the act potentially;* in other words, that the idea involves those nervous arrangements of the highest level which would be engaged in the realisation of the idea. "The tendency of the idea to become the action shows that the idea is already the fact in a weaker form. But if so, it must be performing the same nervous rounds, or occupying the same circles of the brain, in both states."[1] When the idea is not realised, the nervous agitation is comparatively weak and practically confined to the highest level; but when the idea is trans-

[1] "Mental and Moral Science," A. Bain, p. 90.

lated into the act, the agitation is sufficiently intense to communicate vibrations along the efferent strands to the subordinate motor centres, and so on to the muscles engaged in the performance of the act.

One further fact may be given in support of the view that the nervous structures constituting the physical basis of mind represent the entire body. It is well known that if a person direct his attention to a certain part of the body, he not only feels a sensation in that part, but (if the attention be sufficiently concentrated and enduring) experiences an actual change in it; from which it would seem that the act of attention involves an agitation of those nervous arrangements in the highest level which constitute the anatomical substratum of the sensation, and that impulses stream down from the agitated area to the part wherein the sensation is felt—that, in fact, the agitation of these centres (or nervous arrangements) constitutes the physical side of the act of attention, the act of attention on this supposition leading to first a sensation, and then to a dynamic change, in the part to which it is directed.

So much for the physical substratum of consciousness. The chief conclusion I have sought to press home is this: Every mental change tends to be accompanied by some change at the periphery, the physical series in the highest level which underlie the mental series constituting so many potential changes at the efferent periphery, or 'parts of the body.'

CHAPTER VI.

THE FEELINGS AS ACTIVE FORCES (*continued*)—SIMPLE MENTO-MOTOR ACTIONS.

It is an interesting fact that the nervous system, even in the most complex organisms, develops from the outer layer of the ovum, and thus we have, in the initial stage of development, an indication of the original function of that system—viz., the placing and maintaining of the organism in correspondence with its ever-changing environment.

In order to render this correspondence as perfect as possible, certain areas of sensitive nervous tissue become differentiated in the outer part of the organism, these areas being able, by reason of their extreme delicacy of structure, to respond more readily to changes in the environment than the undifferentiated portions, and thus the degree of correspondence is extended.

The nervous system has, of course, other functions. It has, in all complex organisms, to co-ordinate the activities of the several bodily parts, so that they shall act together in proper harmony ; nevertheless its chief, and indirectly its sole, function (since all the operations of the body ultimately work towards this one end), is to enable the organism to adapt itself to its environment.

Briefly, the nervous system performs this important function somewhat as follows : Impressions are made upon the sensory periphery by external agents, whereupon nervous impulses stream up to certain centres, and are reflected down again in such wise that the organism is adapted to the external conditions making the impressions. In some cases a mental change intervenes between the impression and the accommodation to it; in others there is no such intervention, but in either case the process belongs to the same type; and, indeed, the most complex mental process is traceable to such simple, unconscious reflex action. If we remember that the material substratum of mind is but the highest development of the nervous system, and if we keep before us the facts that the general mode by which the nervous system responds to changes in the environment is by reflex action, and that the nervous system is built up on the reflex type, we are led to the conclusion that those physical changes which underlie conscious action belong to the same type also. It would be very strange, as Jackson has urged, if the reflex type were departed from in those physical processes which underlie mentation; that is, if it were followed up to a certain point, and then abruptly relinquished just as the highest development is attained.

Sometimes those nervous impulses which stream down from the brain as the result of mentation, and effect a change at the periphery, cannot be *directly* traced to up-going impulses started at the periphery by external agents; in which case there is no complete reflex arc. In making the following classification, however, I shall assume that the efferent impulses always follow upon impulses ascending from the periphery :—

Classification of the different kinds of nervous action by which the non-nervous parts of the body (muscles, glands, &c.) are influenced.

<table>
<tr><td>Unconscious</td><td>1. Simple reflex action.</td><td></td><td rowspan="2">Involuntary Action.</td></tr>
<tr><td rowspan="2">Conscious</td><td>2. Simple mento-motor action.</td><td>a. Sensori-motor action.
b. Emotional action.
c. Simple ideo-motor action.</td></tr>
<tr><td colspan="3">3. Compound mento-motor, or Voluntary Action.</td></tr>
</table>

1. Simple reflex action. In this type of action a force acts upon an afferent nerve-ending, and, as a result, molecular vibrations pass up the nerve and strike upon a nerve-centre in the *lowest* level. This centre is agitated, and from it vibrations are at once sent down appropriate efferent nerves to the cells in which they terminate, causing therein some trophic change which manifests itself in muscular action, modification of secretion, or otherwise.

In the other two kinds of action a mental state intervenes between the afferent and efferent impulses.

2. Simple mento-motor action. The mental state intervening between the afferent and efferent impulses may consist of a sensation, an emotion, or an idea. These several mental states, or rather their physical correlatives, may cause definite changes at the periphery, so that we get—*a*, sensori-motor action; *b*, emotional action; *c*, simple ideo-motor action. These states may conveniently be termed 'mento-motor states,' constituting as they do the immediate precursors of all consciously performed acts. They do not constitute 'motives' to action in the ordinary sense of the term. I shall endeavour to show, as we proceed, how a so-called motive to action differs from a mento-motor state, the three varieties of which we must now consider separately.

a. Sensori-motor action, or action prompted by a simple sensation. In this a simple sensation intervenes between the afferent and efferent impulses, the result being quite as automatic as in simple reflex action. Thus, as the consequence of some irritation of the skin, efferent impulses may be sent down from the highest centres, causing the fingers to scratch the part. Such an act is purely sensori-motor. There may, of course, be a distinct idea of the act, in which case it would be, not sensori-motor, but ideo-motor; but it certainly may be performed without any such initial idea; and similarly, if the sensation be complicated by an emotion, *e.g.*, anger.

Many cases of purely sensori-motor action should perhaps be regarded as simple reflex actions accidentally complicated by a sensation, the movements not being effected by the highest, but by some lower level, and the agitation underlying the sensation in the highest level being confined to that level. But in other cases we may more properly regard the sensation (or rather the nervous changes in the highest level underlying it) as the cause of the movement at the periphery. As an example of such simple sensori-motor action the crouching attitude of animals, induced by the feeling of warmth, may be cited. Animals learn by experience to connect this attitude with the feeling, and by constant repetition "an adhesive growth takes place through which the feeling can afterwards command the movement." Similarly, the sensation of relish may be said to largely prompt the movements of mastication. Bain maintains that the association of certain feelings with certain movements plays an important part in the growth of the will. The mode in which certain feelings are able to command certain movements he explains by his law of self-conservation, according to which pleasurable feelings tend to hurry on the vital activities, painful feelings to depress them. If, by chance, a particular movement leads to a continuance of a pleasurable feeling—*e.g.*, the crouching attitude to the pleasurable feeling of warmth, or mastication to the sensation of relish—that movement, by a hurrying on of the general vital activities, will tend to be perpetuated, so that in course of time the "feeling is able to command the movement." And he argues in like manner in regard to painful sensations.

But although sensations are undoubtedly able to call up certain movements, which therefore are correctly spoken of as sensori-motor movements, yet many actions which one might at the first glance be inclined to designate sensori-motor, are on reflection seen to be in reality ideo-motor. Hunger, for example, prompts to definite movements, but these movements are not necessarily purely sensori-motor. The hunger of an infant incites to certain sucking movements which may no doubt be regarded as strictly sensori-motor; and the lifting of a morsel of food to the mouth by a hungry man may be equally so, provided it is done semiconsciously—*i.e.*, without any distinct idea of the act rising into consciousness. But hunger also prompts to movements far more complicated than these: it may lead to acts which require careful reflection, to acts involving, it may be, the highest powers of the intellect—to the manifold activities of legitimate bread-winning, to a carefully planned robbery, to rebellion. Though hunger is the prime mover in all these cases, it is clear that each individual movement in the several complicated series of movements to which it incites is far from being purely sensori-motor. The hunger constitutes a motive in the sense in which the word is ordinarily used—that is to say, an abiding mental state, which must be carefully distinguished from that series of simple mento-motor states which are the immediate mental precursors of each consciously performed act. These statements will be rendered plainer as we proceed.

b. Emotional action. In this form of action a more or less complicated emotion intervenes between the afferent and efferent impulses. Suppose an individual receives a blow. Impulses pass up from the periphery assailed, and, reaching the highest level, agitate therein certain nervous arrangements in such wise that a sensation of pain is referred to the part struck. This agitation is transmitted to other nervous arrangements in the same level—to those in which take place the physical correlatives of anger or fear, for instance; and, unlike the mere sensation of pain, the emotion thus induced tends to persist for some time, and to evoke certain appropriate movements, causing the individual probably to retaliate upon, or escape from, his assailant. Inasmuch as the emotion may continue after the sensation of pain has subsided, it is obviously the more effective motor-agent of the two. Of course many emotional acts, in common with acts prompted by simple sensations, are largely ideo-motor, a fact which I would emphasise. The individual under emotion may have, in fact, clear and definite ideas of what he is doing; the emotion constituting a background to a series of ideo-motor acts. But what I want to insist on here is, that movements prompted by strong feeling need not be in the slightest degree ideo-motor. This is manifestly true of the vaso-motor and visceral effects of emotion; but it is also true of the muscular effects. Thus the facial and general bodily expression of a particular emotion is certainly not ideo-motor; a man's face may become distorted by pain, or he may strike out madly in rage, without any distinct idea of how he looks or what he is doing, the actions being almost reflex.

It will be seen, then, that by an emotional action I mean one that is purely emotional—one in which ideation takes no part; and the emotion may in this sense be regarded as a simple mento-motor state.

Here we have an indication of the difference between those mento-motor states which are the immediate precursors of all consciously performed acts, and a 'motive' to action as ordinarily understood. An emotion such as anger or fear may, as we have just seen, constitute a simple mento-motor state, as may also a sensation such as hunger. But a sensation, and still more an emotion, may do more than this. It may constitute an abiding mental state, prompting to a highly complicated series of actions, the latter needing, in so far as they are consciously performed, a corresponding series of mento-motor states. (I say, in so far as they are consciously performed, since many of the *details* of acts which are in the main consciously performed are, to all intents and purposes, simply reflex; voluntary at first, they have eventually become automatic through long habit.) Now such an abiding feeling manifestly differs from the individual mento-motor states to which it gives rise: it constitutes a 'motive' or 'impulse' to action. The strongest impulses or motives are essentially made up of feeling; but, as we shall see in due course, they may be practically devoid of this element.

The word 'emotion' implies, be it noted, movement, and points to what is the essential function or purpose of an emotion. Each emotion has its appropriate muscular expression—involves nervous arrangements, agitation of which causes that expression. In rage the muscles receive a prompting to inflict injury upon the object of rage; in terror, to make the individual start and shrink away from the cause of dread; and the "expressions" of the emotions are, in fact, "the movements which would be manifested in greater degree if the emotions and desires were realised in action."[1] And further, each emotion has its appropriate visceral and vaso-motor expression: the condition of the glands and vascular system is very different in rage from what it is in fear.

Hence it is clear that through the influence of the emotions profound bodily changes may be wrought; muscles may be convulsed or relaxed, secretions augmented, dried up, or perverted, vessels contracted or dilated. To the physician, therefore, the emotional state of his patient is of the highest importance. So long as a patient is kept in good spirits, so long a beneficial influence streams down from the cortex. "A sound heart is," as Solomon, says, "the life of the flesh." Mental depression, on the other hand, acts banefully upon all the bodily processes, so banefully that an individual may actually compass his own destruction by making up his mind that he is going to die. Now mental depression itself results from unhealthy bodily action, so that either tends to provoke and perpetuate the other; and in this way the vicious circle goes round and round, the patient sinking into deeper and deeper gloom, and into a more and more serious bodily state. Hence the great therapeutic interest of the emotions.

c. Simple ideo-motor action. This differs from sensori-motor and emotional action, inasmuch as in it there is a mental representation or idea of the act to be performed. An idea (or, if the act consists of a series of movements, a series of ideas) intervenes between the afferent and efferent impulses, and from the evolutionist's point of view, it therefore ranks higher than either of the other forms of mento-motor action.

We must carefully distinguish between the idea of an act as a whole and the idea of each individual portion of

[1] Maudsley's "Physiology of Mind," pp. 379, 380.

which that act may consist. By ideo-motor acts I do not mean to imply the whole of such acts, but each such individual portion. Here I am met with a difficulty which has been constantly before me in the writing of this and the chapters immediately following. How do these portions mutually limit one another—more exactly, how much constitutes a separate ideo-motor act? The nearest answer I can give is: The smallest part that can be separately formulated in idea. As I shall again have occasion to point out, many of the details of voluntary acts are not definitely formulated in idea, and are not therefore ideo-motor, but are rather reflex, sensori-motor, or emotional. Only such as are thus formulated can properly be regarded as ideo-motor.

Let us now attempt to explain the rationale of an ideo-motor act. We have seen that attention directed to a part produces dynamic change in that part—a fact we explained on the supposition that the nervous arrangements implicated in the act of attention are such as represent, in the highest centres, the part attended to. It necessarily follows that, by concentrating the attention upon a muscle, the muscle may be dynamically affected; and since the special function of a muscle is to contract, we should naturally expect the dynamic change to express itself as contraction, much as by concentrating our attention on a gland *its* special function—*i.e.*, secretion—is modified. Hence ideo-motor action is explained. We have only to assume that the idea of a particular movement has as its physical correlative the nervous arrangements in the highest level which are engaged in the movement; then the idea of the movement will be akin to, or identical with, attention directed to the muscles engaged in the movement. I cannot but think that the phenomena of attention (to the body) help us in explaining the will. Is it not a remarkable fact that, by simply fixing the attention on any one part of the body, distinct dynamic change may be wrought in it? I accept as a partial explanation of the growth of the will Bain's theory of spontaneity, but I venture to think that this element of attention should not be overlooked.

That there is some truth in these remarks any one may prove for himself by attempting some unwonted movement. He will find that success is most readily achieved by concentrating his attention upon the muscles involved. Suppose a singer has been accustomed to breathe during singing from the upper part of his chest, and wishes to adopt the other and right method of breathing—*i.e.*, from the lower chest (by descent of the diaphragm)—he will find it necessary to concentrate his attention upon the lower thoracic and abdominal region.

As an instance of simple ideo-motor action, we may again take the case of an individual in whom the idea of precipitating himself from a height—an idea suggested to the mind by looking down from a great eminence and absolutely unopposed by any antagonistic idea—is translated into action. In such a case the single, unopposed idea becomes an actuality; and therefore I have called it 'simple' as opposed to 'compound' ideo-motor action, in which two or more ideas struggle for the mastery.

Another good instance of simple ideo-motor action is afforded by the movements prompted in a hypnotised individual by suggestion. The *modus operandi* of simple ideo-motor acts is made clear if we remember that the tendency of an idea is to act itself out, for, as we have seen, the physical basis of the idea of an act consists of nervous arrangements, strong agitation of which leads to the performance of that act. Thus the ideas suggested by the hypnotiser being, I take it, the sole mento-motor occupants of the mental field, they tend to act themselves out. An individual who is easily hypnotised informs me that when under suggestion her mind is entirely taken up with the thoughts that are suggested to her, and that she feels herself impelled to do as she is bidden. We must, then, assume that there is no spontaneity of mental action: the ideas which are aroused through the ear and eye do not call up collateral trains of ideas as in normal wakeful life. The mind (or brain) is in a condition of semi-paralysis, in which it accurately receives the impress of a suggestion, but is incapable of anything further; just as a piece of paper is capable of receiving the impress of the printer's type, but yet is wholly incapable of itself spontaneously setting forth impressions which shall express the associated lines of thought in the author's mind.

Sensori-motor, emotional, and ideo-motor acts run into one another, so that each may to some extent partake of the character of the other; in the first two, however, there is no distinct idea of the course to be pursued; when there is, the movement is essentially ideo-motor. When an individual suddenly and instinctively moves his arm in response to a painful stimulus, the action is purely sensori-motor: when in a fit of anger the muscles of his face are contorted, the movement is purely emotional; but both these simple mento-motor actions may be complicated by ideo-motor action, as when he resolves and prepares to return blow for blow. They all three, to repeat my remark, run into one another, but it is well to keep clearly before the mind the essential distinction between them.

These simple mento-motor actions enter very largely into our every-day life, and between them and simple unconscious reflex actions there are innumerable intermediary phases, the unconscious gradually and imperceptibly rising into the conscious; and contrariwise. If we consider the ordinary acts of daily routine, we shall find it difficult to determine how far they are simple reflex, and how far simple mento-motor. During the processes of dressing, undressing, eating, drinking, wending one's way through a crowded thoroughfare, the mind may be pursuing an entirely independent train of thought. Many habitual acts are therefore, like the so-called instinctive acts of the brutes, to all intents and purposes automatic-reflex.

3. Compound mento-motor (= reflective and deliberative) action. It will be advisable to devote a separate chapter to this subject.

CHAPTER VII.

THE INFLUENCE OF THE FEELINGS UPON THE BODY (*continued*)[1] —COMPOUND MENTO-MOTOR ACTION.

IN compound mento-motor or deliberative action the peripheral impression, instead of evoking a simple sensation, emotion, or idea which automatically acts itself out, gives rise to a complex mental state. There intervenes between the afferent and efferent impulses a state of reflection;[2] or, to put it more accurately, there is a struggle between two or more mento-motor states. Thus a sensation may enter into conflict with an idea, as may happen when an individual is having a tooth extracted: the pain tends to excite certain movements (sensori-motor), but these movements may be inhibited by an idea. Similarly, an idea may enter into conflict with an emotion; *e.g.*, an idea may check the movements dictated by blind rage. In like manner, ideas may contend with one another for the mastery, as in calm deliberation, and the action ultimately performed may then be fittingly described as 'compound ideo-motor action.'

[1] It will be observed from the headings that this and other chapters purport to treat of the influence of the feelings on the body. But what, it may be asked, has compound ideo-motor action to do with this influence? I have already, however, strongly insisted that ideas are essentially built up of feelings—*i.e.*, of sensations—and thus ultimately all bodily changes resulting from mentation result from feelings.

[2] Herbert Spencer uses the term 'reflective activity' to denote actions thus prompted, in contradistinction to perceptive activity which broadly answers to the simple mento-motor actions as defined by myself ("Principles of Sociology," § 42).

In these three instances I speak, for convenience, of simple mento-motor states contending together for the mastery. Distinct *motives*, however, generally enter into the conflict. It will be remembered that by a mento-motor state is meant the immediate mental precursor of a consciously performed act, those nervous agitations in the highest level which result in muscular movements being, in so far as these movements are conscious, paralleled by a series of mental, or, as I have termed them, 'mento-motor' states. In fact, a mento-motor state is potentially a movement, and whenever an act is consciously performed there occurs an agitation of certain nervous arrangements in the highest level, this nervous mechanism constituting at one and the same time the central nervous agency through which the movement is effected, and the physical side of the mental precursor of the movement.

Now, as I have said, simple mento-motor states are not usually the sole contending elements in what I term compound mento-motor action. Between the afferent and efferent impulses highly complex mental states, termed motives, may intervene and struggle for the mastery, and, indeed, the most common examples of compound mento-motor action are those in which motives contend among themselves; but in all cases the resulting action must be through the medium of simple mento-motor states; and inasmuch as in all such cases independent mento-motor states are continually presenting themselves for selection, we may conveniently term the resulting act compound mento-motor.

The essence of simple as distinguished from compound mento-motor action is this: Each mento-motor state occupies the mental field unopposed, and being unopposed, acts itself out automatically. Such actions I have therefore regarded as involuntary, a view which will certainly not be accepted by all.[1] Even compound mento-motor action I

[1] According to Bain, "the typical will neither deliberates nor resolves, but passes without interval from a motive state to an action. The superior intelligence of the higher beings induces upon this primitive link a series

hold to be in one sense automatic, but it is more complex in nature than simple mento-motor action, and would by many be regarded as the very reverse of automatic. We have in it, I conceive, the typical will. From a simple mento-motor state only one action can result, but compound mento-motor states may give rise to two or more actions, and, as we shall see in due course, the great problem of the will is this—What determines the victorious impulse?

The consideration of compound mento-motor action suggests that of the distinction between *actual* and *ideal* impulses.[1] It is desirable, though not always easy, to distinguish between the two. An actual impulse is one which is directly excited by some peripheral stimulus; an ideal impulse is the revival of a past mental state independently of such present stimulus. Simple mento-motor action may be, and generally is, excited by actual peripheral irritation, the mento-motor state or impulse being therefore likewise actual. Thus an actual mento-motor state is excited by a peripheral stimulus causing a sensation—a blow, for instance; or by one causing an emotion, *e.g.*, a spectacle, the retina in this case being the area stimulated; or, finally, by a peripheral stimulus calling up an idea, such as a spoken command, in which case the auditory expanse is the periphery stimulated.

of artificial suspenses, not exceptions to the general law of the will, but complications of it" ("Mental and Moral Science," by Alex. Bain, LL.D. p. 364, 1881). From this it is evident that Bain regards simple mento-motor actions as voluntary. Similarly Sully, who regards as voluntary all "actions consciously directed towards some end" ("Outlines of Psychology," 7th edit. p. 573). The criterion by which we determine what is and what is not voluntary action is of course arbitrary, but I venture to think that those acts which occur independently of deliberation are unworthy to be called voluntary acts. From the physician's point of view, at all events, we shall find it convenient, as will presently be seen, to regard only compound mento-motor action as voluntary. Will any one assert that the acts performed by the hypnotised individual on suggestion are voluntary? Yet, according to Bain, Sully, and others, they are, for they must be regarded as such.

[1] I am using the term 'impulse' as synonymous with 'mento-motor state.'

In all these cases the mento-motor state may be regarded as 'actual.' But it is obvious that the more elaborate forms of compound mento-motor action would be impossible if these were the only mento-motor states, because it would be impossible to get several distinct kinds of peripheral irritation causing several *contending* mento-motor states at one and the same time. It so happens, however, that mento-motor states may arise independently of the peripheral stimulation which in the first instance provoked them—they may be ideally revived by memory. Without memory compound mento-motor action would be impossible, every mento-motor state immediately acting itself out as it arises; but owing to memory one mento-motor state is apt to call up others, whereupon a conflict ensues.[1]

Two mento-motor states in the actual may enter into conflict—*e.g.*, a sensation of hunger, urging to action, and a sensation of fatigue, prompting to inaction. On the other hand, both the contending impulses may be almost purely ideal, as in deliberating a move on a chess-board. The most common and most simple examples of compound mento-motor action, however, are afforded by those cases in which some peripheral stimulus causing an actual mento-motor state enters into conflict with an ideal mento-motor state; and in considering this subject of compound mento-motor action I shall confine myself to such.

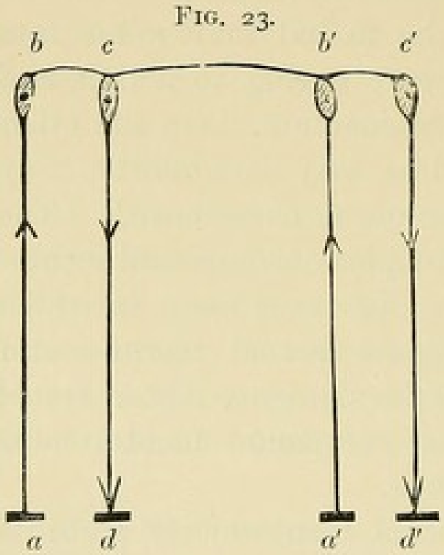
It will be observed that an ideal mento-motor state is not radically distinct from an actual one. We may assume that all ideal states were in the first instance actual—*i.e.*, excited by peripheral irritation; but when ideally revived, instead of being excited from below by peripheral irritation, they are called forth by collateral stimulation of the highest centres.

[1] When a given peripheral stimulus is always followed by a given action, the centre is rigidly organised with a view to this action, which is simply reflex. But when more than one action may result from stimulation of the centre, then, according to Herbert Spencer, there is a passage from the unconscious to the conscious; mentation begins. (See his "Principles of Psychology," §§ 199–220.)

Thus, in the accompanying diagram (Fig. 23), *a*, *b*, *c*, *d*; *a′*, *b′*, *c′*, *d′*, represent two arcs. In the left-hand arc, *a* = the sensory periphery, *b* and *c* = the highest sensory and motor centres, *d* = the motor periphery; and similarly in the other arc. Then *b*, *c*, and *b′*, *c′*, represent respectively the nervous arrangements constituting the physical basis of two separate mento-motor states. These may be excited by an irritation at *a* and *a′*, in which case they constitute actual mento-motor states; but either may also be excited collaterally through the other, along the lines, *b*, *c*, *b′*, *c′*, and the mento-motor state resulting is then an ideal mento-motor state.

It therefore follows that compound mento-motor actions are not so radically distinct from the simpler forms of activity already considered as would at first sight appear, the sole difference being that whereas in the latter there is but one mento-motor state (sensation, emotion, or idea) seeking to animate its appropriate efferent mechanism, in compound mento-motor actions there are two or more mento-motor states, each of which, did it occupy the mental field alone, would translate itself into its appropriate action.

Fig. 23.



In deliberation we have compound mento-motor action. An individual passes through a stage of reflection, as the result of which one out of two or more lines of action which suggest themselves is chosen. In calm, unemotional reflection these suggestions constitute the motives to action, and deliberation is a weighing of such. Very frequently, however, the mind during the period of deliberation is pervaded by strong emotion. The sharp and clear-cut ideas rise up in rapid succession upon a blurred background of feeling. Now we have already seen that emotions tend to excite ideas which chime in with them. A feeling of affection provokes one kind of ideas; a feeling of revenge, another and different kind. Different feelings being thus capable of giving rise to different ideas, and all ideas tending to act themselves out, it follows that feelings indirectly incite to actions; and, as I have already insisted, actions thus indirectly excited by sensations or emotions are not simple sensori-motor or emotional, but ideo-motor.

The Law of the Will.—Indirectly it is *feeling*[1] that gives rise to all forms of compound mento-motor action; feeling constitutes the essential element of the so-called motives to action. The two great incentives to voluntary action are pleasure and pain; we act with a view to secure the one and avoid the other. Pleasure in the actual urges to the continuance of such acts as tend to perpetuate it; pleasure in the ideal prompts us to take steps to realise it. Similarly, pain in the actual moves us to seek its relief; pain in the ideal, to prevent its realisation.

Pleasures for the most part go along with health, pains with disease; therefore in the pursuit of pleasure we unconsciously seek that which is consistent with health, and avoid that which is inimical to it. But in this respect we must draw a distinction between man and the lower animals. The latter are impelled very largely by simple mento-motor action, and we shall soon see that for them the environment and the nervous system are more or less stereotyped, so that the animal may nearly always safely obey the impulses of the moment, such impulses having invariably for their objects the avoidance of pain and the realisation of pleasure. In the case of man, however, and especially civilised man, present impulses cannot be so safely obeyed, because his nervous system cannot automatically meet all the exigencies of his complicated environ-

[1] As elsewhere observed, even an idea is made up of feelings, and therefore ideo-motor action is prompted by feeling; but the word *feeling* in the text is used in its ordinary sense—*i.e.*, to denote a mental state which can be recognised as feeling.

ment. Accordingly, in his case the realisation of present pleasure is very frequently an unsafe course; and therefore does the wise man, knowing that the present pleasure when weighed in the balance against the pain which results from any indulgence in it will be found wanting, forego it, being thus governed by an ideal motive. In so doing, however, he still obeys the principle which is the great moving spring of action—the pursuit of pleasure and the avoidance of pain. The man who so shapes his course as to procure for himself the greatest amount of happiness is the prudent man; he has a vivid recollection of the pains that may follow the indulgence of a present appetite.

And just as the present realisation of a pleasure is often an unwise course, so also is the avoidance of an immediate pain. It may be needful to pass through pain to avoid greater pain in the future, or to secure a future pleasure. Thus a man may voluntarily endure the pain of having even a painless tooth extracted, in anticipation of its eventually causing him, if allowed to remain, a greater sum of pain than that entailed by the operation; and a man keenly alive to the pleasures of youth, and strongly averse to the hard work needful to pass an examination and to the restrictions which it necessitates, submits to both in the belief that the ultimate advantages will far outweigh the temporary disadvantages.

Wherefore the law of the will may be stated somewhat as follows: "The will prompts to acts which, the present being weighed with the future, shall procure the greatest amount of pleasure and ward off the greatest amount of pain; to which end it is sometimes necessary to forego an immediate pleasure, and to undergo an immediate pain." In proportion as an individual is capable of determining what lines of action can best realise these ends, in that proportion has he a clear and well-balanced intellect; and in proportion as he follows the dictates of that intellect, in that proportion has he a strong will.

This is the law of the will stated in its baldest and, I might also say, most repulsive form. Happily its action is modified in response to the workings of sympathy and the sense of duty,—sympathy, which prompts an individual to take on the pains of another; duty, which leads him to do what he knows to be right, without any regard to ultimate self-advantage or disadvantage; but it is not necessary to pursue this subject further.

Distinction between Motives and Simple Mento-motor States.—I have said that all motives to action are in the last resort feelings. This is the view generally held. It must be noted, however, that the quantity of feeling entering into particular motives varies considerably. The motive may be backed up with intense feeling, as when an individual thirsts for revenge; and, on the other hand, the element of feeling may to all intents and purposes be absent, as when he works out a mathematical problem in preparation for an examination. Suppose him to be working with the object of fitting himself for some profession; his motive is the prospect of future benefit, but he may set about his mathematical task without this motive being vividly present to his mind, and even supposing that it is, it will practically be divested of all feeling, and appear, so to speak, as a mere intellectual prompting.

Feelings, then, either in the actual or ideal, prompt to action, and constitute the so-called motives to action. I have already hinted at the differences between such motives and simple mento-motor states, and it is now needful to distinguish between them more precisely. One important distinction is this: A simple mento-motor state leads to a simple action only; so that in a series of consciously performed movements there is a corresponding series of simple mento-motor states—a state for each conscious movement. A motive, on the other hand, may lead to a highly complex series of movements, to acts extending, it may be, over a lifetime, and one motive in this case suffices to call up all the several mento-motor states, the immediate mental precursors of each conscious movement.

But although there is this distinction between a motive and a mento-motor state, the one may, in certain rare cases, be almost indistinguishable from the other. Thus, the feeling of revenge is a strong motive, and if it could be satisfied simultaneously with its rise by such a simple action as striking a blow, it would practically constitute a simple mento-motor state; but if the same prompting were unable to realise itself immediately, and became an abiding state ready to translate itself into action on every opportunity through the medium of a series of mento-motor states, it would constitute a motive properly so called. In such cases confusion may, of course, arise between the two, but there is nevertheless a logical distinction which it is necessary to bear in mind.

Secondly, a motive is always capable of being put in the form of a proposition, whereas a simple mento-motor state, being unanalysable, cannot always. In some instances, however, the motives, though capable of being stated as propositions, do not distinctly formulate themselves as such. More especially is this the case in hasty yet deliberative action, when, in fact, genuine motives can often scarcely be said to enter the field of conflict at all, the struggle being rather between mento-motor states, any one of which may pass into action. Suppose, for instance, an individual to be in a highly agitated state of mind, in which affection, fear, and rage alternate. Now these three mental states are at one and the same time motives and simple mento-motor states. In their latter capacity they are able to excite simple movements only. Thus, affection as a simple mento-motor agent tends to allay motor excitability and to call forth characteristic gentle movements; fear has a paralysing effect, and incites to inaction or shrinking; rage causes a violent perturbation of the muscles—wild and chaotic movement. But as motives these three emotions may act in a far more complex manner. Each tends to call up a series of ideas chiming in with itself, and if one gain the mastery, thrusting the others out of the field, it becomes a motive in operation as distinguished from a motive in suspense, and may dictate a series of highly complicated actions through the intermediation of mento-motor states. In such a case the struggle may in a manner be said to be between simple mento-motor states. As the three emotions rush through the mind each evokes its attendant train of ideas ; hence ensues a wild turmoil of ideas and emotions. Each emotion as it presents itself constitutes a simple mento-motor state, as does also each idea; but ideas have but little power against such strong antagonists as emotions, and the course ultimately adopted will probably (if the individual is strongly affected) be the result of the latter; one of the emotions will at one particular moment rise into such intensity as to act itself out, and the individual will find himself adopting a line of conduct almost before he has time to realise it.

It will be remembered that I have defined deliberation, or compound mento-motor action, as a weighing of motives rather than of mento-motor states, and now that I have sought to distinguish between the two, my reason may perhaps be apparent. Of course, were it allowable, it would simplify matters much, from the point of view of my classification of the different kinds of mento-motor action, to regard compound mento-motor action as involving merely the balancing of simple mento-motor states.

Diagrammatic Representation of an Act of Will.—In the following illustrative case we may conveniently neglect the part played by ideo-motor action in the result, and regard only the contending emotions, which we will consider in the light of simple mento-motor states.

When a savage in a frenzy of rage, and without the slightest deliberation, dashes his child's brains out against a rock, he cannot be said to will: the paroxysm being the sole motive to action, automatically energises its appropriate motor mechanism. The act is therefore simple mento-motor (= emotional). But directly any antagonistic impulse arises, such as a sudden glimmer of affection, or a pang of fear lest he shall himself suffer in consequence of what he may do, he will be acting voluntarily, no matter which impulse he obeys. In such a case the ideally revived feeling of personal suffering (supposing fear to gain the day), will have the same effect upon the muscles as the fear experienced upon the actual approach of such suffering—*i.e.*, a relaxation of them. Here we have the simplest example possible of an act of will. The case is diagrammatically represented in the accompanying figures. (Figs. 24, 25.)

FIG. 24.

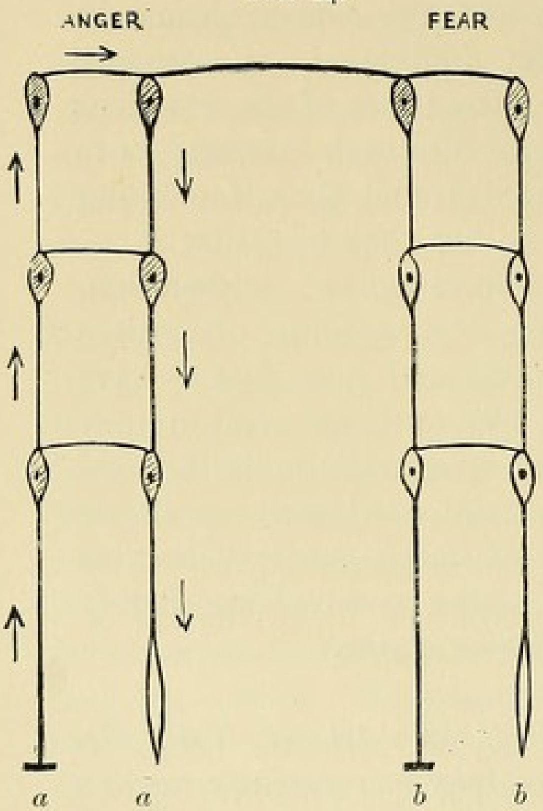
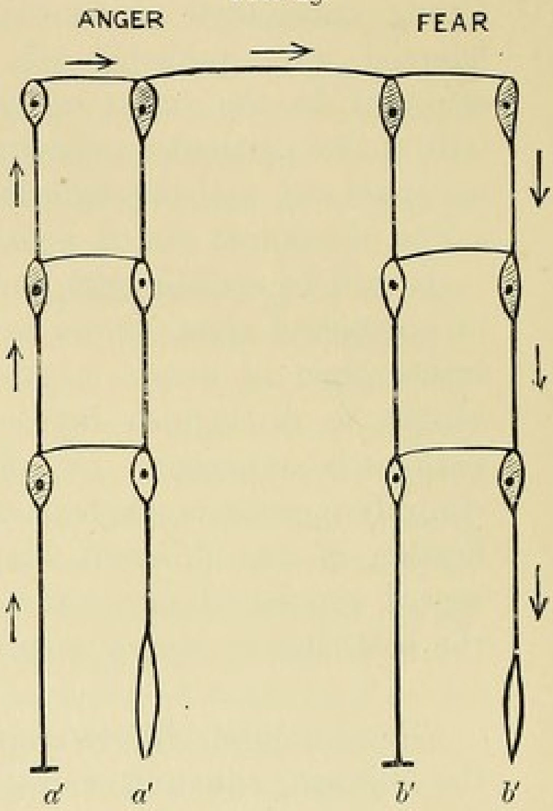


FIG. 25.



We will suppose an act of disobedience on the part of the child to be the cause of the paternal anger. Instead, let us say, of approaching his father when bidden, he runs off. The image of the retreating child on the retina of the parent commotes certain nervous arrangements in the highest nervous level, and there is a perception. As a result of this, other nervous arrangements in the same level are thrown into activity, and the emotion of anger (Fig. 24, arc *aa*) rises into being; and supposing the latter to translate itself into action, an impulse will pass along the efferent part of the arc *aa*, causing a violent agitation of the muscles appropriate to some expression of his anger. Fig. 24 *bb* represents a similar motor arc, the afferent impulse in this case originating in a force violently agitating the periphery, and commoting certain nervous arrangements in the highest level in such wise that fear rises into consciousness, appropriate muscles being at the same time energised.

In the case we are supposing, the emotion of anger and the emotion of fear are the two contending impulses, the former being the actual, the latter the ideal impulse. In Fig. 24 I have indicated by the arrows and by the shading that the arc *aa* has been energised—the emotion of anger translating itself into its appropriate action, and the emotion of fear remaining in abeyance. In Fig. 25 I have, in the same way, indicated that the emotion of fear has gained the upper hand, energising the efferent part of the arc *b′b′*.[1]

Every deliberation resulting in an act of will, however many the conflicting motives, is to be explained on the lines laid down in this simple illustration.

I have assumed that in all deliberation the several contending motives to action are, in the first instance, excited by peripheral irritation, and this is probably true; but in the case of the more lofty and abstract motives the afferent portion of the arc is not so demonstrable as the efferent. Suppose, for example, that in the above simple instance there enters into the father's mind a sense of the cowardice of his act, or a sudden flash of affection towards his child, we shall find it no easy matter to trace to the periphery the afferent portions of the arc to which either of these impulses belongs; yet, seeing that every mental state capable of exciting muscular action is almost certainly in the first instance excited peripherally, we can have little doubt that such arcs possess an afferent as well as an efferent portion.

It follows, then, that between the hasty act of the savage

[1] The effect of this is rather to cause general muscular relaxation than contraction, and there will probably be an inhibition of energy in the efferent part of the arc *a′a′*. However, fear does sometimes actually cause contraction, and this I have indicated by the shaded part of the arc *b′b′*.

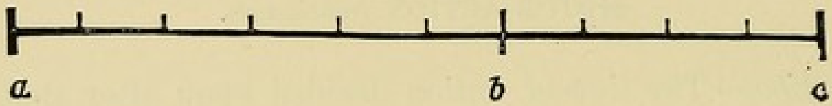
and the premeditated act of the cultured man, the difference is only one of degree. If a highly complicated intellectual process terminates in a definite action, that action is really a compound mento-motor action, and the latter being a form of reflex action, it is clear that intellectual processes are built up on the reflex type. Even in calm thought, when there may be no manifest motor action, there occurs a faint revivification of the nervous changes in those efferent arcs necessary to the utterance of the thought.

CHAPTER VIII.

THE FEELINGS AS ACTIVE FORCES—COMPOUND MENTO-MOTOR ACTION (*continued*).

Resolution.—The line of action decided upon after deliberation may vary from extreme simplicity to extreme complexity. It may consist of a single co-ordinated muscular action, as the uttering of a single word; or of a series of such actions, as the playing of a piece of music, or of a course of actions extending over days, months, or even years, as in a protracted course of study. When the line of action is complex, not one act of will, but several, are needed to complete it, as will presently be made manifest. A particular course of action being decided upon, the decision abides as a persistent motive during its performance, thereby constituting a motive in the truest sense of the term. Such a persistent motive underlying a series of acts, and unifying them, I term resolution. The term resolution, however, is not generally used in this sense exactly. Resolution, according to Bain, is the attitude which the mind assumes when, having decided upon a particular course of action, the individual is prevented from carrying his decision into immediate effect. When he is able to do so, there is, in Bain's view, no room for resolution. This may be true of very simple acts, as shaking the head; but I venture to think that resolution is necessary in all acts needing more than a single operation of the will, such as preparing a meal or going upon an errand. These, and all other purposeful conscious actions which are not merely momentary, involve a persisting motive; and directly that ceases the act ceases. This persisting motive is true resolution. Resolution, as thus defined, includes the resolution of Bain. It is the attitude of mind which persists from the moment the decision is made till the act determined upon is completed, and not only occupies such time as intervenes between the coming to the decision and the beginning of the act, but continues until the final consummation of that act. The matter can be illustrated diagrammatically thus: Let the horizontal line, *a, c* (Fig. 26) represent a definite period of time, and the spaces between

FIG. 26.



the vertical lines units of time; then if *a* indicates the point of time at which a particular act is decided upon; *a, b*, the time which necessarily elapses before the act can be begun; and *b, c*, the time occupied in its performance,—resolution does not (as Bain implies) cease at *b*, but persists to *c*.

So far as acts which extend over days, weeks, or years are concerned, no one will deny the truth of these remarks, but I do not think it is generally recognised that resolution is equally necessary—though not perhaps in so intense a form—in all acts needing more than a single and momentary act of will. That such, however, is the case, a little thought will show. I have said that resolution is necessary to the playing of a piece of music. When the player is young and inexperienced, and is asked to play before a critical audience, it will be very generally acknowledged that resolution—the persisting motive—does not stop with the beginning of the performance, but continues in operation to the end; for if at any moment it ceases, the player will break down. But I maintain that resolution is equally necessary when he is playing by himself; what is it but want of sufficient purpose (*i.e.*, resolution) that makes some people jump from one piece to another, playing a few bars of each, but not one right through ?

I have admitted that where the act is simple and can be immediately performed there is no room for resolution; but this is at most only true of the very simplest act. I know of an individual who had not sufficient strength of will to put his fork to his mouth; he would lift it half-way and then stop, proving that even in so simple an act as using a fork a persisting motive—*i.e.*, resolution, is necessary.

Any one is of course at liberty to distinguish the attitude of resolution as defined by Bain from the kindred state which underlies the actual performance of the act decided upon; but it is necessary to remember that such a distinction is not radical, but arbitrary.

He that cannot be shaken in his resolutions is said to be firm of purpose, of fixed resolve. Such fixity of purpose is a necessary part of strong will.

We have seen that when the course of action decided upon is complex, not one but many individual actions are needed to complete it. Hence voluntary acts include a number of involuntary acts. This is manifestly true of acts which need a considerable period of time for their completion, but it is also equally true of those occupying a very short time, such as making a sketch, or performing a surgical operation. It is clear that the will has not completed its task when it has merely started the act; it must continue in action throughout it. Are we, however, to consider each individual co-ordinated action forming part of the entire series as the result of a separate operation of the will? The answer, of course, depends upon our definition of voluntary action. But if we regard only those actions as voluntary which depend upon deliberation (*i.e.*, compound mento-motor or reflective actions), then, clearly, many of the component actions of the series are not voluntary. For a large number of them are simple ideo-motor, many more are sensori-motor, and not a few purely reflex. When a person is playing for the first time a difficult piece of music, some of the movements are voluntary, in the strictest sense of the term, needing as they do deliberation; but after prolonged practice they tend more and more to become simple ideo-motor, then sensori-motor, and finally reflex. When, for instance, the individual pursues an entirely independent train of thought during his playing, he is, so far as the latter is concerned, a mere reflex automaton. The same remarks apply to the performance of a surgical operation. The surgeon who has by constant practice attained great facility in a particular operation, can perform many stages of it almost automatically.

The Determining Mento-motor State.—The chief difficulty in explaining the will seems to me to turn practically on this question—What enables one particular mento-motor state to obtain the mastery and pass into action when there are two or three such mento-motor states contending together? I have already said that when only one mento-motor state exists, I do not regard the resulting action as voluntary; but whether it be so considered or not, there is no difficulty in explaining it on the principle that every mento-motor state tends to act itself out, and when only one occupies the field that one necessarily does this. Dismissing, then, all cases of simple mento-motor action as requiring no further explanation, we return to the question as above stated, and in attempting to answer it, we must keep distinct two mental processes, which I believe are often confounded one with another. First we have to consider the question of choice, and secondly that of action. We have to ask: by virtue of what power is the ego able to determine upon a particular mento-motor state? and then, having determined upon it, by what means is that particular state able to realise itself in action?

The former process, that of choosing, results from the weighing of alternatives, and is essentially an intellectual process. Different motives or, it may be, merely different mento-motor states, are compared, and as the result of an intellectuation (to coin a word) more or less complex, one mento-motor state is selected.[1]

But a little thought will show that the selection of one motive, and thereby of a certain mento-motor state, or series of mento-motor states, does not constitute the act of willing, which consists in the *realisation* of a mento-motor state. Suppose, for instance, there is a question whether an individual shall, or shall not, sign a document; as the result of deliberation he decides to do so. This decision is not willing. It is comparable to the solution of a problem, and is effected by an intellectual process.

The selection, then, depends upon a more or less complex intellectual process. Moreover, it may extend over a considerable period, or it may be the work of a moment. It may consist in the deliberate weighing of motives from which the element of feeling is practically absent; or in the momentary balancing of violent impulses; or of little more than simple mento-motor states. As an example of rapid deliberation from which the intellectual element is almost eliminated, we may take the case of a man choosing between jumping over a cliff and walking away from it. Let us suppose he is perfectly sane. The thought of throwing himself over is suggested to him, but we will suppose him, instead of acting upon this suggestion, to walk immediately away. Now it might be thought that there is no deliberation in such a case; that the individual, seeing his danger, simply wills to avoid it. Such a conclusion, is, however, fallacious. There is a weighing here between a

[1] In all cases of deliberation, and even when well-defined motives contend for the mastery, it is essentially a mento-motor state that is selected, Suppose an individual to be under two motives. He wants to buy a horse for the sake of the pleasure or comfort which it will bring him; on the other hand, the purchase will necessitate the sacrifice of some other advantage. Here are two distinct motives—not simple mento-motor states—contending for the mastery. As the result of deliberation one is fixed upon. But in order to put that motive into effect he proceeds to action; he must, let us say, go to the market to see about the horse, and this is done through the medium of mento-motor states. These states occur to the mind very largely by association.

distinct motive—the motive of self-preservation—and a simple mento-motor state, the idea of precipitation. The former rapidly suggests the mento-motor states necessary for the safe conduct of the individual away from the source of danger. The deliberation may in such a case be so slight as almost to escape notice, but deliberation there certainly is, differing, I contend, only in degree from that calm deliberation which extends over hours, or days, or months. If any one doubt this, let him say when, in the passage from the complex to the simple, deliberation ceases. It can only cease, I maintain, when the mind is occupied by a simple mento-motor state. In like manner, when an individual is prompted to action by two strongly contrasted emotions, I contend that before he acts he passes through a phase of deliberation, no matter how soon the action is taken. In such a case the intellectual element may be very small—the individual does not calmly compare, does not accurately measure, all the consequences of the two lines of action. One emotion by its sheer violence conquers. Nevertheless the two lines have presented themselves, so to speak, before the ego for selection, and there must have been some sort of deliberation, however faint, before one could be chosen.

We come now to the second and entirely different question : Having decided upon a course of action, by what means is it carried into effect ?

The answer we have in a measure anticipated. It is by the mind lapsing from a compound mento-motor state into a simple mento-motor state. The individual having decided upon a certain course of action, he now wills it, and this is done, I conceive, by his concentrating his entire attention upon the idea of the action. All other ideas are thereby driven from the field: he lapses into a simple ideo-motor state, and just as with a hypnotised individual an unopposed idea automatically acts itself out, so here the mind becomes totally occupied with the idea of the action resolved upon ; and concomitantly with the increase in the vividness of the idea resulting from this concentrated attention, there is an increase in the intensity of those nervous agitations which underlie the idea. The agitation is no longer confined to those nervous arrangements in the highest level which represent the performance of the act in idea, but pass into the subordinate motor centres, and so on to the muscles, which contract. The idea acts itself out. The individual wills.

This element of concentration is more particularly evident in calm deliberative action. In hasty and strongly emotional action, as in the case above alluded to, one particular emotion may gain the day without the individual being conscious of especially concentrating his attention upon it.

Freedom of the Will.—The doctrine of free will appears to assume that there is a power behind motives and mento-motor states capable, by itself and of itself, of increasing and diminishing the strength of any of them, independently of the Law of Causation, which tells us that all phenomena are governed by fixed and immutable law. But no one can determine the relative strengths of these motives and mento-motor states, and therefore, in one sense, no one can be said to have free will. We are, nevertheless, free agents in the sense that we are under no compulsion from without; we are left contending with the forces within us, and have, so some argue, no reason to complain at the result, seeing that it is the one which, for the time being at least, pleases us most.[1]

[1] Herbert Spencer puts this matter so forcibly and clearly that I quote the following passage from him in full:—"Considered as an internal perception the illusion (that every one is at liberty to determine the strength of the impulses to action) consists in supposing that at each moment the ego is something more than the aggregate of feelings and ideas, actual and nascent, which then exists. A man who, after being subject to an impulse consisting of a group of psychical states, real and ideal, performs a certain action, usually asserts that he determined to perform the action; and by speaking of his own conscious self as having been something separate from the group of psychical states constituting the impulse, is led into the error of supposing that it was not the impulse alone which determined the action. But the entire group of psychical states which constituted the antecedent

It is necessary to observe, however—a fact of which illustrations will be given in due course—that the individual sometimes voluntarily acts in a manner which is in no way pleasing to him ; in spite of himself, as it were.

In considering this question of freedom of will we must again be careful to distinguish between the choosing of motives or mento-motor states and the translation of the latter into action. The choice obviously depends upon the peculiar mental organisation of the individual, whether it be deliberate, or the hasty, and, it may be, only semi-conscious, choice of the moment. No one can himself determine the various strengths of the different agencies which will determine his action, nor which shall be the overmastering one. The result must for the same organisation always be the same under the same circumstances, internal and external; so that, if we suppose two individuals to have exactly the same organisation, and to be subjected during life to exactly the same conditions, we may be sure that the results they arrive at by deliberation will be the same. When one of them chooses differently under apparently the same circumstances, we may be equally sure that the similarity is only apparent, that the differences of choice are not due to the fickleness of an autocratic will, but to undiscovered differences in circumstances.

It may be thought that when once a particular course is

of the action also constituted himself at that moment—constituted his psychical self as distinguished from his physical self. . . . . Naturally enough, then, the subject of such psychical changes says that he wills the action ; since, psychically considered, he is at that moment nothing more than the composite state of consciousness by which the action is excited. But to say that the performance of the action is, therefore, the result of his free will, is to say that he determines the cohesions of the psychical states which arouse the action ; and as these psychical states constitute himself at that moment, this is to say that these psychical states determine their own cohesions, which is absurd. . . . . To reduce the general question to its simplest form : Psychical changes either conform to law or they do not. If they do not conform to law, this work, in common with all works on the subject, is sheer nonsense ; no science of psychology is possible : if they do conform to law, there cannot be any such thing as free will" "The Principles of Psychology," vol. i. pp. 501–503.)

decided on, the will displays its freedom of action by a concentration of the attention in the manner indicated. But neither is this the case. If a decision has been really made, performance *must* follow, unless there are obstacles to it, in which case the decision fails to abide. For a firm decision necessarily calls up mento-motor states, which automatically pass into simple mento-motor actions in the manner indicated.

The necessity for compound mento-motor action in the case of man is obvious. In animals which are merely guided by instinct (*i.e.*, are simple mento-motor) each sensory impulse at once translates itself into action ; the environment is comparatively simple, and the animal is, by instinct, more or less perfectly adapted to it. Both the nervous system and the environment are stereotyped ; in other words, the external agencies acting upon any one species being for the most part the same during many successive generations, it becomes more or less perfectly adapted to its environment, and in such a case the promptings of instinct are practically always sure guides. But as we ascend the scale, and notably when we arrive at civilised man, the environment increases a thousandfold in complexity ; it is no longer stereotyped, the same for one generation as for another ; and therefore it is impossible that the nervous system should be stereotyped either—that it should be capable of wisely shaping the course of the organism through life automatically. The individual now, instead of acting on every occasion upon the impulse of the moment (*i.e.*, instinctively), a procedure that would very soon lead to his destruction, has his action in any given case determined by the balancing of a number of conflicting impulses, the fruits of experience, his own or others'. In short, the higher conditions of his existence have a higher nervous system to meet the demands which those conditions make upon it. Let me illustrate what I mean by the case of the moth which, attracted by the glare of a flame, rushes upon its own destruction. Since occasional exposure to this particular danger is a comparatively recent experience in the race-life of the moth, its nervous system has not been organised with a view to avoid it; but if during countless successive generations the moth should continue still, and with more constancy, to be exposed to it, adaptation would probably occur through natural selection—*i.e.*, through the survival of those moths which would show the least tendency to be attracted by the flame, or the greatest tendency to shun it, a race being ultimately evolved which would instinctively avoid the danger. The flame would become, in fact, part of a stereotyped environment, and the nervo-motor action by which danger from the flame is avoided, part of the function of a stereotyped nervous system. Now, supposing that instead of undergoing this gradual adaptation, the moth were from the first compound mento-motor, not, as we may suppose, simple mento-motor, then the memory of the pain suffered on the slight scorching of its wings, or of the fate it has witnessed overtaking other moths, would set up a conflict between the attracting influence of the sight-sensory impulse (= actual impulse) and the deterrent influence of remembered pain (= ideal impulse); there would be deliberation resulting in an act of will, and if the ideal impulse gained the day, the moth would escape a danger from which simple mento-motor action does not save it. Taking, instead of the moth, the case of man, we find that he has not been subjected during successive generations to each and all of the many varieties of environment pertaining to an ever-advancing civilisation, and it is therefore impossible for his nervous system to respond correctly to these by simple mento-motor action; his environment not being stable, his nervous system cannot become stereotyped to meet its requirements, and consequently in his case a more complex mechanism—compound mento-motor action—has to be called into play to meet the exigencies of the more complex condition of existence.

Thus the moth in the supposititious, man in the actual case, derives an obvious advantage from compound mento-motor action.

CHAPTER IX.

VARIETIES OF WEAK WILL—THAT FORM IN WHICH COMPOUND MENTO-MOTOR ACTION APPROXIMATES TO SIMPLE MENTO-MOTOR ACTION.

We are now in a position to consider the different varieties of weak will. They fall under four heads. To wit:

1. That form in which compound mento-motor action tends to approximate to simple mento-motor action.

2. That in which no one impulse to action is able to retain the permanent mastery, *i.e.*, vacillation.

3. That due to the peculiar strength of some one motive of the nature of a fascination.

4. That in which coherent thought is impossible, the individual being incapable of realising in idea any definite course of action.

Each of these types must now be considered in detail. The present chapter will be devoted to the first—to that, viz., in which compound mento-motor action tends to approach the type of simple mento-motor action—that in which the tendency to deliberate is weak or absent, the individual being prone to act upon the impulse of the moment, owing to the absence or feebleness of ideal impulses. Such an one will partake of a certain dish, knowing all the while that he will afterwards suffer from indigestion; or feeling disinclined to work, will abstain from it, though well aware that subsequent trouble will result. The actual impulse (the desire to indulge a certain taste or avoid a certain effort) is stronger than the ideal. Thus the weak-minded person, acting continually upon the impulse of the moment, is swayed hither and thither, now drawn in this direction, now in that. Like a puppet, he dances in response to any external force which from moment to moment acts upon him.

As another example of this kind of weak will, let us take the following case. A is walking along a London street, and he observes B (a cab-driver) cruelly ill-treating his horse. A's righteous indignation impels him to remonstrate, with the result that B hurls at him a torrent of abusive language. A's original indignation at the cruelty is now reinforced by anger at the personal affront, and he vows that he will bring the full force of the law upon the offender. Unable, however, to carry his threat into immediate effect, he contents himself with noting down B's number, and goes home, determined to take the proper steps on the morrow. The morrow arrives, his violent emotions have quieted down, he has a strong sense of the trouble the execution of his threat will entail; his impulse is now to let the matter drop. This *laisser aller* impulse may now be regarded as the actual, the faint flicker of yesterday's wrath, the ideal. He remains inactive.

Such an individual has not a strong will, if indeed he can be said to show *will* at all. Had immediate action followed his access of indignation, it would have been 'simple mento-motor,' one impulse to action only occupying the mental field; and as it is, he still acts upon the feeling of the moment, and is in a very large measure simple mento-motor, that is, weak-willed, for yesterday's impulse, which is now become ideal, has no power to overcome the present feeling.

We have seen that resolution is the abiding of a decision in the mind, a continuous motive, which is not cast off until the end at which it aims is achieved. In this particular case the decision does not persist till the consummation of the act: as a motive power it grows weaker and weaker as time goes on, becoming finally so weak that it is readily overcome by the first fresh impulse.

Let us, in contrast with the above, take the case of an individual whose teeth, though they are not painful, require the services of the dentist. He is, we will suppose, very sensitive to pain, and when the idea of consulting a dentist suggests itself, his vivid conception of the painful nature of the operations to follow prompts him to inaction; this desire to avoid immediate pain may be regarded as the actual impulse. But the picture of future troubles, if prompt steps be not at once taken, also rises up before him, and since these are more remote probabilities, we may look upon the impulse to avoid them as the ideal impulse, and if this overcome the actual impulse the individual may be regarded as displaying strong will.

Another instance of strong will which will appeal to some of my readers is the following. An individual resolves to speak upon a certain subject at a debating society. The moment arrives to do so. He is seized with intense nervousness; his heart beats violently, his tongue cleaves to his mouth, his brain whirls, all his energies are paralysed; his whole mental being cries out for inaction. The impulse prompting this course may be regarded as the actual impulse; that prompting him to get up and speak, the ideal impulse. Now, if this latter is capable of overcoming the former, all will assuredly agree that the man has shown strength of will.

In a strong-willed individual ideal impulses to action—whether many or few—are more powerful than any passing external impulse can be. They so mould his whole conscious being that he is actually unable to act counter to them, and the impressions of the moment are so neutralised by them that they are as powerless to affect his line of conduct as a child's sand ramparts to withstand the advance of the flood-tide. We have but to look at the influence a religious belief has on a man's life to see the irresistible force of a powerful ideal motive; and not only religion, but art and science too, can count their thousands who, for the sake of some dominant idea, have withstood temptations, overcome obstacles—have, in a word, sacrificed their present, and pursued unswervingly and unflinchingly the course it marked out for them, though it led to death itself.

In such cases we have typical examples of resolution, motives abiding until the ends in view are gained. We may diagrammatically represent them thus:

FIG. 27.

The central dark line represents a strong abiding purpose, impelling the individual in a definite direction, and constituting the attitude of mind termed resolution. The lines striking obliquely against it represent so many agencies acting as counter-motives, while the persistence of the purpose in undiminished strength is indicated by the central line remaining of equal breadth and firmness throughout. The next diagram, on the other hand, represents the case of an individual whose resolution is easily shaken, the central dark line gradually weakening in strength under the influence of the forces opposed to it.

FIG. 28.

We must be careful not to confound instances of genuinely strong will, like those alluded to above, with the case of the individual who lets himself be possessed by a fixed idea to the exclusion of all others—the individual, namely, who, not from a conviction based on reason, but rather from a limited intellectual grasp, allows himself in any given case to be entirely dominated by some one impulse to action, probably the first that presents itself to him. In such a case there is practically no conflict of motives, for there are no ideal motives to enter into antagonism with the dominant one, and the individual, far from being strong-willed, is essentially weak-willed, simple mento-motor. It is by no means easy to discriminate between the two—the man whose purpose is strong because it is based on reason, and the man who persists in the course he has chosen simply because he has chosen it. Who shall say whether a man is martyr or fanatic?

But although the stubborn man cannot be deemed strong-willed, he nevertheless possesses, in a large measure, one of the necessary elements of a strong will—viz., resolution, fixity of purpose, the ability to continue for some time under the influence of a given motive. Stubbornness, however, implies also narrowness of view, and this, again, a limited will-power. For the narrower the mind, the fewer the alternatives to action; and the fewer these latter, the less the capacity of the individual to put himself in touch with his surroundings—the less, in other words, the *scope* of the will. The best developed will-power must, therefore, be met with in the person who to fixity of purpose adds culture and experience. On the other hand, the stubborn man is not of necessity narrow-minded, though he is so generally; he may unite wide information with his stubbornness, but in that case his knowledge does not serve him; it is ineffective. He obstinately acts in obedience to a certain dominating impulse, all other impulses failing to counteract it; in short, he tends to be simple mento-motor. We may therefore, I think, class weakness of will arising from obstinacy under the present head; although from another point of view it might be included under the third class—that, namely, in which the weakness is the result of the undue strength of some one impulse.

It is manifest, then, that the more weak-willed an individual becomes (the fewer, namely, the number, and the less the strength, of his ideal motives) the more closely does he approach the condition of a simple mento-motor, or purely instinct-led, organism; until, finally, when ideal motives cease to exist for him altogether, he is entirely simple mento-motor.

Now, inasmuch as all disease is essentially dissolution, there is in disease of the mind a dissolution, or undoing, of the intellect. We should therefore expect to find the will, which depends upon the intellect and is one of its latest acquired attributes, to be weakened when the intellect is in any way disordered. And this we know to be the case; most of the acts of the lunatic are essentially simple mento-motor. In a normally constituted individual, ideal impulses arise in the mind simultaneously with actual impulses, and effectually neutralise any of the latter if dangerous; but in the insane individual the ideal impulses are weak or absent, and under these circumstances he is apt, since every actual impulse tends to work itself out, to commit suicide, or perform other disastrous, or, it may be, ridiculous acts. I have heard of an inmate of a lunatic asylum who so far recovered from his insanity that he was retained as one of the officers of the institution. It one day fell to this man's duty to conduct a gentleman over the establishment. After showing him the various parts of the building, he presently led him to a high tower, from which a good view of the entire premises could be obtained. When they had reached the summit, his old insanity seemed to return suddenly. The idea of precipitating himself took such hold of him that he proposed that they should both jump down. His companion, happily, at once seized the position, and with great readiness suggested that any fool could jump down: would it not be a more difficult feat to jump up from the bottom? The lunatic caught at the idea; he was soon dominated by this new impulse, and quietly followed the visitor down, and the danger was escaped. Such impulses are by no means confined to the insane diathesis; the sanest people are liable to impulses which, if acted upon, would lead to the most terrible or the most disastrous results. A gentleman with whom I am intimately acquainted, and who is perfectly sane, recently took his newly married wife to the top story of his house, in order to watch a fire raging in the neighbourhood; and he tells me that, as he looked down from the height, which was considerable, the idea of throwing over, not only himself, but his wife also, distinctly occurred to him—to be, of course, immediately overwhelmed by ideal motives. And I have heard a boy say that when he held his watch or a piece of money in his hand in the same way as a stone is grasped preparatory to throwing it, he felt the strongest impulse to throw it away as he would the stone.

If we remember that the insane individual is to a very large extent simple mento-motor, we can account for many of his curious acts, for he tends to work out any passing impulse without regard to fitness or expediency.

Another striking example of mental dissolution—to use a term stamped with the authority of Hughlings Jackson—is afforded by hysteria. The typical hysterical patient is swayed by each passing feeling, though underlying it is the ever-present desire for sympathy. This dominates her entire mental being: no nobler impulses rise up before her mind to dethrone it, or, if they do, they are weak and ineffectual.[1] There is also another form of weak will from which the hysteric is apt to suffer, as we shall presently see.

A strong tendency to imitate goes along with the type of weak will we are now considering, and is the mark of an ill-developed mind. Imitativeness, as Herbert Spencer observes, is "shown least by the highest members of civilised races and most by the lowest savages. . . . . It shows us a mental action which is, from moment to moment, chiefly determined by outer incidents."[2]

Here I wish to speak more particularly of imitativeness as manifested in external movements. Many forms of convulsive movements—*e.g.*, choreic movements and the movements of wild dances—are distinctly infective. The explanation appears simple. The sight of a particular movement suggests the idea of that movement—or rather, it agitates those nervous arrangements in the highest level which are engaged, not only in the idea, but also in the

[1] I must here point out the analogy between the form of weak will under consideration and the tendency to jump at a conclusion and obstinately reject all argument tending in an opposite direction. It is said a 'woman convinced against her will is of the same opinion still.' Such an one, like the weak-willed individual, is a slave to one impulse, and turns a deaf ear to whatever runs counter to it.

[2] "An Epitome of the Synthetic Philosophy," by Howard Collins, p. 349.

actual performance of the movement, and inasmuch as an idea tends to work itself out, it follows that there is a tendency in all individuals who see the movement to imitate it. In healthy-minded adults this tendency is counteracted by ideal impulses, but in children and in the weak-minded such ideal impulses may be feeble or absent. The mind is pervaded by an unopposed idea[1] which is thus realised in action.

It is largely in this way that we may explain those frenzied emotional dances which occur even in our own day, but which were a special characteristic of the Middle Ages. The individual is wrought up to a pitch of intense emotion, which acts as a strong stimulus to muscular action, and by which the mind is so completely overwhelmed that there is little room for more than a single train of ideo-motor states. Such a train is suggested by the frantic movements of others ; and the individual, like one hypnotised, acts in obedience to the suggestion. In such cases he is not acting voluntarily, in the sense in which I understand the word. The movements are either purely emotional, or simple ideo-motor.

A similar tendency to simple ideo-motor action is displayed by an excited mob. Every new suggestion is apt to be caught up and acted on. The multitude stops not to reflect, but surges now in this direction, now in that, as circumstance chances to dictate ; a trifle diverts its attention as a trifle, probably, brought it together.[2] Here again we are reminded of the acts of the hypnotised individual.

Some individuals show a natural tendency to be easily led away by others. Incapable of a self-sustaining purpose, they are dominated from moment to moment by what they are told, and, like the hypnotised individual, act upon suggestion. A very large proportion of victimised women probably belongs to this type.

I now proceed to give historical examples of the type of weak will we have just considered :—

[1] Or, rather, series of ideas, for a series of imitated movements has a corresponding series of ideas.

[2] See "Tale of Two Cities," chap. xiv.

"Antony, restless and self-indulgent, devoid alike of prudence and of principle."—Liddell.

"Charles the Bold (or Rash), a man of stubborn obstinacy which never resigned its purpose, however fatal perseverance might prove, ... and of headlong impetuosity which commenced its career without allowing a moment's consideration for the obstacles to be encountered. . . . The most hasty and impatient, nay, the most imprudent prince of his time."—Sir Walter Scott.

The Duke of Buckingham, too, has thus been impaled on the sharp point of Dryden's satire ;

"Stiff in opinions, always in the wrong,
Was everything by starts, and nothing long ;
But in the course of one revolving moon,
Was chymist, fiddler, statesman, and buffoon.
Blest madman, who could every hour employ
With something new to wish or to enjoy."

It is evident from these last two examples that impetuosity, or impulsiveness, may be combined with obstinacy —another form of weak will.

As examples of the opposite type we may take Henry VIII. : "Like all princes of the Plantagenet blood, he was a person of a most intense and imperious will."—Froude.

William III. had "rare force of will."—Macaulay.

Frederick the Great "had received from nature . . . . a rare firmness of temper and intensity of will."—Macaulay.

The following are examples of will weak from stubbornness :—

Charles I. : "The king is in his own nature very stiff."—Contemporary writer.

"Was possessed of an obstinacy which prevented him from making those prudent concessions which the temper of the times rendered necessary."—J. F. Bright.

George III. "had received from nature a firmness of temper to which a harder name might perhaps be given."—Macaulay.

Here let us stop to inquire whether the type of weak will described in this chapter is more characteristic of men or women. There can, I think, be little doubt that it is more commonly met with in women. This may arise from two distinct causes. (*a*) Women have stronger feelings than men, and are, as all the world knows, more apt to be swayed by them. They thus tend to be more impulsive and so far to be weaker-willed. (*b*) Further, probably more women than men are incapable of taking in the whole circumstances of a case, and passing judgment thereupon. Unable to sweep her mind's eye over the same breadth of horizon as the average man, the average woman finds the alternatives to action proportionately fewer, and in proportion as they are fewer, in that proportion does the act dictated by any one of them tend to be simple mento-motor, for, the more intelligent the individual, the greater the scope of the will. How far the difference in this respect between the sexes arises from nature and how from nurture, I shall not stop here to consider.[1] As one of the leaders of female education recently asked us to remember, "There has not yet been one generation of *educated* women."

[1] Möbius observes that weakness of will is characteristic of women, but he makes no discrimination between the different forms of weak will. ("Die Nervösität," Leipsig, 1882, S. 75).

CHAPTER X.

VARIETIES OF WEAK WILL (*continued*)—VACILLATION.

THE second variety of weak will is known as vacillation. In this condition the motives to action are so nearly equal in strength that no single one obtains the mastery. The individual frequently finds the *pros* and *cons* so nearly balanced —*i.e.*, the impulse, or impulses, to one course, and the impulse, or impulses, to another, of such equal force—that he is unable to make up his mind how to act: he vacillates, is undecided, and remains in a state of quiescence. This is in most cases[1] weakness of will, since will essentially

[1] I say "in most cases" advisedly, because I would guard against including among the class of weak-willed individuals those whom a rare capacity to see all sides of a question, uninfluenced by bias, leads to take up a negative position—such a man, for instance, as Lord Halifax, the famous "Trimmer," described by Macaulay as "*of rare powers of reasoning* . . . . in amplitude of comprehension and subtlety of disquisition unequalled among the statesmen of his time. But that very fertility, that very acuteness which gave charm to his conversation, to his oratory, and to his writings, unfitted him for the work of promptly deciding practical questions. He was slow from very quickness, for *he saw so many arguments for and against any possible course, that he was longer in making up his mind than a dull man would have been.* . . . . Too often when he had exhausted all that could be said, and came to act, the time for action was over." It is clear that a great logician can rarely be a great party leader.

Since the last sentence was written, I have come across the following passage in "The Caxtons" bearing upon the same point:

"'Come (Trevanion is speaking), I will tell you the one secret of my public life—that which explains all its failure (for, in spite of my position, I have failed), and its regrets—*I want conviction!*'

"'Exactly,' said my father; 'because to every question there are two sides, and you look at them both.'"

implies action, and to remain inactive when some course should be decided upon is the very negation of willing.

That such a tendency, like the tendency to imitativeness, indicates weakness of will is well shown by the fact that, under the influence of disease vacillation may take the place of a strong will, indecision of decision. The influence of prolonged torture and imprisonment in compelling an individual to recant his belief, or in shaking his firmness of purpose (*e.g.*, Savonarola), may in some cases be attributed to the debilitating effects of such treatment upon the nervous system.

The following instance of vacillation shows that it may be a symptom of nervous disorganisation:

Man, *æt.* 35. Has been able to foretell an attack of nervousness by finding himself unable promptly to make up his mind how to act on any given occasion. On rising in the morning, for instance, he cannot decide what to wear, whether a flannel suit or an ordinary cloth one. He carefully studies the thermometer and the general aspect of the weather. Now he determines upon this, now on that, and when at length he has brought himself to put on something, he begins to question the wisdom of his choice, and to upbraid himself for not having chosen otherwise.

A more remarkable case of indecision than the next I shall cite it will be hard to find:

Man, *æt.* 26. 6 ft. 14 st. Complexion pasty. No hair on his face. Looks like an overgrown boy. Eyes restless. Stoops and walks slowly. Knee jerk exaggerated.

Since his seventeenth year has been engaged as reporter in the Central Criminal Court, and believes the bad air and the trying nature of the cases he has to report have been the main causes of his present unhealthy nervous condition.

This manifests itself chiefly in indecision, which displays itself in various ways. He has a difficulty in getting up; cannot bring himself to put on any of his clothing without great effort, goes about his bedroom in a purposeless way, without even resolution enough to wash himself. At table he cannot make up his mind to eat; if a morsel of food is placed on his fork he will lift it off his plate, but when it is midway to his mouth, he stops, not having will enough to carry it any farther. This occurs at all his meals.

When sitting in court he will arrange writing materials before him and take up his pen, but he has not power to place it on the paper without the help of the left hand. Once started, however, he will go on for some time. When he has copied his shorthand notes he is not satisfied they are correct, and makes his wife read them over at least twelve or fifteen times. When they are posted he is still undecided as to their correctness, and wishes he could get them back and go over them again.

In the street he is uncertain which way he shall turn, or where he shall cross. Cannot hand money to cab- or omnibus-men; they have to take it from him. Is never certain about change; will count it repeatedly without satisfying himself.

After he has performed any ordinary or habitual act, such as locking a desk, shutting a door, putting out a lamp, or posting a letter, is uncertain whether he has done it, and will question himself over and over again.

Is easily controlled by being authoritatively spoken to. Thus, when quietly asked to undo his shirt and collar in order that his chest may be examined, is unable to do it; but a sharp and authoritative "Don't be a fool, man; undo your collar," secures instant compliance.

Now if the explanation of a voluntary action which I have given is correct—namely, that it is due to the concentration of the mind upon the idea of the act, and its consequent vivid realisation—then we may explain such a case as the above by supposing that the individual lacks this power, the power of vividly realising an idea, and the facts that the patient showed an inability to remember that he had already performed a particular act, and also promptly responded to an authoritative command which served to put one definitely before him, to the exclusion of all others, supports this view.

History furnishes not a few examples of undecided or vacillating characters. We may cite Louis XVI. of France, whose irresolution none will deny; and we have it on the authority of Bright the historian that Elizabeth had "a rooted dislike to making up her mind." Liddell writes of Pompey that he was "grasping and selfish, but irresolute and improvident." Pilate's name also at once occurs to us in this connection. Athelstane, the Unready,[1] is another good example of indecision. Sir Walter Scott thus describes one of his descendants: "He was comely in countenance, bulky and strong in person, and in the flower of his age; yet inanimate in expression, dull-eyed, heavy-browed, inactive and sluggish in all his motions; and so slow in resolution, that the soubriquet of one of his ancestors was conferred upon him, and he was very generally called Athelstane the Unready. His friends, and he had many, who, as well as Cedric, were passionately attached to him, contended that his sluggish temper arose not from want of courage, but from mere want of decision."—"Ivanhoe."

Hamlet also, though hardly a historical character, exhibits all the varieties of weak will. He is impulsive when he stabs Polonius, fascinated when he follows his father's ghost, and vacillating throughout.

The vacillator must be carefully distinguished from the shifty individual. A shifty person may be determined of purpose in all that pertains to his own interest, although he may, in the pursuance of that interest, appear vacillating to others.

Whether men or women are by nature the more vacillating it is difficult to say; but as things are, women, perhaps, have on the whole greater difficulty in making up their minds than men. The difference in this respect, however, if any, is no doubt due to difference in training, as I have before hinted.

[1] The epithet 'Unready' is said by modern authorities to mean "without rede"—*i.e.*, without counsel, or wisdom. I nevertheless retain the quotation from Scott for purposes of illustration.

CHAPTER XI.

VARIETIES OF WEAK WILL (*continued*)—FASCINATION.

We have now to consider that weakness of will which is due to the abnormal strength of some one motive—fascination.

It was seen that voluntary acts have essentially for their object the realisation of pleasure and the avoidance of pain; but that in obedience to the promptings of sympathy or of duty, the individual may act in a way that shall secure neither. In either case the will is normal in the truest sense of the word. Sometimes, however, an individual, in obedience to an abnormally strong impulse, not from any sense of sympathy or duty, voluntarily commits an act which leads to pain; he is, as it were, fascinated to act contrary to the general law of the will. In such cases he may, in a certain sense, be said to act in spite of himself; yet the action is here strictly voluntary.

Thus, to take again a previous example, a person standing on the edge of a cliff has a prompting to fling himself over; similarly, a person watching the light of an express train may feel an irresistible impulse to rush towards it, or may have a prompting to cross the rails when the train is quite close to him. Now if in either of these instances the particular morbid idea is the sole occupant of the mental field, the individual obeys it of necessity; he does not act voluntarily in the sense in which I am using that term; but if, as usually happens, some other impulse enters the field to do battle with the morbid impulse, then every one will acknowledge that the individual will be acting voluntarily, no matter which impulse he obeys.

This form of weak will is so interesting and so important that I propose to give some further examples of it.

When a patient dies in a hospital, and the body is covered up and screened, there is often an irresistible tendency on the part of some of the inmates of the wards to peep behind the screen, lift the sheet, and gaze upon the corpse. The silent, cold, spiritless covered-up thing that was but lately warm with life and capable of thought, has now become an object of morbid fascination. Patients who have themselves only recently been rescued from the jaws of death will, I am told, watch their opportunity, and when the ward attendants are not by, silently steal up to the screen. In some few cases the individuals thus tempted take a positive pleasure in what they do; but as a rule the sight of the corpse is most repugnant to them, and in spite of this they voluntarily give themselves up to the painful experience.

As another instance of this kind of weak will, let us take the case of an individual who meets in the street a person afflicted with a strange deformity. Curiosity prompts him to turn to look, though he knows very well the sufferer cannot be otherwise than pained by the act if he observe it. There is therefore a powerful motive prompting him to restrain his curiosity; and yet he may find himself impelled to yield to it, not indeed because its satisfaction will give him any pleasure—it probably does quite the reverse—but because he is under the spell of a morbid prompting. Whenever an individual thus acts he displays weak will. The essence of this kind of weak will seems to be this: the individual acts under fascination, counter to promptings which he knows to be alike more conducive to his own and to others' happiness than that to which he yields.

These morbid promptings sometimes impel an individual to do most ridiculous things. Thus I have known a person who, not content with biting his nails to the quick, must needs rub the tender exposed surface against some rough object and thereby cause himself the most disagreeable sensation, a sensation setting his very teeth on edge. He feels himself irresistibly impelled to do this. In like manner an individual may persist in touching a sensitive tooth so that it shall cause him exquisite pain, and after every such contact nerve himself to repeat the process. But perhaps the most curious instance of this kind that I have met with occurred in a boy of eleven years of age. This lad acquired the habit of licking the collar of his coat. The sensation thus produced was, as we may well imagine, most unpleasant; nevertheless he persisted in it for two or three years, much to the detriment of his coat-collars! Some might suppose this was a veritable case of insanity, but it was no such thing. The boy has since developed into a man of well-balanced intellect, and no one is now more ready to laugh at the absurdity of his conduct and to speculate upon its cause than himself. Some of the wisest men have acquired habits equally ridiculous.

Under this variety of weak will must also be classed that form of impulsive insanity in which the individual finds himself impelled to a certain act which runs counter to all the dictates of his reason. The prompting to do some terrible deed may, like a hideous nightmare, haunt the mind for years. He struggles and struggles against it, but without avail; waking and sleeping it is there, till at last the poor wretch will ask to be protected against himself. Here, as in the other cases cited, the mind is, as it were, fascinated by a particular idea which will *not* be suppressed, and which sooner or later acts itself out. In all such cases, the individual acts voluntarily. We may trace every gradation of fascination, from those cases in which the individual is urged to the doing of some one senseless or ridiculous act, to those in which he is haunted by a lasting motive to commit a terrible crime. Hence the *raison d'être* of my classification. For it is manifest that in considering weakness of will we must not merely take into consideration the weakness of ideal impulses, but also have regard to the morbid intensity of some particular impulse. For example, in homicidal mania an individual is suddenly seized with a frantic desire to kill, and we may fittingly, with Maudsley, speak of it as a 'convulsive' idea. The nervous arrangements in the highest level constituting the physical basis of that idea are abnormally agitated, as in the convulsive stage of genuine epilepsy (in which disorder the discharge begins in the same level), and the tendency of an idea being to act itself out, the individual rushes on to his mad act. He cannot, however, be said to act voluntarily. One morbid idea fills the mind to the exclusion of all others; the action is therefore simple ideo-motor.

To this type of weak will belongs also the not uncommon condition of the hysteric in which she would 'like' to do one thing, but is by an irresistible impulse impelled to do another.

In this connection a curious case, cited by Meschede, of Breslau, may be instanced. It was that of a man who, when he attempted to do a particular thing, whether from his own fancy or at the instance of some one else, found himself—or, at all events, his muscles—doing the very opposite.[1]

Some individuals are capable of exercising a fascinating influence over others, compelling them to do their bidding, but it is only the weak-willed who are thus dominated. They obey the word of command, especially if delivered authoritatively, because the idea it suggests works itself out, no counter-impulses powerful enough to neutralise it coming into play. In much the same way the squirrel is said to be fascinated by the bright gleaming eyes of the snake, and to rush with screams of fear forwards and backwards, each time approaching nearer, until finally lured within reach of the deadly fang. It is possible that the bright eyes exercise a hypnotic effect in such cases. I believe it is generally held that many of the night-prowling carnivora—*e.g.*, foxes—thus fascinate their prey; and it

[1] "Correspondenz-Blatt der Deutschen Gesellschaft für Psychiatrie," No. II. 1874.

seems scarcely unreasonable to assume that two bright globes shining through the darkness may produce hypnosis. Look at a caged owl. The creature fixes its eyes upon the bystander as if with intent to stare him out. Is it rash to assume that this so remarkable stare subserves a definite purpose?

As an instance of fascination, one recalls the mythical story of the Sirens. "These were their words; but the celestial harmony of the voices which sang them no tongue can describe: it took the ear of Ulysses with ravishment. He would have broken his bonds to rush after them; and threatened, wept, sued, entreated, commanded, crying out with tears and passionate imprecations, conjuring his men by all the ties of perils past which they had endured in common; by fellowship and love, and the authority which he retained among them, to let him loose; but at no rate would they obey him. And still the Sirens sang. Ulysses made signs, motions, gestures, promising mountains of gold if they would set him free; but their oars only moved faster. And still the Sirens sang, and still, the more he adjured them to set him free, the faster with cords and ropes they bound him; till they were quite out of the hearing of the Sirens' notes."[1] This, like so many other myths, embodies a great truth—the tendency of the human will to be held captive by external forces which it would fain resist.

I have now considered the first three varieties of weak will. It will be unnecessary to discuss the fourth variety in this work—that form, namely, in which coherent thought is impossible, and in which therefore the individual is incapable of undertaking a purposive course of action.

I have confined my remarks to the influence of the will on the voluntary muscles. As to its presumed influence in controlling mentation—in directing thought and determining desire, &c.—I have said nothing.

[1] "The Adventures of Ulysses," Charles Lamb.

CHAPTER XII.

THE STRENGTHENING OF THE WILL—THE WILL AS A THERAPEUTIC AGENT.

HAVING arrived at definite conceptions of the different kinds of weak will, we are in a position to deal with what is, to us as physicians, the all-important subject, viz., the strengthening of the will; and in considering it, which I shall do very briefly, we shall find it convenient to take each sort of weak will in succession.

1. It is clear that, in the first variety, our object is to create and strengthen ideal motives, so that they shall be able to enter into successful competition with the actual, to develop compound mento-motor, in place of simple mento-motor, action. The individual must be taught the evils of precipitate action and the necessity for reflection—a bit of scientific knowledge already crystallised for everyday use in the proverb, 'Look before you leap.' For, manifestly, the liability to act upon impulse is diminished when ideal motives are strong and numerous; the scope of the will increases as these increase. Nor is mere fixity of purpose sufficient to ensure strength of will, for when this is associated with narrowness of mind the individual merely exhibits another variation of weak will—viz., stubbornness or obstinacy. Our object, then, must be to create a number of *worthy* ideal motives—worthy, because power may be misapplied, and a will strong to follow selfish impulses does not actuate a noble character. The

motives must be the outcome of accurate knowledge and right feeling.

2. The vacillator must be taught to come to rapid and prompt decisions. There are many people—especially many women—who have little occasion, in their commerce with the world, to rely upon their own efforts and judgment. Such are apt to fall into the lazy habit of seldom or never making up their minds upon questions requiring deliberation; they prefer others to decide for them. Decision requires effort, and effort is distasteful to their self-indulgent natures.

Thus Lady William Lennox has alluded to the difficulty which many women experience over so simple a matter as choosing a dress: such should be *taught* to exercise their powers of choice, and here certain games, as chess and cards, affording practice in decision, will be found of the greatest service. Decision of character is most necessary to, and is found best developed in, practical men. What, indeed, do we mean by a 'practical man,' but one who is prompt to decide and swift to act as emergencies arise? The statesman, the strategist, the speculator, the surgeon, all stand in absolute need of decision. Imagine a surgeon in the midst of a difficult operation, when the patient's life depends upon rapid action, hesitating between two courses! Let any one who wishes to understand what decision of character means attend the operating theatre of St. Bartholomew's Hospital any Thursday afternoon, when the surgeons meet to consult over difficult cases. The patients are brought in one by one, and are examined, in presence of the students, by the surgeons in succession. After examination the patient withdraws. Each surgeon then gives his opinion on the case. There is no room for hesitancy. The patient's life may depend upon the result; and while the fierce light of criticism beats upon the speaker, he has to seize upon all the salient points of the case, and give his opinion rapidly and decisively.

3. In the third form of weak will, again, that in which some one impulse to action amounts to fascination, much

good may come from practice in self-control. Every opportunity should be taken of fighting against the morbid impulses. If an individual, for instance, finds a morbid inclination to scrutinise any passing cripple in the street, he should make a determined stand against the tendency.

But I will not attempt to describe in detail the various methods of educating the will ; I merely seek to indicate the main lines on which we should proceed. It is easy, in fact, for anybody to set himself a series of exercises in will-power. Let the weak-willed man make up his mind to overcome some strong impulse occasionally. Let him, for instance, forego the luxury of smoking, or let him give up his wine for a week now and again—not with the object of 'mortifying' the flesh, but in order to strengthen ideal impulses to action. A number of such exercises will readily occur to every one.

I have entered at some length on the subject of the will and its disorders, because it has a close bearing on many forms of disease, both as regards the interpretation of them, their prevention, and indeed their treatment also.

"I feel strongly," writes Sir James Paget,[1] "that this influence of the will upon the health should be a subject of resolute and careful self-education. Men should resolve that they will not allow every unusual sensation to distract their attention from work or any other important object. If they would steadfastly go-on working in spite of noises in the street or of talking in their rooms, they would more easily be indifferent to sensations suggestive of disease. The opposite of this is too often allowed and even boasted of. It is common to hear healthy people say, and sometimes as if it were praiseworthy, that they cannot sleep on this side or that, or without a pillow or some such help. In some of these there may be just reason for their defect, but in the greater number it is a mere habit grown out of a want of will to resist some discomfort. . . . . And others, many of

[1] "Studies of Old Case-Books," pp. 163 *et seq.*

whom are healthy, tell that, unless they have their meals at regular and fixed times, they cannot digest them. There are few of these who may not safely resolve that they will not fix the times, but will breakfast and dine whenever they please or whenever circumstances make it most convenient. Their digestive organs will submit to their wills, if their wills do not submit to them. . . . . I may as well say that I am the more sure of these things because I have myself done what I have here recommended, and have thus worked hard for more than fifty years, happily and without harm. And I have learned to believe that many persons, or all who are not definitely unhealthy, may go even beyond these rules. If they will resolve that their stomachs *shall* tolerate this or that food, or shall not have this or that stimulant, whether wine or mustard or any other, their stomachs will, in time, yield. They need not be more resolute than most of those must be who wish to be smokers; these find that, after a few days' distress, pleasure comes from the very thing that was a cause of misery. They have only to place themselves willingly in difficulties such as others have to endure, whether they will or no; as when, for pleasure or duty, they go to sea or places where the food seems at first unfit to eat. In time they learn to enjoy it, and it serves for active work."

No one, indeed, can doubt that the will may be effectually brought into service in the prevention and treatment of disease. John Reid, in his "Essays on Hypochondriasis" (London, 1821), has an interesting chapter on "the power of volition" in disease, and he aptly heads it with the lines—

> "By all the gods the Romans bow before,
> I here discard my sickness."

In the appendix to the same work occurs the following passage:—"We should have fewer disorders of the mind if we could acquire more power of volition, and endeavour, by our energy, to disperse the clouds which occasionally arise within our own horizon; if we resolutely tore the first threads of the net which gloom and ill-humour may cast around us, and made an effort to drive away the melancholy images of the imagination by incessant occupation."

Many remarkable instances of the influence of the will in disease have been recorded. Thus it is related of the famous Duchess of Marlborough, that in one of her illnesses her physician said to her, "Either you take these pills or you die." "I will do neither," replied the doughty lady; "I will neither take the pills, nor will I die." And she was true to her word.

It is above all in the functional disorders of the nervous system that a knowledge of the will is helpful to us. For the more an individual is a slave to strong emotion, the more he acts upon the impulse of the moment, the more likely is he, if endowed with a weak nervous system, to suffer from disturbance of nervous function; and it may, I think, be safely said that the stronger the will—other things being equal—the less likely is he to do so. The weak-willed, impulsive woman allows herself to be impelled hither and thither by the violence of her feelings, and is tossed now in this direction, now in that, like a bark upon stormy waters; while the woman of strong will, keeping steadily before her the end which she has resolved on, finds herself by and by in the haven where she would be.

The condition of the will in diseases of the nervous system, such, for instance, as hysteria, has been alluded to by more than one writer, but for the most part in such a loose and casual way as to make it impossible for the reader to get a philosophic insight into the matter, and it was indeed this circumstance which induced me to think it out. My attempt will, perhaps, appear somewhat audacious in the eyes of the professed psychologist, but my motive and the inherent difficulty of the subject will, I hope, induce him not to view my efforts in a too contentious spirit.

INDEX.

A.

B.

C.

D.

E.

F.

G.

H.

L.

M.

N.

O.

P.

R.

S.

PRINTED BY BALLANTYNE, HANSON AND CO.
LONDON AND EDINBURGH.