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THE PATHOLOGY OF EMOTIONS

THE UNIVERSITY PRESS

86 A

THE PATHOLOGY OF EMOTIONS

Physiological and Clinical Studies

BY

Ch. FÉRÉ

Physician at the Bicêtre

Rendered into English

BY

ROBERT PARK, M.D.

LONDON

THE UNIVERSITY PRESS, LIMITED

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1899

TRANSLATOR'S PREFACE.

A WORK of the importance of Dr. Ch. Féré's *La Pathologie des Emotions* can dispense with the translator's preface. But, to put myself into "rapport" with the reader, I venture to explain that I am not only the medium whereby the thoughts and experiments and case records of the great French physician have been done into English: but I homologate his conclusions. It was, indeed, because I found in this work a demonstration of conclusions already arrived at by the inductive and deductive processes of reasoning, that I determined to devote my leisure to its translation. I trust it will serve the purpose of enlightenment to the vast thinking and reading public who are unable to obtain the knowledge at first hand: and that it will ultimately fructify in improved legislative and educational methods. It is quite impossible, either can ever be, even approximately, perfect or admirable, so long as the minds of men are over-ridden, or even over-shadowed, by the ideas emerging from a metaphysical or supernaturalistic philosophy. Leave the minds of men alone to Nature and all comes right. They will find the truth, for, as Ruskin says, the truth reveals itself to the seeker. Blind the seekers by preconceived ideas, and, of course, they will seek no more, and the truth will remain hid. The sooner the terms mind and soul are recognised to cover complex phenomena emerging in simple forms of activity the better for humanity: for this recognition or comprehension is the true base line of all knowledge, and the substitution of any other base line such *e.g.* as that of one or more metaphysical entities, purely hypothetical, is bound to vitiate necessarily all knowledge and all reasoning. As Professor Lloyd Morgan* says, "Just as the trigonometrical survey of a whole continent may be constructed from a single accurately measured base line, so may we construct the vast

* *Monist*, January, 1898.

extra sensible world of science from the accurately measured base line of sensible experience. Science does but indefinitely prolong and extend the process of inference which common sense habitually employs in dealing with daily affairs. And only by oft-repeated reference to the touchstone of experience is the gold of valid inference distinguishable from the false coinage and spurious notes of fallacy." All great thinkers are prophets, but all prophets are not great thinkers. This is apropos of the fact that Sir Isaac Newton, in the preface to his great work, entitled, "The Mathematical Principles of Natural Philosophy," remarks, "I wish we could derive the rest of the phenomena of Nature, by the same kind of reasoning, from mechanical principles: *for I am induced by many reasons to suspect that they may all depend upon certain forces by which the particles of bodies, by some causes hitherto unknown, are either mutually impelled towards each other, and cohere in regular figures, or are repelled and recede from each other.*" The truth of this prophetic utterance is becoming unfolded daily in the facts of physiological psychology.

I regret my energies have not been adequate to the complete rendering of all the references in footnotes. Most of them have been rendered, and, in a future edition, I shall see that they are all rendered.

In conclusion, I think I had best ask the reader to look upon all italicised passages as italicised by me. Some, no doubt, are italicised in the original, but all are not.

ROBERT PARK, M.D.

Glasgow,

October, 1898.

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PREFACE.

HERBERT SPENCER divides states of consciousness into states of consciousness which proceed from the centre, or emotions; and states of consciousness which proceed from the periphery, or sensations;* and these last are subdivided into sensations which proceed from the *interior* of the body, and sensations which proceed from the *exterior*. The states of consciousness which proceed from the *interior* of the body are analogous to those proceeding from the centre in respect of the difficulty of recalling them. "It is difficult to recall into consciousness the sensation of hunger. It is easy to think it in *circumstances in which hunger is itself produced:* but, after a good meal, it is almost impossible to effect, in any degree, a representation of this lively want of food which existed before the repast. The same is true of thirst." "It is true also, in a certain sense, of the states of consciousness proceeding from the centre, or emotions. . . . The emotions are excited, not by physical agents themselves, but by certain complex relations betwixt these agents. It is impossible to bring back instantaneously into consciousness, even under a feeble form, the passion of anger and joy. The representation of one or the other cannot be evoked otherwise than by imagination: and by insisting upon some circumstances calculated to produce them, which takes an appreciable time."†

Mind is composed of states of consciousness, and relations between states of consciousness:‡ there is, therefore, evidently not any state of consciousness which pertains either to sensation or emotion which may be completely pure (*i.e.*, clear) of every intellectual element: it is impossible to disassociate states of emotional from states of intellectual consciousness. Automatic acts are unaccompanied by sentiment. Emotion, demanding a certain time

* *Principles of Psychology.* Vol. I., p. 168.
† *Loc. Cit.*, p. 235.
‡ *Loc. Cit.*, p. 503.

to develop itself, necessitates a certain continuity of psychical state.* "In so far as an activity has not become automatic by habit, it is not indifferent; it is painful if it is difficult: it is agreeable if it is easy." "It is clearly proven by the natural language of the passions that the desire to produce a certain act is no other thing than the nascent excitation of the psychical states implied in this act. Fear, when it is strong, expresses itself by cries, efforts of concealment and flight, palpitations and tremblings: and these are just exactly the manifestations which would accompany an actual experience of the evil which one fears. The passions which tend to destruction manifest themselves by a general tension of the muscular system, grinding of teeth, putting up of fists, dilatation of the eyes and nostrils, exclamations or growlings: and this is exactly, only in feeble form, what takes place during the act of putting a prey to death."† The emotions, in one word, result from the mental representation of agreeable or painful states: they are consequently so much the stronger as they bring back the greater number of the actual sensations, or nascent sensations, proper to the recall of these states. It results from this that the more numerous the associations are, the more intense the emotion can be which, considered in its normal form, is proportioned to the intellectual development.

If the emotions are only representations of the states of consciousness provoked by external excitations, it is to be presumed that the physiological conditions of the emotions present an analogy, if not a complete similitude, to the physiological conditions of the sensations: and this approximation ought to clearly impose itself upon pathological as well as normal states.

"Life, in the normal condition, as in the abnormal, is always subordinated to the conditions of an order purely physical . . , and we can say, (says Claud Bernard),‡ that every malady is, at bottom, an alteration or a modification, more or less, of a physical condition, which is endeavouring to return to the normal condition." The phenomena, the most sublime, of life do not escape this law; the mental manifestations obey the common rule.

* *Loc. Cit.*, p. 517.

† *Loc. Cit.*, p. 523.

‡ *Leçons sur la chaleur animale.* 1876, p. vi.-vii.

If the physiological conditions of states of consciousness of central or cerebral origin, and those of states of consciousness of peripheral origin, internal or external, are identical whether in the normal or abnormal state, (then) the physical agents which are capable of modifying a state of consciousness of peripherical origin, are also capable of modifying states of consciousness of central origin: the external signs of these divers states of consciousness can be studied by the same procedures: psychology is only physiology specialised, mental medicine is only a specialisation of general medicine, upon which it ought to impress its procedures of study and procedures of action, all purely physical.

It is the demonstration of these relations which is undertaken in this book.

What we say of emotions can apply to the passions, which are only in fact durable emotions, chronic emotions if you will.

One cannot say that there are indifferent sensations, although one sensation cannot exist in consciousness otherwise than with a certain degree of attention, that is to say, attraction or repulsion, but there is a limit to the discernment of the agreeable or the disagreeable. The same holds good of the emotions. From the physiological point of view the emotions are sthenic or asthenic, according as they are accompanied by an augmentation or diminution of activity: but sthenic phenomena can display themselves momentarily in consequence of an asthenic or painful emotion. The pathology of anger will throw some light on this subject.

Three great ideas dominate psychiatric science. The first goes back to Hippocrates, who taught that madness was an ailment of the body. The two others are very recent. We owe them to Guislain and Morel, who have taught us, the first, that at the beginning a large number of mental troubles are founded upon moral pain; the second, that these same mental troubles are favoured by a state of degeneracy which he himself recognised had many causes: "for such is the mode of existence of living beings," says Bichât, "that everything that surrounds them tends constantly to destroy them."* All the physical agents which tend towards the maintenance of life, or to bring irritability into play: all the ingesta which contribute to the support of the organic combustions

* *Rech. phys. sur la vie et la mort.*, p. 77.

are capable by their actions, sometimes insufficient, sometimes excessive, to provoke modifications of nutrition, which express themselves by morbid modifications of the functions of relation. These modifications of nutrition constitute the physiological conditions of the diverse emotions which accompany them necessarily.

For those who do not very well understand the radical difference which exists betwixt an hypothesis and a demonstration founded upon observation and experience, the history of the relations betwixt the physical and the moral has been long written: and the physiological conditions of mental troubles are sufficiently expressed in the three notions just recalled. But on considering things afresh, in the light of positive philosophy, we are less advanced. The somatic conditions of psychic phenomena, their individual variations, normal or pathological, the different modes of expression of pain, are not yet known to us save in a manner of little precision.

The study which is to follow has no pretention to fill the void, but only to bring together the documents capable of serving to clear up the question in the light of facts of observation and experiment.

The aim of this work is to determine, as far as possible, the physiological conditions of the emotions, and to show that these conditions are identical with the somatic reactions resulting from the action of the physical agents to the influence of which man is subject. One will see then that the emotions are somatic states which are accompanied with states of consciousness such as one may see developed in consequence of physical excitations. External excitations, and representations of external excitations, emotions, can determine the same reactions, general or local, but variable according to the anterior condition of the patient or subject: one finds in the wake of moral shocks and in the wake of physical shocks the same pathological accidents, whether of the bodily or intellectual order. The absence of normal physical excitants are accompanied by the same depression of the animal functions as the absence of mental excitations.

This similitude of physiological conditions will lead us hereafter to establish the physical nature, normal and abnormal, of the mind; and to propose prophylactic measures, hygienic and thera-

peutic, whose physiological action shall be experimentally adapted to their end.

All organised beings, says Paul Bert, are, for general physiology, as one being infinitely diversified. It is now quite legitimate that one can utilise the facts furnished by observation and experimentation on animals. Always, as we have in view the study of man, we shall prize especially the facts of human physiology by not demanding from comparative physiology its evidence; save only where observations upon man shall be in default or insufficient.

But will the experimental method be applicable to man? Erasistratus, step-son of Aristotle, made experiments upon man which Celsus recalls when rejecting the conclusions from them: his criticisms are based on the troubles provoked by mutilations and especially by pain.

Experimentation on man is not much better aided during the three first quarters of this century. Auguste Comte condemns vivisection in general from the point of view of philosophic method and from the point of view of morality.* Claud Bernard says also that, save in some exceptional cases, our moral ideas refuse to sanction experiments on man.†

Although the most grave of our experiments may be borne by the injection of inoffensive substances, and hypnotic suggestion, I believe it useful not to avoid the question which is not to-day a simple subject for philosophical dissertation, but quite a practical question. The exploitation of hypnotism has provoked recently the most lively protestations: but hypnotic practices are not the last word in experimentation upon man, vivisection itself has entered into the domain of surgery: "The surgery of the brain, of the spinal cord, and the abdominal and pelvic cavities is at once experimental and therapeutic. It is a vivisection of the most noble kind. It enlightens physiology, the basis of the art of curing, and it demonstrates the pathology at the same time it cures it."‡ Its immediate end, Barnes says again, is to relieve pain: whether it attains this or not, it has surely one good result: it instructs.

When the American, Bartholow, in a case where the parietal bone had been destroyed by a cancerous disease, caused a current

* Comte. *Cours de Philos. Positive.* 4th ed., 1877. Vol. iii., p. 226.

† Bernard. *Léçons de Physiologie Opératoire,* p. 73.

‡ Robt. Barnes. *The Correlations of Sexual Functions and Mental Disorders of Women.* B. M. J. 1890. Vol. ix., p. 692.

to pass through the brain which determined muscular contractions upon the opposite side of the body, and then convulsions, lively protestations were made, which have left their traces in the writings of physiologists to whom vivisection in itself was not repugnant. In these later years, surgeons, guided exclusively by the knowledge of the functional localisations of the brain, have, after opening the cranium, practised the same excitations to assure themselves if the part, which it was proposed to remove, was really that in which was the convulsional lesion. No protest was raised against an experiment which seemed dictated by the interest of the patient.

"*Primum non nocere,*" that ought to be the motto of a physician equally in pursuit of scientific research as in the exercise of his profession: but it ought not to be forgotten that when he moves in the common ways, opened up by large experience, every evil which can result from his act is imputable to him.

Beard* has quite properly insisted upon the causes of terror to which one is exposed in experimentation upon living man, especially in the psychological direction: and he sums up these causes under the six following heads: 1st. the unconscious phenomena which transpire either in the experimenter or the subject of the experiment: 2nd. an unconscious self-deception on the part of the subject: 3rd. a conscious deception on the part of the subject: 4th. a voluntary intervention of assistants: 6th. the risk of coincidences. These causes of error merit especially strict attention when evoked psychical phenomena are concerned: but the experiments to which appeal will be made in the course of this work have relation exclusively to physical conditions: studied for the most part with the aid of instruments of precision: and, for the most part, at least, I do not believe that they merit the reproaches which can be addressed to the method.

Most works, where effects of the emotions or passions physiologically are in question, approach their description on the basis of facts drawn from authors who were strangers to the biological sciences: some indeed exploit, without any scruple, even the dramatic authors. Without entirely neglecting the facts which

* S. M. Beard. *Experiments with Living Animals.* P. S. Monthly, Mar. and Apl., 1879.

pertain to history I have systematically set in relief (repoussé) those which are scattered (répandus) in literary works whose authors have not proposed for themselves the motive of a biological study, but a description capable of interesting their readers.

I have myself dealt almost exclusively with facts drawn from medical works: I believe that this precaution is almost indispensable: it appears to me that it would be wrong to permit oneself to accept, as scientific documents, facts reported by literary authors.* Many romances, literary studies, and even philosophical works, contain pathological or psychological facts unrelated to their true source, and are more or less disfigured, perhaps involuntarily, perhaps by the necessities of the case. By borrowing from authors, who have not besides the pretention of relating facts scientifically described (observed), one lays oneself open to alignment of comparison with purely imaginative observations, which have already been registered under other forms. In support of this reserve I cite an anecdote personal to myself.

When I have had occasion, during some years past, to observe an assemblage of phenomena of singular (nature) which I have described, wrongly or rightly, under the name of electrical neurosis, and which may be found, moreover, in the course of this work,† I have cited in support of my observation a fact which I have found in a romance of M. Goncourt, *La Fille Elisa.* Shortly after the publication of my memoir, I was in doubt, and I went to find M. de Goncourt, and asked him if he had truly observed the subject of which he spoke in his book. "No," said he, "I found the fact in Dr. Liouville." I went to the latter, but he had never seen the "Alexandrine phenomène." He vaguely remembered having read something on the question. It was not until after some days that he could indicate to me the source where he had gained his information; it was a note in the *Hospital Gazette* of some years previous, and which I have always cited in my memoir. Literature has furnished no further document to me, unless that which was false.

* *Progrès Médical*, 1884, p. 540.

† Annales Med. Psy., 1888. 8vo ser. T. vij, p. 141.

CHAPTER I. (PART I.)

Physiological Effects of Physical Agents upon Man.

Summary—Air—Atmospheric Pressure—Temperature—Hygrometric Condition—Electrical Tension—Ingesta—Light, Sound, Odours, Savours—The Equivalence of Sensorial Excitations, Coloured Vision, Synaesthesias—The Physical Signs of the Sensations.

In order to show the analogies betwixt physiological and pathological phenomena which accompany states of consciousness of internal origin with those which accompany states of consciousness of external origin it is necessary to pass in review, at least succinctly, the influence of physical agents upon man. It is only after having followed the analogies of the somatic conditions of these diverse states of consciousness that one can very well understand the physical basis of the phenomena of mind.

This rapid review must comprise the circumfusa and the ingesta.

I. We cause seven to eight cubic mètres of air to pass through our lungs in twenty-four hours; there is, therefore, no room for astonishment that all the changes of its composition entail important modifications of the functions of life.

The oxygen fixes itself in the globules and forms oxyghémoglobine, which becomes reduced in the capillaries, and maintains (undergoes) organic combustions; it is the most important element in the air. It is its variations especially which influence the phenomena of life.

The quantity of inspired oxygen has a considerable influence, not only on the function of nutrition, but also on the functions of relation, and especially on the energy and rapidity of psychical acts. Priestley had determined even in his day that a mouse can live three times longer under a bell filled with dephlogisticated air, than in the same bell filled with ordinary air, and he had remarked the sensation of well-being that follows the inhalation of this gas in a state of purity, of this "air de luxe" as he called it.

Amongst the physiological conditions of this sensation of well-

being and energy must be noted the effects of oxygen on the composition of the blood and urine. Beddoes had already remarked that under the influence of the inhalation of oxygen the blood became more coagulable, more plastic (Nysten), besides that the number of globules therein augments in a considerable proportion (Dmarquay, Aune), and also hemoglobine (Albrecht): oxygen appears to act on the development of hematoblasts. At the same time the elimination of urea and uric acid by the urine notably diminishes (Ritter). The urines of herbivora, ordinarily acid, become alkaline when they are made to respire oxygen.*

To these modifications of nutrition correspond modifications of the functions of relation which are not without interest. On twelve persons, of whom six were furnished by the medical and administrative personnel of my services at Bicêtre, and six were taken from amongst the least affected epileptics so far as intellect is concerned, I have made the following experiment:—

With the dynamometer of Régnier we took the energy of the pressure of the fingers, two trials to each; then the simple motor reaction of the right hand (ten trials successively). The same explorations were repeated, about one hour later on each subject after inhaling tranquilly about thirty or forty litres of oxygen. Here is the result:—

		Energy. kilos.	Reaction Time. sec.
Before Inhalation:	1st group	56	0·173
	2nd group	40·9	0·215
After Inhalation:	1st group	58·3	0·148
	2nd group	44·6	0·183

These figures, which represent the average for each group, concord with individual results: in a single subject of the first group there was found no difference before or after the inhalation. They show that under the over-activity of the respiratory changes the energy of the movements augments synchronously with their rapidity: we shall have occasion to find more than once this corelation.

The air which has served for respiration has lost a part of its oxygen and its vivifying properties. Carbonic acid accumulates

* Cl. Bernard. *Leçons sur les Substances Toxiques et Medicamentenses.*

in the atmosphere of the places where living beings dwell, and where the air is not adequately renewed: this accumulation determines troubles of the respiration and the circulation which tend to cause asphyxia.

In confined air, moreover, one experiences a sensation of general malaise, the respiration becomes painful, there are cephalalgias, vertigos, sometimes syncopes. The dyspnœa is progressively accentuated: the sensation of thirst becomes painful, there are profuse sweats, the senses are blunted, an increasing prostration follows, and the loss of consciousness and death arrive sometimes after a short period of delirium. The diminution of the proportion of oxygen and the augmentation of the carbonic acid play a *rôle* in the production of these phenomena, but the part which belongs to one and the other respectively it is difficult to determine.

Carbonic acid, which at the normal pressure only constitutes 0.03 to 0.04 of the volume of air, can be found in Halls of Reunion in the proportion of 0.2, 0.4, 0.8, and even 2.70 and more in certain mines. It proceeds, it may be, from the disengagement which produces it in volcanic regions, it may be from fermentations taking place in the superficial layers of the soil, it may be from the respiration of animals and the nightly exhalation of plants, it may be also from combustion hearths. Its accumulation in the blood retards organic changes, whence there results a diminution of nervous excitability, which expresses itself by anæsthesia and paresis, then by suspension of the respiratory movements without either agitation or convulsion.

The daily oscillations in the proportion of carbonic acid scarcely passes 0.2 to 0.5 per 1,000: let us note always that its proportion is a little greater in towns, and that its maximum appears to be reached at night.

When the blood is much charged with carbonic acid not only the functions which depend upon the brain become numbed, but those which depend on the spinal cord are subject to the same influence: the reflex action of the cord can be entirely suspended. Tarchanoff concludes from these experiments that the intensity of this nervous action is, up to a certain point, in relation to the richness of the blood in oxygen.* The experiments which we have

* C. R. *Société de Biologie*, 1875, p. 329.

reported previously indicate that psychical activity is also in relation, within a certain limit, with the quantity of oxygen in the blood.

The products of the combustion of the substances which maintain bodily heat, especially when the organs function badly, accumulate themselves in the air, and determine frequently very characteristic phenomena. This kind of intoxication is due partly to the carbonic acid, but especially to the carbonic oxide. It presents itself in an acute or a chronic form.

The acute intoxication begins by a period of excitement, characterised by headache, ringing in the ears, tremulousness, necessity to respire which becomes progressively anxious. Then comes a period of depression when abolition of sensibility and voluntary movements supervene, and finally cyanosis, coma, and death. When the sequelæ are arrested at an advanced stage of their evolution, they persist frequently to a certain degree, under form of troubles of sensibility, movement, intelligence, which remain more or less enfeebled. The functions re-establish themselves even after an apparently prolonged period of apparent death.*

The chronic intoxication characterises itself by continued headache, vertigos, defects, a progressive enfeeblement of sensibility and movement entailing intellectual troubles, objectified by the loss of memory, or speech. The digestive functions become weakened: vaso-motor paralyses, mainly of the extremities, supervene. Like all nervous shocks, intoxication by carbonic oxide can determine the apparition of persisting neuropathic troubles, phenomena of exhaustion which are met with, especially in predisposed individuals, and in hysterical women. These troubles are not limited to the motor and sensory functions: they attack also the psychic functions: it is thus that we have observed in the wake of this sort of intoxication an amnesia which approached very nearly the traumatic sort or the post epileptic, by this circumstance, viz., that they could become retro-active, that is to say, comprehensive of events which have preceded the intoxication.

These facts show that the activity of the nervous functions is not without relation to the quality of the blood. The variations in the quantity of the blood express themselves by concording physio-

* Henry. *Du Sommeil et de la vie latente*, 1885, p. 21.

logical effects. Hemorrhage abolishes also sensibility, and in the same order as the anæthesias: one observes the disappearance successively of conscious sensibility, special sensibility, general sensibility, unconscious reflexes, and the automatic reflexes.*

The quantity of water in the air, which is about one per 100, undergoes considerable variations. The relative humidity of the atmosphere augments at night up till 2 a.m., to remain stationary for six hours, then it decreases till 2 p.m., when it attains its minimum. The humidity of the atmosphere has a great influence on the functions of the skin and the respiratory organs. Barral has seen that at the temperature of 20.8 C., and in a dry season, a man exhaled 47.6 grammes of water, whilst he did not exhale more than 21.8 grammes in a rainy season, and at a temperature of 6.32. The humidity which augments the density of the air favours the effects of nocturnal chilling.

II. Atmospheric pressure effects a mean equilibrium with a column of mercury 760 mm. in height. The exhaustions and foulings of air, the modifications of temperature produce for the same place oscillations more or less extensive of this pressure. But, these normal oscillations are not, in general, perceived by normal subjects. Neuropathics experience therefrom, however, often a certain uneasiness, irritability, and a sense of oppression, etc.

The pressure diminishes in proportion as one ascends, and this diminution, at mean altitudes, is about one mm. of mercury to 10 m. 50 of elevation: higher up each lowering of the same value corresponds to 16 m. 8 of elevation. The diminution of pressure which has for its consequence a lowering of the proportion of oxygen introduced into the lungs at each respiration, has for its first effect to provoke mechanical troubles of respiration of a compensatory kind, the augmentation of the frequency of respiration and heart beats. If this compensation becomes insufficient, with the defective hematosis appear the first symptoms of asphyxia. Respiration becomes precipitate, inefficacious, anxious. It produces palpitations, with throbbings in the temples, and often violent headache: the members become the seat of continued pains: there is a sensation of invincible lassitude with thirst and

* Cl. Bernard. *Leçons sur les Anaesthèsiques et sur l'asphyxie*, 1875. p 150.

distaste for food. Then ensue absolute powerlessness, vertigo, nausea, vomiting, somnolence, loss of consciousness, and death.

This succession of phenomena which exhibits itself in a greater or less degree in the Mal des Ballons, in the Mal des Montagnes, has for its prime condition, as Paul Bert has demonstrated, the diminution in the quantity of respired oxygen: the lowering of the temperature and the muscular fatigue only play a relatively unimportant *rôle*, like the diminution of pressure also. These influences are not, however, null: we know, in fact, that in the tropics mal des montagnes is scarcely produced at an elevation of 4,500 mètres or nearly, whilst in the countries where one has to contend against low temperatures it manifests itself at about 3,000 mètres. On the other hand, it supervenes sooner with Ascensionists than with aeronauts who have to make no muscular efforts.

The organism can adapt itself to the defect of hematosis which results from the diminution of atmospheric pressure: one can, in fact, live in the Hospice of St. Bernard which is at a height of 2,470 mètres: villages of Thibet are at a height of 5,000 mètres. Always, under these conditions, as we have especially well observed in Peru, in Bolivia, and in Mexico (Gourdannet), the acceleration of the pulse and the respiration establish themselves on a permanent footing: for the development of the thoracic cage which one observes there does not constitute an adequate compensation; besides which the inhabitants of these countries are attacked by a particular anæmia, (anoxhemia, Jourdanet), and, in general, they are little capable of muscular efforts.

Under the influence of the diminution of pressure, the psychical activity diminishes at the same time as the physical. The observations of M. Janssen* on the summit of Mont Blanc show only that by avoiding fatigue one avoids, to a great extent, the psychic troubles which result from ascensions: but the absence of precise determinations prevents the deduction of the absolute integrity of the functions. The aeronaut Joves has made, at my request, notably in the ascension of the "Horla," dynamometric experiences which exhibit exactly a very appreciable diminution of the muscular force, at about 1,500 mètres.

Augmentation of air pressure hardly finds itself realised except

* Janssen. *Une Ascension Scientifique au Mont Blanc.* (Rev. Scien. 1890, t. xlvi, p. 391.

in the compressed air apparatus used by divers in working under water: or for therapeutic purposes. In the first the pressure varies in general from two to four atmospheres, in the second it scarcely exceeds one, and frequently it is not used above one-quarter. Under the influence of this augmentation the movements are easier:* the efforts bring less quickly the sense of suffocation (l'essouflement); in spite of the abundance of sweats, thirst is little felt, the appetite is augmented. If the sojourn in the apparatus is prolonged exhaustion follows: to a species of intoxication at the beginning succeeds a physical and mental depression.

I have observed that under an augmentation of pressure, even feeble in kind, (such as one obtains in aërotherapic apparatus), there is induced an augmentation of the muscular force simultaneously with a diminution in the time of reaction; coinciding with a sensation of well-being. I shall have to return to these facts apropos of the physiology of attention.

III. Man can support enormous variations of temperature. In certain countries of Africa temperatures of 50 deg. to 60 deg. C. It is observed that in the stokeholes of steamers which traverse the Red Sea the temperature attains 65 deg., or even 75 deg.: we have observed experimentally that in dry stoves temperatures of 120 deg., and even 132 deg., can be supported during a short space of time. On the other hand, we have noted in Siberia temperatures of— 63 deg. Man can, therefore, live in temperatures differing almost as much as 200 deg.

The regulation of animal heat which adapts itself to the environment is dependent upon that part of the digestive process which furnishes the combustible to the machine; and, on the other hand, to the respiration which furnishes the oxygen, and accelerates or retards combustion; and the pulmonary and cutaneous transpiration which regulates the loss of caloric. In the process of heat loss, radiation, conductibility, and evaporation play a more or less predominant *rôle* according to the circumstances. The movements of the air favour evaporation in proportion as the air is dry. In animals of a constant temperature the quantity of oxygen absorbed by the blood varies in inverse ratio to the temperature of the air they respire; the augmentation of the quantity of respired oxygen

* Foley. *Du travail dans l'air comprimé.*

is *not* in relation to the number or frequency of respiratory movements which diminish under the influence of cold.

All the circumstances which tend to retard nutrition and enfeeble the organism in any way tend also to diminish the production of animal heat, and consequently the resistance to cold. Prolonged action to heat can have this effect like every other cause of depression. Heat augments after muscular contraction, then it abolishes it; it augments the swiftness of transmission of nervous action, but this swiftness diminishes when the temperature is raised above 42 deg. to 45 deg.

W. Edwards has shown now for a long time that young animals which produce less heat, resist cold much less well than adults. He recognised besides that in cold seasons which necessitate a more considerable production of heat to make up for the greater loss, and to maintain the temperature, the effects of cold are more intense.

The influence of cold on nutrition is not momentary; organised beings often manifest the effects thereof ulteriorly. Silk-worm rearers have remarked that when one places for incubation under identical conditions of temperature eggs of the bombyx, which during winter have been conserved in an icery, and others which have been placed in a cave the temperature of which was less, these last generally open quicker than the others: the difference may be four or five days.*

W. Edwards draws from these observations the following conclusions: "Thus when one has been exposed to a degree of cold below that which is agreeable to the economy, although the temperature of the body has regained its first degree after the application of the external heat, there does not the less remain for a time a diminution of the faculty of producing heat; and the more one is exposed to the repeated action of this cause, provided the intervals are not too long, the more this effect augments."† *There exists a constant relation betwixt the activity of the organic combustions and the activity of the diverse functions, as well of nutrition as of relation.*

We know well the influence of climate on menstruation, which is more precocious in hot climates, and is delayed longer in the

* Milne Edwards. *Léçons de Physiologie.*

† W. Edwards. *De l'influence des agents sur la vie,* in 8vo, 1824, p. 248.

north, just as is the frequency of heat (rut). Buffon had already noted that in hot seasons the growth of man was quicker: the fact has been confirmed by recent researches.

Muscular action itself is influenced by temperature: muscular irritability is, in general, enfeebled by cold and augmented by an agreeable temperature.

The lowering of the external temperature induces a depression of physiological combustions; it has a great influence upon the phenomena of life, and particularly upon nervous phenomena: Helmholtz having calculated the swiftness of the nervous current at twenty-six mètres per second, in the nerves of the frog, observed that this swiftness can be reduced to fifteen mètres if one lowers the temperature to zero. The influence of cold on the swiftness of nervous action in the motor nerves has been often controlled since, as by Marey, and in the sensitive nerves by Bloch and Richet. This influence of lowering of the temperature shows itself not only on physiological activity, but even on the nutrition of the nerves after their section: thus, in the frog, segmentation, which only requires fifteen to twenty days during summer, only begins at the third month in winter: Vulpian and Phillippeaux have seen excitability persist for six months in the latter season. The ganglionic nervous system does not escape this action: we know that the muscular organs which have the property of preserving a certain motor autonomy after their separation from the rest of the organism (a property which they owe to the presence of nervous ganglions), such as the intestinal walls, certain parts of the heart, and of the diaphragm, can, after having lost their contractility, have it restored again, momentarily, under the influence of heat.

The modifications of nutrition which produce themselves under the influence of changes of temperature can perhaps be explained partly by a purely physical condition. Poiseuille has observed that cold exercises an influence on the circulation in the inert tubes over and above its action on the density of the fluid and the calibre of the tube: the immobile bed of serum thickens itself and augments its adherence, whence retardation of circulation.

The influence of heat on vital phenomena is considerable in the superior animals, but it is especially great amongst insects, as Spallanzani remarked, and as Treviranus especially has observed.

The general depression of vitality under the influence of cold expresses itself in man by the more pressing necessity for prolonged sleep in cold climates and during winter.

The influence of heat makes itself felt in the anatomical elements, and, especially, in the elements of the blood. The study of the movements of leucocytes has furnished the same results in cold-blooded as in warm-blooded animals: at 10 deg. or 12 deg. C. there are no movements; active movements are produced about 20 deg., but especially about 37 deg. (Schultze, Ranvier). Heat acts similarly upon epithelial cells as upon vibratile, etc.

The excessive elevations of temperature determine, on the contrary, relaxation of the vital functions in general, as well as of movements. In man one can establish that in feverish affections sensibility is diminished under all its forms, and that there exist very marked retardations of the voluntary reaction.

The effects of cold upon man have been studied by Edwards, Bence Jones, and Dickenson, by Messrs. Tholozan and Brown-Séquard, by Fleury, Marey, etc. The facts have led me to study the same conditions, and have shown a certain number of facts of which some are confirmatory of those which have been observed by authors whom I have cited; but of which some also are contradictory.

(a) The simple exposure of the naked body to air, in an atmosphere whose temperature, is relatively high, say 18 deg. to 20 deg. C., suffices to determine, in a few minutes, an augmentation of pressure in the radial which can attain to 200 to 300 grammes at the end of ten minutes, even when the initial pressure was high enough, from 800 to 900 grammes, for instance. This effect enables us to comprehend how a sudden exposure to a low temperature can determine ruptures of vessels previously altered. The augmentation of pressure which realises itself then can also explain the facts in which epilepsy has been observed to be determined by exposure to cold.*

When the augmentation of arterial tension provoked by expo-

* All these experiments have been made with the sphygmometer of M. Bloch. I made them concurrently with my internes and we learnt generally, to 25 or 50 grammes almost, on the figures obtained. Sometimes we arrived at exactly the same figure: that is to say, the method of examination yields indications sufficiently precise, especially when they proceed from comparative observations on the same individual examined at the same hours, in the same position. (C. R. *Soc. de Biologie*, 1889, p. 472).

sure to the air of the naked body passes 200 to 300 grammes, there is produced, in general, an interesting phenomenon, which has already been related by M. Aubert , and can produce itself also in old subjects under the influence of emotions:* that is a considerable hypersecretion of the cutaneous glands of the armpit, which, in some subjects, gives place to an extremely abundant flow. This local sudorific action of cold merits being known, for it appears to me capable of explaining some effects which we have attributed to electrical excitation of the costal and spinal regions (Vulpian, M. Raynaud).† That this electrisation of the skin excites secretary action of the glands of the armpit has appeared to me evidently defective, when one practices the excitation, in the absence of cold, on an extensive expanse of skin.

This hypersecretion appears to me moreover interesting, inasmuch as it appears to indicate that the reflex vaso-constrictor action of the cold is not so general as one might have believed.

(b) An epileptic under my treatment could often avert or suspend his attacks, at the commencement of the premonitory sensations of obnubilation, when he could manage to reach a glass of cold water: the manœuvre was not successful when loss of consciousness was already near. I have wished to explain, in some measure, the mode of action of this ingestion. When this patient, who has, in the normal state, an arterial pressure of 800 to 850, from 9 to 11 a.m., as measured by the sphygmometer of Bloch, swallows as he does spontaneously and habitually before his attack a glass of water, say about twenty-four centilitres, the pressure, according as the water is simply cold from 10 deg. to 12 deg., or iced, mounts to 1,050 or 1,200. At the end of five or six minutes, sometimes more, sometimes less, the pressure is barely reduced to its initial figure, and, several times, I have seen it descend below that from 50 to 100. The augmentation of pressure is still more feeble when the same quantity of water is ingested, not at once, but in small sips at a time. All the other subjects whom I have submitted to the experiment have reacted in the same fashion. I have made it once upon myself, and obtained for result a dreadful

* Du Cazal. *Art. Sueur, Dict. Enc. des Sc. Med.* 3rd serie to. xiii., p. 180.

† Raynard. *Nom, Rech. sur la Nature et la Traitement de l'asphyxie locale des extremities (Arch Gen. de Medicine,* 1894, t. i., p. 13).

migraine which began a few minutes after the ingestion. This effect which manifests itself very often in analogous circumstances is not perhaps without interest. The augmentation of pressure which produces itself under the influence of the ingestion of cold water ought especially to be attributed to the constriction of the abdominal vessels: but one can ask oneself if the encephalic vessels are not the subjects, at the same time, of a reflex contraction, which can explain the syncopes, which produce themselves sometimes by this mechanism; and migraine, in which the vascular spasm also appears to play an important *rôle*, as certain amblyopic or paralytic troubles indicate which accompany it sometimes.

I have sought, by aid of the plethismograph, to see if the ingestion of cold water determines a diminution in the volume of the members, but I have repeated the experiment on the hand a dozen times without being able to appreciate the smallest modification of volume.

One can ask how this augmentation of pressure, which appears to be one of the physiological conditions of the epileptiform discharge, can bring about a suspension of its access? Does it proceed by a sort of substitutive action which provokes a partial spasm capable of warding off momentarily a general discharge? This explanation, which would adapt itself to the applications of cold to the exterior, might perhaps explain the happy effects which hydrotherapy sometimes produces.

(c) Having seen that in general the psycho-motor excitations or depressions characterised by an augmentation or a diminution of the energy of voluntary movements, and a shortening or lengthening of the time of reaction, coincide with correlative changes of the circulation and nutrition, I have tried a control experiment: I have augmented artificially the quantity of blood in a hand by plunging it for some minutes into hot water containing mustard, and I have established the facts at the same time of a slight augmentation of the energy of the fingers in flexion, and of a shortening in the time of reaction for the different fingers.* Studying the time of reaction of the opposite side I did not find any modification.

This result surprised me: we know, in fact, that Messrs. Brown-

* *L'énergie et la vitesse des mouvements volontaires* (Rev. Phil. Juillet, 1889, p. 67).

Séquard and Tholozan have announced that when one plunges a hand into cold water, the hand not immersed suffers a cooling of from one to twelve degrees, which only failed once in their experiments;* and Vulpian has successfully made the inverse experiment.† The latter admits, it is true, that his experiment is not exact, and, when he repeated the experiment of Messrs. Tholozan and Brown-Séquard, he has, in general, observed a slight warming of the hand not immersed in cold water, and M. Bloch has obtained the same result as M. Vulpian.‡ I also have repeated the experiments of Messrs. Brown-Séquard and Tholozan without obtaining the result which they announce, although I have varied it in the conditions which appeared to me favourable to the observation of the phenomenon.

In several experiments I have plunged the hand of the subject into water of 40 deg. C., and after having given time for the elevation of the temperature of this part by 3 deg. to 4 deg., I have plunged it into iced water. During the time the experiment lasted there was not produced any modification of the temperature of the other hand passing 2-10ths deg.; that is to say, in fact, that I have obtained neither the result of Vulpian, nor that of Messrs. Brown-Séquard and Tholozan.

M. Franck modified this experiment, and sought to bring into evidence the vaso-constrictive reflex of cold, studying the changes of volume thereof by aid of the plethismograph. He obtained an abatement of the curve of short duration. I have repeated the experiments several times on three different subjects without any result, although I have refrigerated the non-immersed arm in the reservoir of the plethismograph by means of a mixture of ice and salt with sprays of ether and methyl chloride. In presence of this lack of success I have formed the idea that the lack of the classical reaction proceeded from the fact that the subjects were epileptics, and might be analgesic. One of my internes then subjected himself to the experiment, but without any result; and I would remark that, in general, a result absolutely negative has a great value, because the regularity of the plethismographic trace

* *Réch. Exfér. sur quelques-uns des effets du froid sur l'homme.* (*Journal de Phys.*, 1858 t. i., p. 500.)

† *Léçons sur l'appareil vasomoteurs*, t. i., p. 233.

‡ *Archives de Physiologie*, 1874, p. 573.

proves that nothing transpired, whilst an elevation or a lowering could be produced by another thing than modification of the circulation.

I conclude from these various experiments that if, in certain circumstances, cold applied to a member can determine a vaso-constrictive action on the homologous member the fact is far from being constant.

The influence of cold on the character and manners has struck observers of all times. Polybius tells us that music was necessary to soften the manners of the Arcadians, who inhabited a country where the air is dry and cold. Montesquieu* has made interesting remarks on the influence of the climate on the organic and psychic functions. The influence of cold climates on the frequency of suicide has been recognised for a long time.†

Whatever the resources which man has at his disposal to contend against the variations of temperature, extremes of temperature, nevertheless, affect him exceedingly.

When he succumbs in the struggle against cold, he begins to experience fatigue, a physical and intellectual depression; frequently he is not able to contend against sleep. The respiratory and circulatory movements become enfeebled; the excitability of muscles and nerves diminishes and then disappears; the action of the vaso-motors progressively diminishes even up to the paralytic dilatation of capillaries, the nutritive changes become arrested, and death comes by asphyxia.

Tolerance for high temperatures varies much according to the hygrometric state of the air. It is thus that various observers have been able to remain in dry stoves carried to more than 100 deg. C. (129 deg. to 132 deg.); whilst in stoves with moist vapour tolerance hardly passes 50 deg., and even then during a very short time. The explanation lies in the fact that there is no evaporation in the latter case.

These accidents, products of excess of heat, are known under the names of insolation or heat apoplexy. The insolation which produces itself by direct exposure to the rays of the sun does not constitute, in reality, a distinct form, although the action of the light on

* Montesquieu. *Esprit des Lois Liv. V.* Ch. xv., et aliter.

† Bourbousson. *De L'Influence des Climats sur le Moral et le Physique de l'homme.* Th. 1835.

the eyes and on the skin may be capable of determining, by itself, accidents.

Amongst the physiological effects of elevation of temperature, there must be numbered acceleration of the heart-beats: Delaroche* has already established that for a temperature of 65 deg. the pulse beats at the rate of 160 per minute. The respiration also becomes rapid, painful, and anxious. The evaporation from the surface of the skin and the pulmonary cavities augments considerably, there result therefrom considerable losses which entail a diminution of motor activity, and also of sensibility. The effects of elevation of temperature on motility have been related long ago from the industrial point of view. Coulomb (in the memoir relating his experiments and conclusions) has indicated that the quantity of action of which a man is capable at the Antilles is only a fraction of what he is capable of furnishing in Europe.†

All these accidents, like those which result, moreover, from low temperatures are favoured by exhaustion of the organs from any cause whatever, fatigue, alcoholism, etc. Moreover, Handfield Jones admits that there exists a very great analogy betwixt the effects of heat apoplexy and those of exhaustion, from any cause whatever. This opinion, accepted by other authors,‡ appears to me to conform to the most common facts.

Whether heat apoplexy or sunstroke presents itself under the form congestive, or sthenic, with injection of the face, respiratory distress, embarrassment of speech, delirium, and convulsions; or under the form of asphyxia with oppression, cyanosis, vertigos, faintings, there remains always as result muscular resolution and obnubilation, more or less, of the intelligence.

IV. The physiological conditions in relation with electrical states of the atmosphere are almost unknown to us in respect of the normal subjects. Nervous subjects, and some patients, experience before, during, and after storms various phenomena of excitement and depression which are less obscure since we have studied the action of static electricity, in particular, on the phenomena of the depression of hysterios.§ Under the influence of augmentation of

* *Sur les effects qu'une forte chaleur produit sur l'économie animale, thèse.* 1853, p. 33.

† *Mémoires de l'Institute*, ann. vii, t ii, p. 381.

‡ Hyslop. *Sunstroke and Insanity.* ("Journal of Mental Science," 1890, p. 494).

§ (The word hysterio is used throughout to mean "hysterical person.") Translator.

electric tension sensibility re-establishes itself at the same time as the muscular force augments. To these modifications of the functions of relation correspond modifications of the organic functions. The peripherical circulation is more active, the volume of the penis (membre) increases, and at the same time the respiration becomes more ample, the pulse and arterial tension increase, the body warms, the urinary secretion becomes modified.* We shall see further on that there exist parallel modifications of the psychic state.†

As for the effects of lightning, apart from the destructive lesions which it produces, we know nothing precise regarding the mechanism of the functional troubles which it provokes, and which present the greatest analogy to those which result from traumatic shock or from intense nervous discharges. However, a remark which emanates from Vieussens it is interesting to relate: this author has established that in two lightning-struck infants the blood was imperfectly coagulated. This circumstance is also found in exhausted animals and in those which have succumbed to violent pains.

"It is a general remark," says Hunter, "that many animals seek a shelter before a storm bursts, and before any special senses can possibly be affected. Many people know themselves at the time, as it is commonly said, and present sometimes, like the beasts, changes which much affect them. There are some who sleep more profoundly than ever during a storm."

V. The existence of the organic combustions is due to alimentation. Life only persists on condition of a perpetual interchange of matter betwixt the external world and the organism. The number of bodies which enter into this circulation is limited to that of the elements constitutive of our organs.

The quantity and quality of the elements act not only on the vitality of the individual, but also on the fecundity: it is a fact now long well known,‡ but much better known to-day. They act also on the physical and psychical activity: the activity of the

* Féré. *Degenerescence et Criminalité*, p. 127.

† Damian. *Etudes sur L'Action Physiologique de l'Electricité statique, Lyon*, 1890.

‡ A. Leroy. *De la Nutrition et de son influence sur la Forme et la Fécondité des Animaux sauvages et domestiques : avec un mémoire sur l'influence de la lumière sur l'économie animale.* 8vo., 1798.

nervous system is subordinated to the intensity of the nutritive acts.

The nutritive substances are generally tasteless or of bad taste. They determine, however, a local excitation which provokes the secretion of digestive juices. But their exciting action is considerably augmented by their temperature, their savour, and their odour.

The introduction of hot water determines, of and by itself, a general excitation, especially of the intestinal functions. Savour and odour act similarly, provoking a most useful general excitation. The condiments which assist the odour and savour of aliments act also as general excitants, they augment the activity of the heart and the blood pressure: they quicken the circulation of the brain and stimulate all the forms of activity, the genital functions in particular. In larger doses they determine exhaustion phenomena which manifest themselves at first locally, and express themselves quickly by dyspepsia and all its consequences, but which can be still more grave: the essence of mustard introduced in doses of two grammes into the stomach of a hare induced the death of the animal in half an hour, without local inflammation (Mitcherlich).

Drinks play an important *rôle* in alimentation: they aid digestion, and consequently the utilisation of solid substances, and they replace the liquids which escape from the organism whether by exhalations or secretions. Water is indispensable to the maintenance of life: of itself alone it prolongs life in inanition. But most drinks contain nutritive elements or substances which act as stimulants of the nervous system and of nutrition.

Fermented drinks act especially by the alcohol which they contain. Alcohol acts, at first, as a peripherical irritant on the upper part of the digestive tracts. Introduced into the stomach it irritates its mucous membrane, and brings about an augmentation of activity of the gastric juice. When it has penetrated into the general circulation it augments the activity of the circulation and the respiration, and produces a general excitation of the functions of relation; sensibility appears increased in all its forms; the same may be said of the muscular force and intellectual activity. In infants, in women, and in nervous subjects these phenomena of

excitation readily assume a morbid character. Its stimulating action is especially manifest in enfeebled subjects. Its dynamogenic action in normal subjects can be debated. Most travellers declare that alcoholic drinks are of no assistance in the struggle against polar cold, and in general mountain guides abstain from them.

In large doses they induce drunkenness, that is to say, a state which cannot be considered as an exaltation of the normal functions: then it is characterised by disorders of sensibility and movement bordering upon abolition of the nervous functions which have also especially to suffer in chronic intoxication where one observes paralysis appear, anæsthesias, dementia, to which are added tremblings, convulsions, hallucinations, deliriums, which interrupt the monotony of the tableau, without changing the general aspect thereof. The decay of nutrition which produces itself under the influence of alcoholic intoxication expresses itself not only by phenomena which border upon the destruction of the individual, but also by troubles transmissible by heredity, and end by the destruction of the race.

The alcohols are dangerous proportionately to the complexity of their atomic elements (Rabuteau): in proportion to the element of carburet of hydrogen their toxicity becomes more intense (Dujardin, Beaumetz, and Audigé). Certain essences added to alcohol augment its toxicity.

The aliments termed false aliments, nerve aliments,* like maté-guarana, coca, kawa-kawa, etc., appear to supplement insufficient alimentation: but they do not assist in the reparation of anatomical elements, and, as a matter of fact, in the end their usage creates a condition of irritable feebleness.

Coffee, for instance, in the ordinary dose, a cup containing ten to twelve centigrammes of caffeine, determines a stimulation of the circulation by increasing the contractions of the heart; there results therefrom a certain exaltation of the nervous functions, and a greater resistance to physical fatigue, a greater facility for intellectual labour. In large doses, on the contrary, coffee induces entirely different phenomena, palpitations, arhythmia, vertigos, troubles of sight, tremblings.

* Mantegazza. *Physiologie du Plaisir*, tr. fr. 1886, p. 73.

If, in moderate doses, coffee has merited the name of intellectual drink, in strong and repeated doses it produces a very characteristic state of depression. Moreover, even in moderate doses, its exciting effect is followed by a marked depression capable of explaining the saying of Madame de Sévigné; "Le café m'abêtit:" but it is a secondary effect which does not allow the denial of the other. Balzac was right when he said that sots were more ennuied when they took coffee; but it is not because they are more drunk, but because they exhibit their drunkenness with more exuberance. Tea, the active principle of which is identical with that of coffee, has analogous effects. In feeble doses it stimulates the nervous system, excites the circulation, the digestion, physical and intellectual activity: the movements are more energetic, the time of reaction less long. It augments the secretion of sweat and urine. In large doses it provokes a sort of poisoning, in which the phenomena of excitation take the place of those of depression: discoloration of the skin, enfeeblement of the pulse, coldness of the extremities: then appear headaches, vertigos, troubles of sight, uncertainty of gait, irregularity of pulse, which becomes more and more enfeebled, painful palpitations, dyspnœas, syncopes, suffocation. To this physical state corresponds a considerable depression of the mental, and a great irritability.

Alimentation inadequately prolonged ends by bringing about what Bouchardat has described under the name of physiological misery: a general state of enfeeblement, anemia, wasting, relaxation of respiration and pulse, diminution of exhalation of carbonic acid, and slight lowering of the temperature; all conditions creating a special vulnerability of the organism, which expresses itself by defective resistance to physical agents and infective germs. Inadequate alimentation predisposes especially to typhus.

Inanition has been studied in man: but Chossat, who has experimented on animals, has related interesting facts which are capable of being applied to human physiology. Hunter had already determined that in mice privation of aliments is often followed by a notable lowering of the temperature of the body and a diminution of the faculty of resisting the action of intense cold. Martius has made analogous observations. But Chossat has ascertained precisely that, under the influence of abstinence, respiration

is less active, and that in pigeons nocturnal cold in place of being 0.74 deg., as in the normal state, was successively 2.3 deg., 3.2 deg., 4.1 deg. C.

M. Bernard has noted the predisposition of ill-nourished animals to the contagion of parasitic affections and infectious maladies; and he has related their sensibility to toxic substances. In order to poison a well-nourished hare, one-third more of curare is requisite than that required to kill an animal of the same size ill-nourished. Delafond and Bourgignon have demonstrated that the itch takes more easily on debilitated sheep, who are cured by a better *régime*. The influence of inanition upon infection is especially well established since the experiments of Canalis and Morpurgo.

Prolonged hunger expresses itself by a painful expression of the visage, which becomes terrifying; the aspect is uneasy and anxious, the eyes become sunken, the mouth half open, and depressed at the commissures. The voice becomes weak and rough. The general aspect of the physiognomy expresses not only suffering, but ill-will to a degree such as one does not find in any other pain. The mental state is conform to this expression: hunger, "malesuada fames," is a pain whose reactions are tempered by a sentiment of real powerlessness. It is this struggle which impresses upon the physiognomy a complex expression of suffering and aggressive ruse.

In hunger, says Brillat Savarin, "the soul is occupied with objects analogous to its needs, memory recalls the objects which have flattered the taste. The delirium of the famished is entirely filled with the same pre-occupation, copious repasts sumptuously served hold a great place there. When the sentiment of hunger passes certain limits it provokes certain intellectual troubles which assume the forms of mental alienation. All the sentiments become altered under the influence of inanition. Cæsar said that with three days dieting he could make a man a poltroon."

The satisfaction proceeding from the need of food accompanies a sensation of general well-being which invades the mind to such a degree that it is only with great difficulty the sensation of hunger can be recalled, it seems that one can never be *assouvi*. "How to comprehend," says La Bruyère, "during the first hour of digestion,

that one might some time die of hunger!" Satiety evokes sentiments of goodwill and generosity. We know well the effects of fermented drinks—

"Narratur et prisci Catonis
Saepe mero caluisse virtus."—*Horace.*

The people who belong to the lowest conditions of society possess no better means for bringing to them sentiments of good-will, and it is always with the glass in their hand that they effect their reconciliations, bargains, contracts, friendly commemorations (Alibert).

The habit of good cheer provokes new needs, at the same time that it softens pleasure, and ends by entailing permanent changes of character which bear towards egoism. These changes of character have, moreover, frequently in these circumstances for their physical condition more or less marked dystrophic states, such as those which we observe in gout, chronic alcoholism, etc.

Fatigue evoked by excessive work of digestion expresses itself by a somnolence, a state of intellectual and physical torpor which manifests itself in diverse forms: frequently it is physical impotence which prevails, sometimes it is mental. In some individuals the effect of this kind of exhaustion expresses itself by an absolute genetic impotence: this genital powerlessness of gross eaters ceases under the influence of a *régime* which shows well the nature of the evil.

Sometimes overcharge of the stomach expresses itself by local sensations of fatigue and localised pains. These local phenomena, of engorgement, of pins and needles, of painful or painless paresis in the arms or in the limbs, manifest themselves in nervous subjects apropos of a certain aliment. Most authors yield an important *rôle* to the derangements of the stomach in the production and in the exaggeration of the exhaustion of the brain, but it is to be feared that one takes frequently the effect for the cause.*

VI. The action of solar light, independently of the production of heat which accompanies it, exercises a useful action, not only by the destruction of a great number of micro-organisms, but by a special excitation which it exerts upon the functions of nutrition.†

Darkness, of and by itself, exerts a marked influence on the vital

* Beemer. *Brain Exhaustion* (Med. Rec. N. Y., 1886, p. 552).

† Bally. *Recherche sur l'influence du nuit dans les maladies.* Th, Paris, 1807.

functions. Moleschott has observed that the quantity of carbonic acid exhaled in darkness is, compared with what is exhaled in light, as three to five, and that the elimination of carbonic acid is in relation to the intensity of light. Fubini and Benedicenti have shown recently that the influence of light manifests itself even among hibernating animals.*

Bidder and Schmidt have observed that the loss of weight due to exhalation of carbonic acid and transpiration in animals in a state of inanition tends to be equal during the day and during the night when they have been rendered blind.

I have shown elsewhere† that in certain neuropaths not only light acts on the amplitude of the respiratory movements, but that the colour of the luminous rays has a considerable importance: under the influence of the first colours of the spectrum the energy of movements is greater.

The influence of white light or coloured on nutrition in the development of animals has been well put in evidence during the last few years by the works of Moleschott and Fubini,‡ Uskoff,§ de Gysi and Luchsinger,‖ de Schenck,¶ de Pouchet,** de von Platten,†† etc. Moreover, W. Edwards had already determined the influence of light on the development of the larvæ of batrachians. The influence of the rays of light of coloured quality on nutrition is well established by the relation which exists betwixt colouration of the integuments of certain animals and that of the medium where they live. The shrimp which is gray on the sand becomes brown or green when it lives amongst brown or green algae: experiments prove that when it is rendered blind it is no longer thus able to change its colour. Similar observations have been made upon a large number of animals (Pouchet, Poulton, etc.)‡‡

* F. and B. *Influence de la lumière sur le chimisme de la respiration (Arch. Italiennes de Biologie* 1891, p. 81).

† *Dégénérescence et Criminalité*, p. 13.

‡ *Sull'influenza della luce mista écromatica nell esalazione di acido carbonico por l'organismo animale. Fubini. Influenza della luce sul peso degli animali Torino*, 1875.

§ *Einfluss von farbigen Lichte auf das protoplasma des Thier Morpers Centralblatt* f.d. med. Wiss, 1879.

‖ *Ueber das Verhalten der Aal Iris gegen verschieden farbiges Licht. Ibid*, 1879.

¶ *Zur Lehre ueber Einfluss der Farbe auf das Entwickelungsleben der Thiere (*Mittheil, p. 265; Wien, 1880.)

** *Du rôle des nerfs dans les changements de coloration des poissons (Journal de l'anat*, 1873 to viii., p. 71). *Note sur influence de l'ablation des yeux (gl. de l'anat et Phys*, 1874, p. 568). Ibid, 1876.

†† Von Platten. *Ueber den Einfluss des Auges (Pfluger's Arch*, Bd. xi., p. 263).

‡‡ Wallace. *Le Darwinisme*, p. 265.

Different luminous rays have not the same influence upon the different functions. If the first colours of the spectrum, and especially red, appear to have a greater influence upon activity, and to have, in general, a catabolic action, the last colours, and especially violet, appear on the contrary to favour development, and to have in general an anabolic action.* It is thus that J. Béclard† has observed the influence of violet rays on the development of the larvæ of flies; that Poëy‡ has suggested the same influence upon the growth of the vine,§ of cocks and bulls; that Yung has also observed it in the case of tadpoles which, under the influence of violet rays, resisted better the lack of nourishment.‖ M. Bouchard showed long ago that in solar erythema, they were the violet rays which had atrophic action upon the skin.¶

The relation established by Darwin betwixt the colour of the flowers and the fertilization of the plants by certain insects exhibits, in another fashion, the influence of coloured rays upon animals, an influence which has not struck naturalists only. "M. de B. pretended that his tone of conversation with Mme. de —— was altered after she had changed into crimson the furniture of her cabinet, which was blue" (Chamfort). It is a common observation that light and certain colours favour intellectual activity. Balzac never travelled otherwise than surrounded by a considerable number of lighted candles. Wagner always carried with him satin and silk stuffs of brilliant colours with which to adorn his apartments: he died in a chamber tapestried in rose and satin and pale blue.**

We have, moreover, tried to utilise in the treatment of mental patients the action of the different colours. I have shown that

* Modern physiology conceives living matter as a complex and unstable substance subject unceasingly to chemical changes, termed metabolic. The changes which conduct matter to the apogee of its complexity and instability are comprised under the term anabolism: the changes of rupture which tend at first toward stability, and then towards disassimilation are comprised under the name of catabolism.

† Note relative to the influence of light upon animals, t. iii., 1888. C.R.

‡ *Influence of Violet Light on Growth* (C.R. 1871, t. lxxiii., p. 1236). (Later Röntgen ray experiment indicate the *ultra* violet rays as the real atrophic agent. Translator.)

§ P. Bert. *Influence des diverses couleurs sur la Végétation.* C. R., ibid, p. 1444, has shewn, on the contrary, the more active influence of red rays upon several vegetables.

‖ E. Yung. *Contrib. à l'histoire de l'influence des milieux physiques sur les êtres vivants (Arch de zoologie exper,* 1878 to vii., p. 278).

¶ Plateau. *Sur la force musculaire des insectes. (Bull. de l'ac. roy. des Sciences de Belgique,* 1865, p. 732), has put in evidence the considerable energy in comparison to that of mammifers. I have determined that under the influence of red rays, fleas yield a traction equal to eight or ten times the weight of their body, whilst they do not attain to more than six times and a half with ordinary light.

** *Insanity of Genius.* Nisbet, 1891, p. 172.

under certain conditions this exciting action can objectify itself by modifications of the muscular force, of the circulation, of the sensibility: the exciting value diminishing in general from red to violet.* The action of luminous excitations on the energy of voluntary or reflex movements is confirmed, moreover, by the experiments of M. Charpentier on the muscles of the eyes.† The influence of the absence of luminous excitation on the energy of muscular efforts has not escaped notice besides: Reydelet‡ relates that night marches are more fatiguing, and he recalls an observation of Humboldt who had treated a countess of Madrid who lost her voice at the setting of the sun and recovered it at the rising. The effects of excitation of a sense on the sensibility of the others, and those especially of the visual excitations which I have indicated,§ have been confirmed by the experiments of Urbantschitch.‖ Besides, the effects of luminous excitations on the other senses can be well placed in evidence by a fact of common experience: many smokers have remarked that in darkness they are incapable of feeling equally well by taste as by odour if their cigar is lighted or no. The diminution of sensibility under the influence of darkness has not moreover been quite overlooked: Taillefer¶ has related that during the night impressions are slower and more fugacious. It is easy to verify experimentally the retardation of reaction under the influence of closed eyes: I have sometimes found the lengthening of the time as 7-100ths to 8-100ths of a second in perfectly sane individuals. I have discovered that in some hysterical people the influence of darkness expresses itself by a diminution of the volume of the upper limbs, easily observed with the plethismograph; by an augmentation of the electrical resistance; by hemato-spectroscopic modifications;** a diminution of the amplitude of the respiratory movements,†† etc. Limited luminous excitations of the retina appear to determine an irritation of the circumscribed parts not directly affected.‡‡ One might explain to

* *Sensation and Movement.* *Bib. de Ph. Cot.*, 1887.
† *Sensation et Mouvement*, p. 70; *Dégénérescence et Criminalité*, p. 24.
‡ C. R. *Société de Biologie*, 1888, p. 621.
§ *Essai sur la Nuit.* Th. Paris, 1819, p. 26.
‖ C. R. *Soc. de Biol.*, 1886, p. 389; 1887, p. 511, 747. *Prog. Med.* No. 35.
¶ *Soc. Roy. de Méd de Vienne.* Oct. 22, 1887 (*Sem. Med.* Nov. 2, 1887, p. 45.
** *De l'influence de la Nuit.* 1820.
†† C. R. *De Soc. de Biol.*, 1888, p. 217; 1889, p. 184, 101.
‡‡ *Dégénérescence et Criminalité*, 1888.

oneself thus the increased size of clear images compared with dark images of the same dimensions: this explanation is, moreover, sufficiently conformable to the views of Plateau.*

M. Duval has reported a personal observation which shows that the excitation of one eye by light favours the function of its fellow. This fact is not new, but, up till now, it has not been established in a normal subject; but this circumstance is most important. The observation of M. Duval was made long ago in hysterical persons in certain cases of hysterical amblyopia, on the sincerity of whom doubt was cast: one found that each eye, reckoned alone, is almost amaurotic, the subject scarcely distinguishing day from night, whilst, when the eyes are both open, he might see well enough to walk. In others, the subject, achromatoptic in each eye studied separately, is capable of distinguishing almost all colours, or even all colours, in binocular vision. M. Parinaud has further indicated that in hysterical persons the visual field of an eye is much more extended when, during examination, the other eye is held open than when it is shut.

These phenomena, whose reality is confirmed by the observation of M. Duval, are much greater, as one can observe, in hysterical persons than in the normal subject. This circumstance is not to be despised, for it exhibits to us what usage we are authorised to make of hysterical persons for purposes of experimentation.

It appears now well shown that the excitation of a sensorial organ of duplex type modifies the sensibility of its fellow, even although the excitation of one sensorial organ modifies that of all the others; I say modifies, because according as it is moderate or very strong it can be augmented or diminished.

None of the forms of sensibility escapes these modifications. It is thus that in hysterical persons whose anesthesia attacks the muscular sense, one may observe that this sensibility may be evoked or deadened when it is subjected to the same excitations which develop general and special sensibility. We believe generally that the muscular sense is mainly in connection with the sense of sight. The sight of a member has, in fact, a great influence upon the energy and precision of its movements; but Duchenne (de Boulogne) says that in certain hysterical persons the simple fact of

* Plateau. *Mémoire sur l'irradiation (Mém. de l'Académie Belgique,* 1838, t. xi.)

having the eyes closed diminishes the troubles of the muscular sense. It is frequently possible to verify this fact. But it is not only luminous excitation which is capable of modifying the sensibility termed muscular; in some circumstances also in hysterical persons auditive and olfactory excitations are adequate: the mechanical vibrations of the tuning fork can induce the same effect with varying intensity. Reciprocally muscular exercise develops general and special sensibility: the exploration of the visual field, in some hysterical persons, leaves no dubiety concerning this. I shall have to return to the subject of this equivalence of sensitive sensorial excitations.

The luminous excitations are not alone in producing general effects on nutrition and on nervous manifestations in particular. Sounds, colours, odours, cutaneous excitants have an analogous action. But, a point which merits especial attention, in that it touches perception, this effect can be retro-active.

We know that consecutive sensations develop themselves more easily in fatigued persons: they produce themselves with a special intensity in hysterical persons who are in some way the subjects of congenital fatigue.*

I have had occasion to observe upon myself this exaggeration of intensity of consecutive sensations under the influence of fatigue, and I have established in the same circumstance a phenomenon which appears to me worthy to attract attention.

After having passed, on a railway journey, a night without sleep, I watched the rising of the sun on the banks of the Seine, in the mist. After having maintained my observation during a certain time in all directions of the red disc, I came to perceive that I had the whole visual field almost completely obstructed by a large quantity of grey greenish blue discs, so clearly defined in general, that they were nearly approached to fixation; I could count sixteen at the same moment. I turned myself round to the opposite side in order to give my eyes repose, and at the end of a time which I was not able to measure, I was no longer conscious of their presence, all the negative discs had disappeared; I had the idea of establishing for a second time this experience which seemed to offer nothing in particular besides. When I turned anew my

* Ch. Feré. *Sens. et Mouv*, 1887, p. 20, et passim.

look towards the sun, I was struck to see reproduce themselves a certain number of the negative images immediately and together. I repeated the experience upon several occasions, and I determined the fact that always the new luminous experience or excitation determined the recall of a certain number of the effaced negative images. The number and intensity of the renewed images appeared inversely proportional to the *time of obscurity*. In one experiment it did not take place till two minutes after the disappearance of the last consecutive image, and notwithstanding six of the images reappeared. The dispersion of the mist put an end to the experience which, moreover, did not seem to yield anything new: I had often remarked in studying consecutive images that when they effaced themselves, it sufficed, in order to bring them back, to rub the eyes and compress them forcibly. I instinctively compared the effects of the luminous excitation and those of the mechanical; and I believe the two facts also correspond the one to the other. I then instituted new experiments, and perceived soon that not only a new luminous or new mechanical excitation brought directly to bear on the eye is capable of recalling consecutive sensations, but that these same sensations can be renewed under the influence of very diverse sensorial excitations. In certain hysterical persons the phenomenon produces itself with a remarkable intensity: when the complementary sensation of a coloured disc has completely disappeared one observes it reproducing itself under the influence of moderate auditive, gustatory, and olfactive excitations. The same effect reproduces itself more difficultly in healthy subjects, and is more difficult to determine, because where one is obliged to have recourse to a more intense excitation, and on that account disagreeable, the subject is less disposed to observe what is passing in the field of vision. I have frequently induced the re-appearance of definite coloured consecutive images in healthy subjects by the application of a tuning fork in vibration to the crown of the head.

These observations are still somewhat crude, (biên grossières), but I trust that they will be the point of departure of more interesting experiments relative to the duration of periods of obscurity, and the duration of prolongation of sensations relative to the intensity of the new excitation.

After having already remarked that the sensorial excitations bearing upon another sense, or even mechanical excitations, are capable of recalling visual sensations consecutively, after having been effaced during a certain time, I have thought that it would not be without interest to put in evidence the possibility of bringing into the sphere of consciousness excitations which remained (as yet) unperceived, by an excitation of *later date.*

Amongst several hysterical persons, I have sought, by a series of experiments, the minimum perceptible by the different senses. For taste and odour I served myself with graduated solutions, and I sought the excitation just perceived. After several days I verified the fact that a solution less concentrated than that just perceived was not felt, and then I made a visual excitation with red, or a mechanical excitation, and I determined that, sequent to the new excitation, that which had not previously been perceived, was at once felt. But these experiments did not arrive at the goal to which I tended: they only showed that the new excitation lowered the scale of perception for an excitation which had not perhaps been completely exhausted: since the rapid or odorating particles might be seated in contact with the mucosa.

The sense of sight is capable of yielding more precise effects. I gather on white cards phrases struck in a type of uniform impression, and I find the maximum distance at which they can be read. I assure myself that by increasing the distance a very little reading is impossible. When the card has been placed at a still greater distance at which the subject is surely incapable of reading, he may nevertheless observe the figures, then he mazes them, and at the same time, he is subjected to another sensorial excitation, auditive, olfactory, or mechanical: the subject then recognises the characters, and can read in his memory the phrase which he was incapable of distinguishing when it was present.

This phenomenon may appear perhaps exceptional, but I believe that with a certain delicacy of material one might bring it into light, even in normal subjects, and, moreover, it is only a clearer form of commoner facts. We know, in fact, that interjections have for their effect to make us understand an unheard phrase, that these interjections may be made by him who hears, or by him who speaks.

If a moderate excitation is capable of lowering the plane of perception with retro-active effect, strong excitations produce sometimes an inverse effect. We have seen, for instance, that if certain moderate excitations of vision develop the visual function in all its modes, the same excitations prolonged or exaggerated can bring about a complete blindness: we have cited cases of blindness induced by solar fixation: we have seen that explosions of violent kind have provoked durable deafness. These effects of exhaustion can also be retro-active: it is what we see, for instance, as the sequel of various traumatisms, of violent sort: we see an amnesia supervening which comprises a certain period anterior to the shock.* This retro-active amnesia consecutive to violent excitations is, moreover, interesting in this sense that it throws a certain light upon the amnesia which succeeds to certain states of epileptic impulsion during which the subject conducts himself as if he enjoyed memory and consciousness whilst the excitation lasts, followed by total oblivion when the discharge is complete.

VII. The facts which we have just passed in review serve to show how man can be modified by environment in his physical constitution and consequently in his psychical. We proceed, however, to consider some peculiarities which will be perhaps capable of enabling us to understand the analogous action of very diverse agents.

Since the observations of Verga, of Lussana, of Nussbaum, we have had, frequently, occasion to record the phenomenon known under the designation of coloured audition, paradoxically enough, and described, for the first time, in 1812, by Sachs† Medicin Albinos d'Erlangen. It is, doubtless, the vicious denomination which he had applied, which has vexed the history of this question, for it had anew struck the attention of some ophthalmologists towards 1850.‡ Since, then, it has been the object of new observations upon the part of Chubalier, Kaiser, Nussbaumer, Bleuler and Lehman. 1st, coloured audition consists, as we know, in that an auditive sensation determines a coloured visual sensation. In the subjects liable it presents itself in a sufficient number of varieties.

* C. R. *Soc. de Biologie.* 1887, p. 747.

† *Histor. nat. duor. leucaethiopum anctoris ipsius et sororis ejus,* 8vo., 1812, p. 82.

‡ Cornaz. *De l'Hyperchromatopsy (Ann. d'oculistique.* 1851, t. xxv., p. 3).

We confound frequently photopsy, that it to say the sensation of light and chromopsy, that is to say, coloured sensation. Photopsy can only produce itself a propos of a sonorous vibration in darkness. As for chromopsy, its forms are extremely multiple; sometimes it is only induced by the singing voice, sometimes by the spoken voice, sometimes consonants, sometimes vowels, frequently it is a particular voice, frequently it is an instrument. The visual sensation is not exclusively in relation either with the timbre, nor with the intensity or the memory of sound. Some subjects never see but one colour only, others see several of them a propos of different sounds; sometimes to high notes correspond bright coloured sensations, and to low notes dark coloured sensations (Pedrono). In a certain number of individuals, discordant noises, like that of cannon, determine a veritable dazzling. The phenomenon of coloured audition being purely subjective it is not surprising that it has been denied. It is not an adequate explication thereof to say only "it proceeds from associated sensation" or "it is an error of the mind" *(esprit)*. MM. Pouchet and Tourneux, in giving an explication of it had inferred "nervous fibres coming from the ear and returning themselves to the perceptive centres exclusively affected, ordinarily, by excitations transmitted by the fibres of the optic nerve;" others have supposed anastomoses betwixt the cerebral centres (Pedrono). To the theory of the simultaneous action of the sonorous vibrations and luminous vibrations on the two sensorial organs, we have objected that upon the firing of a cannon, the coloured sensation does not appear at the moment of issue of the smoke, but when the sound is heard; that, in certain subjects the luminous sensations occur even when the sound passes behind them or even when they are blind.* In a critical review M. Baratoux† admits with M. Urbandschitsch (to whom he attributes the discovery of the general effects of the excitations of the sense organs now recorded by me long ago at the Biological Society and elsewhere)‡, that coloured audition is "the result of a sensitive excitation on the perception of existing sensitive objects"; which brings me to say, if I understand

* Girandeau. *Audition Colorée* (*Encephale*, 1885, p. 589).

† Baratoux. *l'Audition Colorée* (*Prog. Med.*, 2.S. t. vii., p. 495).

‡ *Bull de la Soc. de Biologie*, 1886, p. 389. *Prog. Med.*, 1886, p. 517. *Sensation and Mouvement*, 1887, p. 77, 120.

rightly, that he admits that the sonorous vibrations affect, in a feeble degree, the sense of vision but that this excitation is only perceived *in consequence of the irritation of the sense of hearing.* I have also expressed the opinion that if the two senses were impressed at the same instant, it was because of the identity of nature of the excitants.*

Probably to-day one may interpret the phenomenon of coloured audition by basing it upon some other thing than hypothesis.

It must be remarked, at the outset, that coloured vision† (from which must be distinguished the phenomena of irisation, which are induced in consequence of troubles of accommodation, alteration of the environment of the eye, etc.), produces itself in several other circumstances than apropos of an auditive excitation. Besides the anthopsy which manifests itself in Icterus or subsequent to the ingestion of Picric Acid (Hilbert), and which one can attribute to a modification of the coloration of the media of the eye, we know that Santonine determines violet vision at the commencement of the intoxication; later, on the contrary, the violet is lost and the subject sees objects in green or greenish yellow (Schultze). The succession and the variety of the troubles permit of the supposition that in this last case, it proceeds, not by a phenomenon of impregnation, but by nervous action (Hilbert). The same is to be said of vision—green, blue, yellow, red, which has been observed under the influence of *guison* (Lésoinne, de Liège), and of the red vision induced by poisoning with henbane.

Other sensorial excitations than those of hearing can also provoke coloured vision, coloured olfaction is also presented; it is thus that Hilbert observed a young non-nervous girl (as he says), in whom diverse olfactory excitations determined coloured visions, presenting themselves, in general, in various tints of brown.

I know a female attacked by nervous anorexia for more than ten years, without permanent hysterical marks, or convulsive phenomena, who, when she took aliments too largely impregnated with vinegar, pretends to see everything red for some minutes. This red vision is followed by a clear green vision which endures sometimes more than an hour. The odour of vinegar has never

* *Revue Philosophique*, 1885 t. 20, p. 355. *S. and M.*, p. 46.

† Ch. Féré. *La vision colorée et l'equivalence des excitations sensorielles* (C. R. Soc. de Biol, 1887, p. 791.)

induced in her the same sensation: she has never experienced it a propos of any other excitation. This coloured gustation has only been observed by the patient since she has taken to very acid meats. Bleuler and Lehman have cited very analogous facts, and M. Sollier has observed another case of coloured gustation which manifested itself a propos of eructations.* I have cited the case of an epileptic who has erythropsy at the moment of the spasmus cynicus.†

Photopsia can manifest itself apropos of a shock on a certain part of the body when one is in darkness. I have had several times accasion to remark the experience in myself a propos of even trifling shocks on the neck, on the knee, etc.‡ Lehmann and Bleuler have cited several examples thereof.

Coloured vision can, moreover, manifest itself spontaneously in neuropaths in the apparent absence at least of every particular excitation. Hirschberg has seen a woman in whom blue vision had endured for several months. Red vision or erythropsy, studied by Purtscher, can also be present itself apparently spontaneously, in the absence of any apparent characteristic morbid state.§ In some feeble subjects prolonged exposure to an intense light, to the reverberation from an extensive brilliant surface such as a black plain, a lake, etc., provokes sometimes coloured vision in orange, red, etc.

But coloured vision can present itself, moreover, in the course of morbid states of the nervous system; it is not rare to hear subjects attacked with depression complain of seeing objects coloured in yellow, blue, and grey.

Finally chromopsia can present itself a propos of momentary troubles; it is thus that at the beginning of syncope patients perceive sometimes objects tinged with diverse colours which succeed one another; erythropsia is sometimes indicated in the invasion of apoplexy, in the congestive attacks of general paralytics, in hanging. Moreover, red vision manifests itself in anger, at the commencement of a certain number of impulsive acts, under the influence of certain states of exaltation. Saint Catherine of

* C. R. *Soc. de Biologie*, 1891, p. 763.

† *Les Epilepsies et les Epileptiques*. 1890, p. 284.

‡ Notes, etc. C. R. *Soc. de Biol.*, 1889, p. 34.

§ *Dobrowolsky (Arch fur Ophth.* Bd. xxxiii., Heft 2).

Sienna saw the host coloured red.* Epileptics complain sometimes of this sensation at the beginning of their fit; hysterical persons complain also of the same phenomenon. Besides, several subjects of this last category have chromopsia in the wake of nervous discharges it may be after the attacks, it may be after violent angers, after fits of weeping; they complain of seeing yellow, violet, blue for a time, longer or shorter, sometimes for several hours.

Forbes Winslow refers to an alienist in whom the first trouble was the apparition of a sort of halo round the letters each time that he read.†

It appears that, in general, the vision of the higher colours of the spectrum responds to states of exaltation, whilst, to states of depression, correspond the lower colours. In every case, it is evident, that coloured vision can result from excitations bearing on the different senses, or further, coincides with an emotional state. The popular usage which results from multiple observations appears to have registered the phenomenon before it has been remarked by Science, and made to play a rôle in metaphorical language.‡ Coloured vision appears to be in relation to a particular tonality of the organism.

I am forced to show, by numerous and varied experiments, that the excitations of the sensory organs do not determine only the subjective phenomena of sensibility, but that, in chosen subjects, one can place in evidence that these phenomena are accompanied and appear to have for their physiological conditions, modifications of muscular tonicity, of energy, of the circulation, of the organic functions in general. These facts have appeared to me of a nature adapted to serve as a basis for a physiological interpretation of coloured vision.

We observe that a sensation can only produce itself concurrently *with certain physiological conditions, or at least conditions very analogous;* and that, on the other hand, the same physiological conditions, or at least conditions very analogous, can be put in evidence a propos of two excitations brought to bear on two different

* *Du délire des Sensations*, 1846, p. 133, 182.

† *Obscure Diseases of the Brain.* 2nd ed., p. 270.

‡ The metaphors "to see in rose," "to see in black," "to be in the blues" appear to have thus a basis in physiology.

senses; in certain subjects, for instance, the augmentation of muscular force and of the volume of the upper limbs, determined by a visual excitation, can be equivalent, or less it may be, to that which is produced by an auditory or olfactory excitation. The same physiological effects can also be obtained by the mental representation of these same excitations, or, better, by emotional states, which are, in fact, the resultant of peripherical excitations or representations of which the subject possesses more or less exactly the consciousness. Red vision, for example, can be the consequence of an auditive, olfactive, gustative excitation, of a lively emotion, (anger, joy), of a special state of the cerebral circulation producing equivalent dynamic states of the nervous centres and the entire organism.*

If, in a given person, the physiological effects of an excitation of the optic nerve, of the auditive or olfactory nerve, were absolutely equivalent, this individual would be apt to confound, more or less completely, the sensations furnished by these three nerves. But this is hardly what takes place in coloured audition, olfaction, or gustation. It appears therefore, that *the equivalence of physiological effects of sensorial excitations* may be the hypothesis, which can render the best explanation of the phenomena of coloured vision considered in general. This interpretation is rendered more likely, it appears to me, if it is established that the individuals who have visual sensations apropos of auditive excitations or others, are capable of experiencing auditive sensations a propos of visual excitations of corresponding kind. De Rochas, Bleuler and Lehmann have determined the fact—I have sought for it in vain. This want of success has besides enabled me to relate a peculiarity which is not without interest. Individuals who have asserted that they have had coloured sensations, be it apropos of hearing or taste excitations; be it after hysterical discharges, or before the epileptic fit; recognised that this coloured sensation was of an entirely special origin; it is impossible to assort their subjective colour so that control experiment is impossible. We know, moreover, that the subjective sensation of light, or photopsy, which is induced, it may be apropos of a blow on the eye, apropos of

* "Under the influence of Haschish," says M. Theophile Gautier, "my hearing was prodigiously developed, I heard the noise of colours: green, red, and blue sounds came in perfectly distinct waves." (J. Moreau de Tours, Du haschisch et de l'alienation mentale, 1845, p. 71.)

mechanical modifications of the cerebral circulation, as during violent effort, sneezing, vomiting, cough, the action of blowing one's nose, etc., presents precisely the same character; there follows in general, in these circumstances, an incomparable luminous sensation. The galvano optic reactions present the same characters and the colour perceived is very variable, not only according to the pole and the intensity of the current, but also according to the individuals. Certain persons, so to speak, endowed with coloured vision, give such descriptions,* that apart from all objective control doubt of their sincerity is permissible.

We can compare with the phenomenon which we have just been studying, another anomaly of sensibility which consists in sensations, painful or otherwise, which are perceived on certain points of the body a propos of excitations brought to bear on regions more or less distant, but which are not united to them by any known nervous connection. Such are the syncinesias or synaesthesias indicated by Robt. Whytt,† by la Mettrie,‡ by John Hunter,§ by Muller,‖ but specially studied by Gubler,¶ by M. de Fromentel.** These associated sensations appear to have for their exclusive seat the common integument. Nevertheless, M. de Fromentel cites the case of an individual who when rubbing with his nail the posterior part of his axillary region, right side, heard in his ear a sound of rubbing. These cutaneous synaesthesias which present an extremely varied topography are very much less susceptible than the sensorial synaesthesias of explaining themselves by a more or less unconscious association.††

I am subject to phenomena of cutaneous synaesthesia and I know also by experience photopsy, which produces itself in darkness; it may be apropos of a sudden auditive excitation or an unlooked for blow upon the limbs. I have been struck with a very important differential point; the visual excitations provoked by a noise or a shock appear much more rapidly than the cutaneous synæsthesias, whilst the first take only 0.45 seconds to 0.75 seconds; the others take 0.90 seconds to 1.20 seconds. But the subjective

* *Suarès et Mendoza. L'audition colorée* in 8vo., 1890.

† *Traité*, etc., t. i. p. 114.

‡ *Vues Physiologiques*, 1780, p. 149.

§ *Works*, t. i., 364.

‖ *Phys.*, 1845, t. i., p. 359.

¶ *Beaunis et Binet. Sur deux cas d'audition colorée.* (Rev. Ph., 1892, t. 33, p. 448).

** *C. R. de Biol.*, 1876, p. 393.

†† *Synalgesia and Synaesth*, 8vo., 1888, p. 51.

cutaneous sensations present this analogy to the visual, that they cannot be compared to any real sensation.

The physiological synalgesias permit of the comprehension of the synalgesias which afflict hypochondriacs. Especially a propos of digestive troubles, that is to say on occasion of visceral irritations these patients experience peripherical pains the most minute exploration of which fails to reveal a cause, but the reactions which they induce cannot be denied.

A good number of the lower animals deprived of eyes manifest sensibility to light: the observations of Trembley on hydras, of Pouchet on the larva of flies, of Plateau on blind myriapods, etc., leave no doubt upon this point. The experiments of M. Raphael Dubois present an especial interest. This author has seen in fact that in the finger pholas light provokes the same movements as the mechanical excitation of the skin of the syphon.*

This dermatoptic function exists truly in man to a certain degree, and it might suffice perhaps in certain subjects by appropriate exercises to render it conscious. I have seen in several hysterical persons modifications of the volume of the hand and muscular force, evoked by occlusion of the eyes, notably weakened when a large extent of the surface of the skin was exposed to light.

The phenomena of general excitation are not induced only a propos of visual excitations; stimulation can be induced quite as well also by excitation of the other senses and by general sensibility even.

The fact that all the functions exalt themselves under the influence of sensorial excitations corresponds to the observation of Schiff,† who has seen peripherical excitations, brought to bear even on one side of the body only, determine an increase of heat in both cerebral hemispheres, a warming, comparable to the augmentation of the volume of the brain observed directly by Mosso under similar circumstances.

Irritations brought to bear on the different senses can, in certain individuals, determine equivalent states of excitation: one may explain thus how these individuals have a double sensation a propos of an irritation bearing upon one sense only, a coloured sensation

* Dubois. *Nouv. Théorie du méc. des Sensations Lum. R. G. des Sci.*, 1890, ti. p. 198.

† *Rèch. sur Echauffement, etc. (Arches. des Phys.*, n. et p. 1170, t. iii., p. 333).

for instance, a propos of an irritation of hearing, taste, or smell.

So far as concerns the influence of auditory impressions I would recall the effects observed on the muscular energy, concording with modifications of volume of the members determined by the plethismograph.* These merit comparison with modifications of the carotid circulation observed by Dogiel,† who has seen that the modifications of pressure are in relation to the intensity, the height, and the timbre of the sound.

Excitations of taste act similarly. They provoke at first a general excitation which expresses itself by the modifications already indicated of motility, sensibility, and circulation. Their energy follows a definite rule.

When these excitations become more energetic or disagreeable, they determine at first expulsive efforts localised apparently, then general effects which can proceed so far even as cold sweats and even arrest of heart action.‡

It is in great part by the satisfaction procured by the general excitation which results from the irritation of the nerves of taste that one can explain the habit of masticating certain irritating substances in the form of soluble bodies or vapours, or of smoke. The pleasure which certain animals experience from lechery can be explained in great part by the excitation induced, the rubbing mainly in those who have a dry and rough tongue; but, in the dog, which appears to enjoy this practice in the highest degree, taste plays certainly an important *rôle*. The simple reflex action suffices to explain these facts without calling in the association of an hereditary emotion of affection as Darwin would.§

Thus now, "every excitation of a particular nerve generalises itself in the nerve apparatus."‖ Nevertheless the effects manifest themselves especially upon the organs attacked, and upon those which are functionally associated with them. The excitation of the salivary secretion, like that which is provoked by tobacco, determines a greater activity of the gastric juice.¶ M. B. Séquard**

* *Sensation et Mouvement*, p. 34.

† Dogiel. *Arch f Physiologie*, 1880, p. 415.

‡ Ch. Richet. *Essais sur les Causes du dégoût. Rev des deux Mondes*, 1877 to 22, p. 644.

§ *L'expression des Emotions*, 2nd ed., 1877, p. 129.

‖ Broussais. *De l'irritation et de la folie.* 2e ed., 1839, ti., p. 82.

¶ *Leçons*, p. 398.

** *Leçons*, 1877, p. 31.

has seen injections of hot water into the rectum of a dog determine a secretion of gastric juice. When the excitations are too intense, if they determine phenomena of exhaustion, it is at first in the organ irritated or in those which are associated with it: the substances called "aperitive" in very strong doses determine very often a total suspension of the gastric secretions. We have indicated alterations of the gastric juice in consequence of irritation of the nerves of the arms and rectum. Chapman reports two cases of dyspepsia whose cure was obtained by the extirpation of hæmorrhoids.*

Cutaneous excitations do not escape the rule. The temperature rises under the influence of a moderate excitation of the skin (Röhrig). Bubnoff, Heidenhain and others, physiologists, have seen that the irritability of the cerebral cortex is modified under the influence of certain cutaneous excitations. If the excitation is feeble, excitability augments; if it is strong and painful, excitability diminishes. In man the same thing holds good: slight excitations, caresses, determine phenomena of general excitation, whilst stronger excitements induce phenomena of depression. Tickling which can, according to its intensity, run through the whole gamut of pleasure and pain has been employed as a method of punishment on the tremblers of the Cevennes.

The general effects of cutaneous excitations explain the pleasure which most animals experience from rubbing themselves, rolling themselves, seeking caresses, etc. Gratiolet in great part understood this rôle of general excitation, and when Darwin treats them with contempt or disdainful negligence, he only gives proof of his ignorance of a large number of physiological facts. The habit of scratching the head or the body, of stroking the beard, of rubbing the hands, etc., when one is in search of a souvenir, explains itself by the general excitation which these diverse irritations induce.

When the skin or the sensitive nerves receive a very strong excitation, there results therefrom a sensation of pain which accompanies itself with general phenomena of depression of all the organs (functions). A very intense excitation can determine such a disturbance that the senses are affected: a violent

* *Lectures, etc.*, 1844, p 216

shock on a member can provoke visual or auditory sensations, especially in individuals whose special sensibility is much developed.

If the excitation is still more considerable, there can result therefrom a sort of general attrition of the nervous system whose action finds itself momentarily suspended to the extent that the subject has no idea of shock: his consciousness is completely obscured for a certain time; an amnesia is established comprising a certain period preceding the traumatism, a retro-active amnesia. This dulling of psychical activity has for its physical condition a momentary diminution of vital activity which can be characterised by a considerable lowering of temperature, a depression of circulation and respiration, and even an abolition of a great number of reflex phenomena. A very strong excitation of the nerves provokes an arrest of innervation (Gross), an arrest by exhaustion. This exhaustion can be such as to have a definitive effect, the arrest of the heart determines a mortal syncope.*

The same influences do not act with the same intensity on all subjects; they can even be indifferent to a good number, but these exceptional examples suffice to show to what divergences the explorations of sensibility in hysterical persons can give rise. This study, to be conducted rigorously, would necessitate not only the exact determination of the ingesta and circumfusa, but the psychic conditions moreover; that is to say, that the difficulties are almost insurmountable.

The augmentation of the muscular force and the diminution of the time of reaction when the curve is equally bent impress characteristic aspects upon the graphic form of effort in addition to those to which I have already drawn attention.†

When the effort is energetic and the reaction rapid, the curve rises rapidly, whilst when the effort is feeble and the reaction slow, the curve slowly rises and takes a long time to reach its summit.

The modification of the energy of movement, and that of the time of reaction only exist by reason of the physiological conditions the study of which affords an interest of a peculiar kind in some hysterical persons.

* Vincent. *Des causes de la mort prompt, etc.*, Th. Ag., 1878. T. Piéchand. *Que doit on intendre par l'expression de choclo ?* Th. Ag., 1880.

† *Sens. et Mouv.*, p. 20, 30, 43.

These modifications are, in fact, accompanied by changes in the volume of the limb which one can explain with the aid of the plethismograph. The augmentation of volume which coincides which functional exaltation is induced more rapidly than the voluntary reactions. It is consequently independent of the will and appears one of the conditions of the accomplishment of voluntary movement.

I have rendered plain to myself the chronological succession of the phenomena by the annexed experimental diagram. The right hand of the subject is placed in the reservoir of the plethismograph, which is in communication with a registering drum. Another drum register is in communication with a tube closed at the end and placed upon the head of the subject. A diapason of 100 vibrations registers the time. The foot of a second diapason in vibration is then applied to the head, and the time of this excitation registers itself by the depression of the tube through the mediation of which this diapason touches the head. The time of the plethismographic reaction (fig. 1) is 0.18.

In a second experiment the right hand being placed in the same manner in the reservoir of the plethismograph, the second drum register is in communication with a tube closed at its end and placed in the mouth of the subject who reacts with a tooth bite to the cephalic excitation made after the same fashion by the interposition of the same tube as previously. We find also that the voluntary reaction of the jaw has a delay of 0.22 sec. over the plethismographic reaction of the right hand. The time of the voluntary buccal reaction is 0.40 sec.

In a third experiment, a closed tube is placed between the teeth, a second between the thumb and index finger of the right hand. The subject ought to react at the time (at once) to the same excitation with the mouth and with the right hand (fig. 3). The reaction of the hand exhibits a retardation of 0.14 sec. over the reaction of the mouth; its time of reaction is consequently longer by 0.36 sec., than the plethismographic reaction of the same hand and it is in fact 0.54 sec. (These figures indicate the mean of several experiments).

What is the cause of the plethismographic reaction, of the augmentation of the volume of the hand? We are right in thinking

à priori that the change in volume is not due to muscular contraction, for we know that the muscle which contracts itself does not change its volume. Moreover, one can establish experimentally that the involuntary contraction provoked by the excitation is not synchronous with the plethismographic phenomenon. If the hand, being in the plethismographic reservoir, a myographic tambour is placed on the flexor muscles of the same side fingers, one finds that the reaction of the flexors precedes by 0.06 sec. or 0.08 sec., the plethismographic reaction (fig. 4). This verification is not without use, for if two reactions had been synchronous, one could believe that the change of pressure in the plethismograph was due to the flexion of the fingers across the reservoir, causing a greater part of the forearm to enter into the apparatus. This order of the succession of the phenomena might be favourable to the theory which admits that the phenomena of vaso-dilatation are secondary to heightened activity of the tissues, the which is under direct dependence of the nervous action.

I would remark, in passing, the difference of 0.46 sec. betwixt the involuntary muscular reaction and the voluntary reaction.

If the plethismographic reaction is not due to a muscular phenomenon it can only be due to an afflux of blood in increased volume as Mosso has recognised. Moreover, the augmentation of liquids in the member in the conditions which we are passing under review can be established by other facts. I have recognised, for instance, that the same influences which produce augmentation of volume determine a diminution of electrical resistance. But this diminution may be only due to an augmentation of the quantity of fluid in the parts traversed by the current. M. Vigouroux had, moreover, already determined that electrical resistance is diminished on the anæsthetic side in hysterical persons: that is to say, on the side where the muscular force is least and where the period of reaction is longest.

Although these modifications in the energy and rapidity of the movements are not accompanied, in normal patients, with circulatory modifications so appreciable as in certain categories of patients, the relation of the nutritive phenomena to the psychomotor phenomena can nevertheless be established by very exact facts. We know that the energy and agility of movements

diminish under the influence of cold which determines true impotences; this action of cold is specially remarkable when it is attempted to effect delicate movements, to design, to play upon a musical instrument, etc. Inversely, under the influence of moderate heat, the energy and especially the rapidity of movements augments. One can objectify the phenomenon by taking the time of reaction of the two hands simultaneously in a subject who gives, for example, a slower reaction of the left, and repeating the experiment after having dipped this hand for some minutes in hot water. One sees then that the hand that was the slower becomes the quicker, the right having maintained the same time of reaction. If one takes experimentally the time of reaction of flexion and extension movements of the fingers, before and after heating, we obtain a more constant and interesting result.

	FLEXION.		EXTENSION.	
	BEFORE. SEC.	AFTER. SEC.	BEFORE. SEC.	AFTER. SEC.
Thumb	0·346	0·233	0·362	0·194
Index	0·269	0·234	0·270	0·186
Middle	0·266	0·261	0·280	0·201
Ring	0·255	0·239	0·320	0·250
Little One	0·283	0·237	0·312	0·220

I have chosen this example in spite of the somewhat exceptional characters which it presents, because, besides that it places very well in evidence the action of artificial heating on the diminution of the time of reaction, it shows that the action of this artificial excitation acts especially upon the slower movements of the normal state; we observe, in fact, that they are the movements of extension which have had the most considerable benefit. The same holds good of the influence of education in the case of the pianist. It must be remarked, moreover, that it is in the most feeble subjects, in hysterical folk, that the phenomena consecutive to excitations of every description exhibit themselves most exactly.

In the most healthy subjects all the conditions which exaggerate the intensity of the nutritive changes develop the energy and rapidity of the movements equally with psychic activity in general. Such is the action of diffusible stimulants, such also is the action of certain slight morbid irritations which provoke an exaltation of the psychomotor functions and which one names with reason

febrile activity. I imagine that it is this febrile activity which M. Brown Séquard procures for himself when he injects under his skin the orchitic juices to which he attributes a special dynamogenic power.*

VIII. If physical agents provoke general effects which affect the organism in its totality with a certain uniformity whatsoever the nature of the excitation, they have also a local effect which expresses itself by modifications of nutrition and movements which specify the sensation and objectify it to the observer.

A local skin excitation provokes local movements of fear and defence which generalise themselves according to certain well-known laws, but which always conserve their local predominance. To Pflüger's researches we are specially indebted for our knowledge of these laws. These movements present a character which has escaped Darwin and which diminishes singularly the value of the principle of antithesis introduced by this author into the theory of the expression of the emotions, to wit, that they vary (*i.e.*, in expression) according to the predetermined (préalable) position wherein the member finds itself at the moment of excitation. When the member is flexed, painful excitation induces movement of extension; when extended, that of flexion.

The excitation of the sensory organs determine also, synchronously with modifications of the local circulations which entail modifications of sensibility, movements of attention or of repulsion and defence which vary for each of the organs and which constitute the objective signs of special sensation. Each special sensation has a particular expression which varies according as, sequent to its intensity, it is agreeable or attractive, or disagreeable and repulsive.

When an object provokes an agreeable sensation of touch, taste or odour, etc., "the whole body is directed by the felt object and tends in the direction of the organ of sense which reveals the existence of this object."† The convergence of the movements towards the organ affected is such that, under the influence of the excitations of taste or of odour, the forehead contracts and wrinkles into the attitude of reflexion, and the eyes direct themselves for-

* *La Semaine Medicale.* No. 23, p. 190.

† Gratiolet. *La Physionomie*, p. 232. *L'entendement*—possibly "sound," but the meaning in any case is plain.

ward and downwards towards the nose and the mouth to such an extent that some persons squint whilst eating and in smelling.

In the case of the disagreeable excitation all the body draws back into a direction adapted to withdraw the affected organ from the excitant.

These movements are not only symbols of the sensation, they constitute the most important physiological conditions thereof: no movement, no sensation. "I regard," says Bain, "what is called expression simply as part of sensation; it is, I believe, a general law of hearing, that it has always induced a diffuse action or excitation upon the outer organs of the economy, at the same time as it operates the internal or conscious sensation."*

If the physical agents which have an action upon the sensory organs provoke modifications of motility which are generalised throughout all the motor apparatus, it is not less evident that these motor effects are mainly produced in the muscles annexed to the excited organ. It is thus, that visual, olfactory, and gustatory impressions etc., provoke special movements of the sensation and which one must consider the objective signs of the special sensation.

The excitations of the organs of the senses provoke, according to their intensity, in the muscles annexed to them movements appropriate to facilitate the action of the excitant or movements appropriate to withdraw from this same action. In the first case the movements, which are reflex, express attention or attraction, and are associated to an agreeable sensation; in the second, it expresses repulsion or defence and is associated to a disagreeable feeling. The muscles of organic life equally with those of the relational life concur towards these two so different ends. We shall have to return upon these signs apropos of sensations and hallucinations, but we must at least cite some facts (now).

When a gentle light strikes the eye, the pupil is moderately dilated, the eyelids open themselves largely to allow passage to the luminous rays. As soon as the excitation augments the pupil contracts itself, the eye softens or moistens itself with tears, before any sensation of a painful character has been experienced; pain barely begins to be felt when the voluntary muscles, the perior-

* "Bain" *Les sens et l'intelligence.*

bitals, place themselves in their turn upon the defensive by obliterating the palpebral window (*i. e.*, by closing the eyelids).

Gustatory sensations provoke movements which tend to place the tongue in the best possible position to favour the sensations, its upper surface approaches the velum palati and this elevation of the tongue is accompanied by synergetic movements approximating the jaws and contraction of the cheeks which open the commissures as in smiling, whilst the lips range themselves against the teeth, giving to the physiognomy an expression of softness, honied and sweet. Then the lips elongate in appearing to stretch towards a desired object and recalling the appetitive movements of the infant when it wants the breast: this lengthening of the lips, thereby augmenting the extent of their surfaces in contact, favours gustation; when there ensues a disagreeable sensation, bitter for instance, the tongue tends, on the contrary, to lower itself, en masse, in order to separate itself from the veil of the palate; there is made a synergic movement of the jaws and the lips, the labial commissures lowering themselves. Whilst the common elevator of the lip and nostril maintain elevation by its two extremities, the middle part of the upper lip, the nasogenien fold, is accentuated and elongated, giving to the physiognomy an expression termed bitter. If the sensation becomes still more disagreeable, the mouth opens itself in a painful attitude, analogous to the manner of a person found sobbing. Finally, an exaggerated coloration is induced, then movements of expulsion, which can be sufficiently generalised to bring about evacuation of the stomach contents.

The muscles of the lips excite movements of preventive defence due at once to contraction of the muscles of the jaws, which draw the commissures downwards and backwards; of the orbicularis, which applies the lips to the teeth, whilst giving to these a pinched aspect; and to the common elevator of the nose and upper lip, which raises the middle of the upper lip; and to the elevator of the lower lip which concurs in vigorously closing the buccal orifice. When the contractions, which recall the contractions of the mouth of an infant refusing nourishment, come to be exaggerated, the elevation of the nostril and the lip uncovers the canine tooth, and the expression of defence finds itself still more precisely characterised: "one shows his teeth."

Agreeable olfactory sensations accompany themselves with movements of dilatation of the nostrils executed by the dorsal muscle of the nose; the nostrils distend themselves. The closure of the nostrils under disagreeable sensations is less efficaciously executed by the myrtiform muscle; but the disability of single nostril occlusion is compensated for by the altered pose (redressement) of the upper lip. If the impression becomes still more disagreeable, it provokes violent, even convulsive, movements of nasal expiration, such as sneezing.

Feeble impressions of hearing determine a movement of the motor muscles of the lower jaw, which opens slightly, thereby opening, more or less, the mouth. This opening of the mouth characterises hearing attention. In man even very strong sensations of hearing are unaccompanied by visible movements of the ears; but they provoke reflex movements of the jaws more or less violently. It is very much the same with several other animals, and, besides, movements of the head supplement, in a certain measure, the movements of the ear.

Excitations of hearing when they are intermittent and rhythmic, are specially adapted to put in evidence the reflex motor effects of peripherical excitations. If one recalls this law of reflex motor actions, especially investigated and set forth by Cayrade, (Rech. critiques et expérimentales sur les mouvements réflexes), and which shows us that every excitation provokes a movement whose direction varies according to the primitive position of the member, one will comprehend how each new excitation expresses itself by a change of position, and how the rhythm entails the cadentic movements which constitute the origin of diverse dances. The movements of the members in relation with the auditory excitations are not special to man: one can also see them produce themselves in animals in such a form that their reflex origin scarcely appears doubtful. Tenicheff* relates the following fact relative to the education of learned bears in Oriental Russia and Siberia. The bear is placed in a cage whose floor is subjected to a temperature more and more elevated. In order to avoid, as much as possible, the heat, the animal poses itself on its hind legs, and jumps in the cage. The attendant then sets himself to whistle and beat the

* *L'activité des Animaux*, 1890, p. 179.

tambourine. The bear is not slow in gaining the habit of dancing when it hears the tambourine and the whistle, be the floor heated or not.

Cutaneous excitations provoke, also, according to their agreeable or disagreeable nature, sufficiently characteristic movements of attention or defence.

Movements of propulsion provoked by caresses are very characteristic, especially in the cat, which curves its back in order to multiply frictions. Purring, which by reason of the intermission of the excitation, permits to the utmost the generalisation of the effects of a local irritation, provokes not only reflex movements of defence generalised to all the muscles of the life of relation; but exaggerates the amplitude of the respiratory movements to such a point that they become convulsive. Piderit has conclusively shown that the laugh carried to its highest degree of intensity gives to the physionomy an expression which hardly differs in anything from that which accompanies crying: the change in the physionomy is brought about by bringing the myrtiform muscles into play. There is thus a gradual transition betwixt the expression of pleasure and that of pain.

The phenomena of excitation provoked by cutaneous impressions are in relation not only with sensations of contact, but still more with sensations of temperature, which play their *rôle* in the pleasure of handshaking, the action of patting the arm, embracing and so forth. *The sense of touch is the first in the order of evolution, all the other senses are only derived therefrom;* and from the point of view of sentiment in general it preserves the first rank: Bain has said, with reason, that *touch is the "Alpha and Omega of affection."**

The cutaneous excitations exercise on the organic functions an action analogous to that of sensorial excitations which has been recently carefully studied by Albert Besson.†

a. Intense and rapid excitations produce a local vaso-constriction, whose duration is in inverse ratio of energy to excitation, and which can even be wanting if the excitation has been very acute. This vaso-constriction is followed by a vaso-dilatation whose dura-

* *The Emotions and Will*, p. 123.

† *Etude expérimentale sur la revulsion.* Th. Lyon, 1892.

tion is in direct ratio to the energy of excitation. To this vaso-motor condition correspond variations of pressure, slight augmentation, and less durable, followed by a notable abatement of arterial pressure. After a short acceleration of the cardiac beats there is induced a slowing with marked augmentation of the amplitude of the pulsations corresponding to the vaso-dilatation and to the lowering of pressure. Respiration, after slowing, quickens. The organic changes are quickened, absorption of oxygen and exhalation of carbonic acid being augmented, sugar diminishes in the blood, whilst carbonic acid augments there. The internal excitation of the skin can produce a generalised or localised analgesia, it can suppress pain.

b. Feeble excitations act similarly on respiration, on nutrition, and upon sensibility, but they act differently upon the heart. They induce a notable acceleration of the heart which can persist; they elevate, in a durable manner, the general arterial pressure; they elevate the central temperature.

When a certain agreeable sensation attains a certain degree of intensity, it provokes in the muscles of all the organs of the senses the movements which characterise the agreeable sensation of each of these senses. The proof thereof is afforded by the genital excitations which provoke on the part of the eye the movements which we have indicated as attractive of the light; on the part of the mouth, the same attractive movements which characterise themselves particularly by the aspirative retreat of the tongue in kissing, and are rendered still more significative by salivation; on the part of the nostrils their dilatation is not less interesting: and one may add that among many animals the ears address themselves as if in the act of hearing. In one word, the agreeable sensations put the organism into a state of general excitation which expresses itself by movements proper to favour the action of the physical agents on each of the organs which it is prone to impress: and they demonstrate, consequently, the local pleasure of each of the organs.

The expression of the pain, whatever may be its outward causation, when it is violent, expresses itself by movements of defence, which apply themselves to all the sensorial organs: the entire organism suffers, and each sensorial organ expresses its particular suffering.

It is not only by their intensity that the excitations act upon the nervous system; it is also by their variety. The objects in motion attract particularly our attention, and have a special exciting action.* The pleasure which we experience in placing ourselves upon elevated places, in going quickly upon horseback or by carriage, appears to have this origin. I have observed a pathological case where this effect of rapid translation manifested itself in a striking fashion: A young girl, sent to me by Dr. Gilbert, of Havre, presented amongst other nervous troubles a very painful hyperesthesia of the hairy scalp, which only disappeared during equitation and rapid walkings. The swing induced similar effects: but when too prolonged it induced inverse effects. Manassein has shown that the cradle which promotes sleep induces also a lowering of the temperature of the body.†

* *Sensation et mouvement*, p. 83.

† Cl. Bernard. *La Chaleur Animale*, p. 160.

CHAPTER II.

Pathological Effects of Physical Agents upon Man.

Summary—Cold—Night—Influence of Night upon Maladies—Paralyses of Non-irritation—Paralyses of Exhaustion, Nervous Shock—Default and Excess of Excitation.

In the preceding chapter we have passed in review the general effects of the action, defective or excessive, of the agents which support life: we only considered the common effects, capable of showing themselves in healthy individuals, and so attached to their determining conditions that they cease along with their cessation, —in short, so to say, to the *normal* effects. We now proceed to consider more particularly some more pathological effects by reason of the individual conditions of the subjects upon whom they are induced.

When the elements necessary for the respiratory combustions come to be defective there result therefrom well known troubles upon which it is not necessary to return. We will only enumerate the principal.

The diminution of the normal proportion of oxygen, only realised in all its simplicity by diminution of atmospheric pressure, plays the principal *rôle* (P. Bert) in the pathogeny of troubles comprised under the terms, mountain or balloon sickness. In mountain sickness always, the labour of the ascent produces an exaggeration of organic combustion, the organism uses more heat than it is able to provide (Lortet); and, on the other hand, there is induced a diminution of pulmonary capacity (Vallat), bringing about perhaps a condition of congestion, according to the circumstances which complicate the situation.* But this diminution of oxygen can likewise show itself in other more numerous and more complex circumstances, in which the combustion element of the atmosphere is in insufficient quantity, because it has been in part consumed, it

* Laurent. *Cont. à l'étude du mal des Montagnes.* Th. Lyon, 1890.

may be by the respiration of animals and plants, it may be by other combustions: and when it has been replaced by irrespirable and toxic gases like carbonic acid or carbonic oxide.

The troubles which appertain properly to a diminution of the proportion of oxygen, are the phenomena of lowered nutrition; which characterise themselves by the necessity for respiration and circulation, by diminution of sensibility and motility.

The lowering of the *temperature* acts upon the living being, not only by forcing it to an unequal struggle with cold; but by depriving the nervous system of one of its normal excitants, heat. The privation of heat brings about, in short, phenomena of depression very analogous to those which result from privation of oxygen.

Cold, by modifying the conditions of the circulation, and even the constitution of the blood, diminishes the resistance of the organism to infection.*

If the application of cold appears to have, in certain circumstances, a stimulating action, this action is only passing and of short duration.† Cl. Bernard has determined that the ingestion of a small quantity of ice or cold water excites the secretion of gastric juice: but the opposite effect is produced if the action is prolonged.

Mental troubles consecutive to cold have been recorded by Larrey, Parry, Resch, Brush, Ball, Pick, etc.‡

Friedreich, Chiarngi, Amelung, Necker, Osiander speak of the influences exercised by the variations of atmospheric pressure, not only upon the development of maniacal exacerbations, but, moreover, on the disposition towards suicide.§

The influence of night upon man and animals in the respective state of health and sickness has been the object of numerous works.‖ This influence has been attributed to numerous factors, to wit, sleep, cold, hygrometric condition of atmosphere, darkness, inaction, each of which, without doubt, plays a *rôle:* but this *rôle* is still badly defined.

Some physiological conditions of sleep merit narration. Quételet

* A. Habib Goraïeb. *Cont. à l'étude de la pathogènie des maladies et valeur du froid comme élément pathogène.* Th. 1889.

† C. Bernard. *Exp. sur la digestion.* (Arch. Gèn. de Méd., 2nd sér. 1846, p. 7.)

‡ Pick. *Ueber psychosen, von seltener Etiologie.* (Berl. Klin. Woch, xxii. p. 643.)

§ *Morel, Etudes Cliniques,* t. i. p. 286.

‖ Fére. Contribution to the Pathology of Night. (Brain, Oct. 1886, t. xii, p. 389.)

observed that during sleep respiration diminishes by about one-fourth in frequency. Boussingault observed that a turtle awake burned 255 milligrammes of carbon per hour, whilst when it slept it only consumed 162 thereof. Scharling observed that a man asleep and awake consumed quantities of carbon which varied as 1 to 1.237. During the night the respiratory movements are less energetic moreover, and slower (Becquerel). The pulsations, as Galen already knew, diminish by about ten per minute. But it must be remembered that the physiological conditions of sleep are most complex and difficult to isolate experimentally.

Bonnal,* who has undertaken the study of the temperature of the body at the different hours of the day, has observed that, according to climate (Nice and Paris) the minimum nocturnal varies from 36.3 deg. to 36.05 deg., and the maximum diurnal from 37.35 deg. to 36.7 deg., and he remarked that the nocturnal cold did not produce itself so exactly if the subject remained seated.

Under the influence of sleep, irritability diminishes in all its forms: it results therefrom that one submits less easily to the harmful effects of excessive excitations. Erichsen has remarked that those who are surprised by a shock during sleep experience the effects thereof with less intensity. Wm. Edwards has determined in different ways that in the conditions where the vitality is less active the causes which determine asphyxia are less rapidly efficacious: these conditions are realised in sleep. Absorption is relaxed during sleep, and there results therefrom another kind of immunity.† Claud Bernard has injected into the cellular tissue of hares, subjected to the influence of ether, quantities of anhydrous prussic acid very much larger than were required to kill in the normal state: no poisoning resulted whilst they were insensible. When the modification of the nervous system ceased then accidents happened.

Heat, on the contrary, favours the nervous functions in general, and also the psychic functions.‡

The modifications of the hygrometric condition of the air during the night join their action to that of temperature. Barral has

* *Rech. exp. sur la chaleur de l'homme pendant le repos au lit.* (Gaz. Med. 1879, p. 591.)

† *Lécons sur les anesthésiques et sur l'asphyxie*, 1875, p. 100.

‡ Lombroso. *L'homme de génie*, p. 137.

studied in what manner humidity of the air caused diminution of aqueous exhalation. The electrical condition is akin to the hygrometric state of the atmosphere. During the night atmospherical electricity finds in the humidity of the air a good conductor whereby to gain the earth, where it embowels itself.

All these conditions favour, during the night, languishment of nutrition both in animals and vegetables.

We have reviewed the effects of luminous excitants: there is no room then for astonishment that their absence expresses itself by concording phenomena of depression. That is just what happens in fact. We will see, apropos of attention, that, even in normal subjects, the time of reaction is lengthened under the influence simply of closing the eyelids. In hysterical persons this delay of the reactions is associated with a considerable diminution of muscular force, with troubles of the muscular sense which reproduce themselves in the same circumstances in other maladies of the nervous system. If the excitation of the optic nerve can provoke an exaltation of the sensibility of other sensitive nerves the absence of the normal excitant entails a variation, in an inverse direction, of the other senses. We admit generally that the blind have an augmentation of the other senses, but Galton* contests this opinion, and I have myself several times had occasion to assure myself of its falsity. Amongst amblyopic hysterios we have frequently established that the occlusion of an eye restricts the visual field of the opposite side, diminishing visual acuity and sensibility to colours. Whence we may understand how complex is the influence of night: and it must be added that each of these causes of depression of the vital phenomena become so much the more efficacious as the others act at the same time.

Whatever may be the relative importance of these different factors their collective influence expresses itself by a diminution of the intensity of nutrition during the night, a diminution entailing cooling of the body. Von Boerensprung, Gierse, Ladame, Ogle, Jürgensen, etc., have seen that the lowest temperature is observable from 4 to 7 a.m. Weyrick says that the minimum sudoral secretion is produced between 5 and 6 a.m.

Women whose normal combustions appear less intense (Hirn)

* *Inquiry into Human Faculties*, p. 30

are more sensitive to these cosmic influences, especially to a lowering of temperature (Gavarret).

This influence of night and absence of excitation is especially set in evidence by the physiological conditions of hybernating animals. Marshall Hall had already noted these conditions, and related the effects of the slightest excitations upon animals. This lowering of nutrition is so profound upon them that Schiff observed, that in a marmot, atrophy of the lower crural nerve, cut five weeks previously, was no further advanced, than that of a dog (similarly treated) after five days. In some individuals affected by a profound depression of the nervous system one observes during the night such modifications of the functions that one might say that they are subject to a veritable nocturnal hibernation.

Bichat* appears to have well understood the *rôle* of the night when he says, "wherefore are the light and the darkness, in the order of nature, regularly co-ordinated to the activity and intermission of the outward functions? It is because, during the day, a thousand means of excitation surround the animal, a thousand causes exhaust the forces of the sensitive and locomotor organs, determine their lassitude, and prepare a relaxation which night favours by the absence of all kinds of stimulants."

Some have attributed to the night a special influence upon some physiological acts, such as accouchement, which appears, in fact, more frequent at night, as well as natural death: this influence remains unexplained, and I would add besides, as regarding death, that the very respectable figures which I have been able to bring together entirely fail to put in evidence this influence of night!†

If night has an evident influence upon a good number of physiological phenomena it has it, to a still larger extent perhaps, upon morbid phenomena. Frequently this influence seems determining, at others it is only exasperating. A good number of painful affections present nocturnal exacerbations: we know the hours of election of osteocopic pains: neuralgias, articular pains, frequently exhibit recrudescences during the night. Handfield Jones‡ says that rheumatismal migraine becomes worse during the night: he

* *Réch. Phys. sur la vie et la mort.* Ed. Cerise, p. 28.

† Porel. *Etudes sur les aliénés au point de vue de la nuit,* 1865.

‡ On functional nervous disorders, pp. 421 and 556.

makes a similar remark upon the brachial neuralgias, which are not only more intense at night, but are sometimes entirely wanting during the day.*

Gout frequently makes its appearance about 2 a.m., an hour of the night when the lowering of the atmospheric temperature approaches to maximum: the gouty manifest frequently morbid terrors during the morning, and these matutinal terrors constitute frequently one of the features of gouty madness. Wilks says that it is at the same hour when nutrition is relaxed that certain stomach troubles mostly show themselves, and the hemoptyses; it is at this hour also that epidemics of cholera make their invasion: the fact being that at Munich 70 per 100 invasions took place at night. The sweats of phthisis, which are rather paralytic exudations than active secretions, show themselves also preferentially during night. In the miliary sweat one relates almost constantly the existence of nocturnal recrudescences of all the symptoms.

Spasmodic asthma, whose accesses appear in general at night, is sometimes solaced by the action of a bright light. Laënnec had already pointed out a fact of this kind in which the accesses were attenuated when the lamps were lit: Baginsky had pointed out in infants, a paroxysmal nocturnal cough which induces itself perhaps under the same influence. In uremia we observe nocturnal accesses of dyspnœa and polyuria (pollakiurie).

Accesses of epilepsy present often towards morning a recrudescence of frequency, but this recrudescence can be the object of multiple interpretations.

The influence of night upon the mental state was well known to the ancients. Homer calls it "the governess of men and gods." Hesiod accuses it of engendering all the harmful beings of the darkness, and makes thereof the goddess of unhappiness; but what mostly struck him perhaps was its influence upon the mental state; she was the "grand nurse of chagrin," matrix maxima curarum (Ovid). Night, in fact, plays a grand *rôle* in delirious explosions† and this influence is not due only to sleep and dreams.‡ Baillarger§ had remarked long ago that in

* *Ibid.*

† Porel. *Etudes sur les aliénès au point de vue de la nuit*, 1865.

‡ Féré. *La Méd. d'imagination* (Prog. Med., 1886, pp. 741, 760). P. Chaslin. *Du rôle du rêve dans l'evolution du délire.* Th., 1895.

§ *Influence de l'état intermédiaire à la vieille et au sommeil*, 1842.

some aliens the lowering of the eyelids sufficed to provoke hallucinations of vision. Aristotle refers to an innkeeper of Tarentum who was in the habit of being delirious at night, and was of sane mind during the day. Alison has pointed out cases of exclusively nocturnal delirium in men over-harassed in business.* The same fact is redisplayed in persons subjected to prolonged inanition, as Savigny has related it in the history of the shipwreck *Medusa;* we find it again indeed in the neuropathies of the sane (Goethe, Müller). We know, on the other hand, that the anxiety of melancholics exaggerates itself almost constantly during the night, and sometimes always at the same hours.† Senile imbecilities, alcoholic delirium, present nocturnal exacerbations.

Nocturnal terrors, as M. Debacker has noted,‡ are met with sometimes in individuals who are exhausted, in which case they constitute a sort of delirium of inanition. In the nocturnal terrors it is well, moreover, to distinguish two orders of facts. These terrors are most frequently the effect of most terrifying hallucinations which arise during sleep, and persist a certain time after waking, sometimes even on till light appears to dispel them. But in some subjects night terror produces itself in the wake of every determined mental representation. It consists in a state of anguish analogous to that of agoraphobia, sometimes of such intensity that one can compare it to angina pectoris, and it produces itself by the sole fact of privation of light, sometimes in full day in a darkness artificially brought about. It is related that Hobbes was incapable of bearing the privation of light: I have already cited the case of an individual, who, surprised by darkness in passing through a tunnel in an unlighted carriage, experienced such an agony, associated with so painful a sensation of choking and lung pressure that he would have thrown himself out of the door if he had not been prevented. Another individual, in similar circumstances, falls into a veritable collapse with incontinence of urine and fæces. With most neuropaths this effect of darkness expresses itself solely by the melancholic or hypochondriacal tendencies which manifest themselves at nightfall: we know well, moreover, that many

* Allison. *Nocturnal Insanity* (Med. T. and G., 1868, vii., p. 210).

† Dubuisson. *Des Vésanies ou Maladies Mentales*, 1816, p. 198.

‡ *Des hallucinations et des terreurs nocturnes chez les Enfants.* Th., 1881.

patients have at this period of the day a recrudescence of their pains and their pre-occupations, and call specially for their aid. "Night gives pain all its power and enfeebles only the mind."

Insane suicides frequently take place in the morning; and the influence of nocturnal depression on the ideas of destruction, is set in relief by the fact that they disappear frequently after the ingestion of a certain stimulant, or even an aliment of slight value. This circumstance might be, let it be said in passing, cited in support of the organic origin of pessimism which I have maintained elsewhere.

The influence of darkness on delirium manifests itself frequently in individuals affected with ocular affections. In such patients the closure of the eyes sometimes determines a delirium, with anxiety and hallucinations of sight, which has a certain analogy with alcoholic delirium. Sickel has observed the fact in patients operated upon for cataract. MM. Armaignac, Parinaud, Valude, etc., have observed analogous facts. Schmidt Rimpler has seen the same fact produced in patients attacked by syphilitic iritis and iridochoroiditis; and Hirschberg, in a patient attacked by glaucoma, and on whom he had practised an iridectomy under anæsthetics.

But the most characteristic troubles bear relation to the sensorial and motor functions.

The influence of night can manifest itself by troubles which can moreover be related to another cause. The impotence of alcoholics is manifestly worsened by night. Alcoholics suffer in the morning a general lassitude, or a paretic state, which frequently affects the lower limbs: but sometimes also that limb which plays the greatest *rôle* in professional occupation; under the influence of a painful emotion the paralysis can become complete.* The morning impotence of alcoholics manifests itself especially by the exaggeration of the tremulousness which follows in the wake of new excitations.

The various impotences which can be properly imputed to the influence of night offer a combination of sensory and motor troubles.

The first which has struck attention is nocturnal incontinence of urine. J. L. Petit recognised three groups of cases thereof

* Boisvert. *Et. cl. sur les formes atténuées de la paral. alc.*

according to their causation, viz., the incontinence of infants too lazy to rise; the incontinence of those who sleep so profoundly that they are not awakened by the sensation of distension: the incontinence of those who believe (think?) to urinate some part. It is just to recognise with Trousseau that the first cause of incontinence is the neuropathic predisposition;* but the classification of J. L. Petit merits not any the less consideration because it takes account of motor and sensory troubles whose existence is indisputable. Indecision, horror of movement and darkness, which makes infants stay abed up to the moment when the contractibility of the bladder has overcome the resistance of the sphincter, hardly differs from the indecision and defects of will which one observes in a great number of neuropaths under the influence of night. It is likely, moreover, that the vesical sphincter, which is so sensitive to peripherical excitations and to emotions of every kind, loses its tonicity when the luminous excitation is wanting; and that, all things being equal, it resists less well by the sole fact of the obscurity. This is no theory of construction: the experiments of Mosso and Pellicani have shown the sensibility of the bladder to all sorts of excitants, and, on the other hand, I have been able to determine in man that the energy of the sphincter of the anus, which does not lack functional analogies to the sphincter of the bladder, is subject to notable modifications under the influence of sensorial excitations.† The experiments of Mosso and Pellicani still further compel admission that under the influence of darkness the sensation of distension is enfeebled.

Cold adds, it appears, its action to that of darkness in the pathogeny of nocturnal incontinence. Eichorst had remarked that ameliorations happen more frequently in summer than in winter, and Buckingham notes that in 36 infants treated in the Boston Hospital for Sick Children, five presented themselves during summer, and 31 during winter.‡

Another nocturnal syndroma in which sensorial troubles combine with nocturnal troubles is well known under the name of hemeralopia or night-blindness. This blindness, if it is not pro-

* L. Guinon. *De quelques troubles urin: de l'enfance.* Th., 1889

† *Sens. et M.* p. 57.

‡ *Boston M. and S. Jl., 1888.* No. 118, p. 270.

duced, like nocturnal incontinence, in neuropaths attacked by congenital nervous exhaustibility,* exclusively, presents itself frequently, if not always generally, in those who have been subject to diverse causes of exhaustion: first it may be general, as in the wake of acute maladies (Gubler), in puerperality (Demenlater), in paludism, in bad hygienic prison conditions, in ships, in armies, in schools, where epidemics attack generally the least nourished and worst lodged personnel: second, it may be local, as in the wake of fatigues of vision in equatorial seas, or on plains of snow. Sanson and Sichelont reckon hemeralopia due to this last order of causes as an insensibility consecutive to too strong a stimulation, and comparable to deafness of workmen who labour in the midst of an intense noise; we might more justly compare it to the temporary anæsthesias which succeed the sensorial paroxysms of epilepsy, and upon which Hughes Bennett has recently insisted.† These anæsthesias by exhaustion are not rare in hysteria, and I have shown that one can always provoke them experimentally by making such carry, for a short period of minutes only, red spectacles: one can with good reason compare the motor paralyses from exhaustion of which I have had occasion to report examples, and of which M. Suckling has had an example in practice recently.‡ The origin of the hemeralopia of tropical countries due to exhaustion can be upheld on the fact that it can be cured by a general treatment, as, for instance, by cod liver oil and phosphorus.§

Hemeralopia is not constituted merely by a periodic anæsthesia: the necessary troubles are accompanied, in a great number of cases, by mydriasis, pupillary paresia, accommodation troubles, diplopia, and even strabismus.

Mackenzie has cited a case of hemeralopia where it was associated with paralysis of the members which disappeared during the day with the visual trouble.

In fact, there is produced in the accesses of nocturnal blindness an association of phenomena, the inverse of those which one observes to be produced under the influence of a moderate augmen-

* Weir Mitchell. Lectures, 2nd ed. 1885, p. 102.

† *Ex. Cort. disch. and their effects, Lancet* (89, pp. 619, 672). C. Féré. *Les Epilepsies et les Epileptiques*, 1890, p. 188.

‡ *Exhaustion Paralysis, Lancet*, 1889, p. 573.

§ *Dumas. Contr, à l'etude de l'hemeralopie essentielle et de son traitement.* Th., 1889.

tation of the luminous excitant, which determines at once an hyperactivity of special sensibility, and of the muscular annexes of the eye. One can, therefore, say that if hemeralopia is a syndroma of general exhaustion or local exhaustion,* its accesses develop themselves under the influence of an insufficiency of the physiological excitant of the organism, light.

This impotence by defect of physiological excitation finds itself again frequently in hysterical women under the form of a general depression of all the functions: they present frequently, on waking, a general torpor, an incapacity to move themselves, a general insensibility, sometimes a remarkable coldness of the skin. I have often determined that, shortly after rising, the narrowing of the visual field, the diminution of visual acuity, and chromatic sensibility, was much more perceptible than some hours later.

The influence of defective excitation and the modifications of nutrition, which produce themselves during night, on the nervous exhaustibility, appear to me of some interest in the interpretation of other more frequent phenomena which one would not believe from the reading of the classic books.

M. Weir Mitchell has pointed out, under the title "Night Palsy," or "nocturnal hemiplegia," a paralysis showing itself generally at the hour of waking sometimes with painful tingling or numbing, and comprising frequently both hands, sometimes the whole of one side of the body, more often in women at the menopause, but also in men.

M. Ormerod† has observed similar facts, in which he has been frequently struck by the numbing, the tingling, sometimes so painful as to wake the patient, and accompanying itself with swelling of the hands. He remarks that this numbing with paresia comes on specially at night, but that it can present itself during the day after certain labours, such as washing, scrubbing, with the fork, needle-work, etc. This last circumstance seems to me worthy of relation, for it appears adapted to show that in subjects in a state of exhaustibility which may be in question, prolonged exercise, fatigue, can have the same value, as defective excitation and the relaxed nutrition of night. In the cases of M.

* Several authors have pointed out its coincidence with *Scurvy*. Nozereau, Vallin, H. Guéneau de Mussey.

† Baizeau. De l'hemeralopia Epidem, 1861, p. 32.

Ormerod, which are generally women at the menopause, the paretic numbing usually disappears by simple frictions.

M. Sinkler* has also observed these numbings, especially in women at the menopause. He makes jading play an important *rôle*, and thinks that the troubles are due to an hyperemia of the nerve trunks, or of the spinal cord, favoured by nocturnal decubitus. His patients were cured by galvanisation of the cord, massage, and ergot.

M. Saundby† has published facts of the same order, painful numbing, which he compares to what succeeds compression of the nerves, and associated with a bluish coloration and chilling of the hand. He considers these cases as a form of neurasthenia: the most severe which he has observed concern men having, in general, gastric troubles, and which were cured with rhubarb and calomel. Following M. Saundby's note, M. Notley‡ has reported that he has seen them cured by iron; he attributes them to anemia. M. Moir§ on his side has also observed this night paresis in women at the menopause, frequently dyspeptic, but strong, who were cured by potass. brom. Steavenson‖ has observed the same troubles also with women at the critical age. He is constrained to admit hysteria, as also has Weir Mitchell. Bernhardt¶ has also observed in man and woman troubles which compare with the preceding, and where one remarks a sensation of tension of the skin of the members. Some patients indeed have the feeling as if their limbs were going to burst. Finally, more recently, M. A. H. Smith** has discovered anew these facts in making the remark that the nocturnal lowering of the circulation can play a *rôle* in their production.

The works I have cited show that there exists a paresis with numbing of the extremities, which developes itself under the influence of night, disappears temporarily under the influence of slight excitations, and definitely under the influence of a treatment at once tonic and calmative. This paresia, which developes itself in general in exhausted subjects, can appear again under the influ-

* *On Peculiar Numbness and Paresis of the Hands.* (St. Barts. H. Rept., 1883 t. xix., p. 17.)

† *On a Form of Numbness (N. Y. Med. Jl.*, 1884, t. xl., p. 107).

‡ Saundby. *On a Special Form of Numbness (Lancet*, 1885, t. ii., p. 422).

§ *Lancet*, 1885, l. c., pp. 548, 643.

‖ *Practitioner*, 1886 to. xxxvi., p. 410.

¶ *Bernhardt, (*1886, p. 33, *Centralblatt f. Nerventh).*

** A. H. Smith. *Waking Numbness* (A. J. M., 1817 t. xciii., p. 410.)

ence of night after a forced exercise, a chilling of the extremities, and also, as we will see, after a painful emotion. There is engendered a special symptomatic complex which differs from the recrudescences of pains which one observes under the influence of night in certain neuralgias,* in certain forms of paresthesia,† in erythromelalgia.‡ These paresias appear to be only an exaggeration of the phenomena which present themselves in the normal state under the influence of night. The more transient and slighter troubles which one observes, so to say, every day, in a large number of neurasthenics, and especially hysterios, constitute intermediaries betwixt the normal and these paretic states. As Weir Mitchell has well observed, hysteria appeared to play an important *rôle* in the causation of these troubles. The following observations can serve as examples:—

OBSERVATION I.

"Bilateral Neuropathic Heredity—Nervous Antecedents—Migraine, Chorea, Nocturnal Terrors, Anorexia of Pregnancy—Hysteria—Nocturnal Paralysis.

"Madame V. presented herself for the first time at my consulting room at Salpêtriére upon the 12th January, 1895. She was accompanied by her mother, who was over sixty years of age, but is very alert and appears younger, and has, moreover, a painful ovarian spot upon the left side and a slight hemianaesthesia of this side, although she has ceased to change for nine years. She has been subject to migraines, attacks of melancholy and to convulsive attacks. The father, who was a drunkard and debauchee, left home twenty-five years ago, and no one knows what has become of him. A brother of the father died in prison whilst serving a term of punishment for forgery.

"Madame V. has had two sisters born before her—the elder died at the age of eighteen months of teething convulsions; the other succumbed at six months to convulsions also.

"Madame V. was a precocious infant as much from the intellectual as from the physical point of view—she walked and spoke early, she learnt easily at school. She changed early, has never had convulsions or tics, but she has, from the age of six years, had frequent migraines followed by vomitings; and all her life her sleep has been troubled by nocturnal terrors and nightmares. She changed at the age of twelve years. At seventeen, after a thwarting, she had an attack of chorea which lasted three months, and was worst upon the left side. She married at nineteen, and had her first infant at the age of twenty-three; it was a boy, which died of convulsions on the eighteenth day. The following year there was a second infant, born dead.

* *Studies of fl. Nerve Disorders.* Handfield Jones, 1870, p. 550.

† Putnam. *A Series of Cases, etc. (Arch of M., N. Y.*, t. iv., p. 147).

‡ *Dana. Acroneuroses (N. Y. M. R.*, 1885., t. xviii., p. 57).

During a third pregnancy she had anorexia and some vomitings which ceased spontaneously at the fourth month; the infant was full term, and although it had had some convulsions, she was at present in good health and was seventeen years of age.

"Since the chorea Madame V. was always in good health and had not had any nervous accident until three years ago. Having then lost her husband she was subjected to serious money losses; she had insomnias, followed by loss of appetite and flesh. The state of her affairs was somewhat bettered under condition of hard work, her health was maintained rather better than worse; when two months past, she had a very abundant metrorrhagia, for which no organic cause can be found and which has not been reproduced. Since then she has remained pale, her menses being scanty and painful. A few days before this loss she began to feel a constrictive pain in her head, comprising all the cranial dome, but predominating in the postero inferior region, which appeared to be the seat of a permanent pressure. From time to time she felt at the back of the neck noises which were delayed at the occipital region. At nightfall she was seized with sad ideas of ruin for her mother and daughter, and sickness for all the others, and at the same time a pusillanimity and unusual indecision; her sleep is troubled by frightful nightmares, she wakens about six a.m., but finds herself incapable of making a movement, she suffers from distension of the bladder, but she does not even dream of rising. Her members appear to her to be asleep and in cotton wool, she appears to have no notion of the position of the extremities, only it appears to her that her hands and feet are very near her body, and that the greater part of the member is wanting. This strange sensation is comparable to that experienced by some who have undergone amputation of limbs, and can only represent to themselves the extremity of their absent member. Up to the day, up to the moment, when her mother enters into her chamber, she makes no movement. After day-break gradually a sensation of numbing and tingling appears at the extremities of the fingers and nails. These sensations, sometimes very painful, precede the return of the movements of the arm, but the delicate movements of the fingers remain almost impossible, she is incapable of buttoning her garments, of seizing a needle or pin. When she has moved her arms, and some one has applied friction for some time, the fingers become supple. From the hour of waking up to the moment when restoration is almost complete, nearly three hours have passed. One day she was left in darkness up till ten o'clock, and then she was found still in the same condition of impotence. The movements of the head and neck and the movements of articulation are not affected.

"On direct examination one cannot establish any modification of the outward aspect of the members. There exists a pain in the region of the left ovary, a little sensitive sensorial anaesthesia of the same side. The retraction of the visual field on the same side is very considerable, and the patient does not see violet at all with the left eye. The left grey is of a darker brown, and the pupil is less large upon this side.

"Under the influence of treatment with bitters and chalybeates, bromide of potassium and hydro-therapy, combined with static electricity, all these phenomena disappeared within three weeks, excepting the ovaralgia and hemi-anaesthesia which persist."

OBSERVATION II.

"Arthritic and Cancerous Heredity—Nervous Antecedents, Ophthalmic Migraine with Procursive Impulsions—Troubles of Sleep, nocturnal Paralysis.

"Madame P., aet. 52. She does not admit of any antecedent hereditary neuropathy. Her mother was rheumatic, and succumbed to a cardiac affection. Her father died of cancer of the pylorus. Amongst the collaterals there exists a certain number of arthritic manifestations. She herself has never been ill, but since the establishment of menstruation at the age of fifteen years, she has been subject to very violent migraines which return about every fifteen days—migraines which merit at least a short description. They begin with a suborbital pain seated always on the left. Gradually this pungent pain extends itself to the frontal region and is associated to an exquisite hyperaesthesia of the skin; a sensibility such that the least contact even on the hairs determines an insupportable feeling of burning. When this pain is installed for half an hour or an hour, the patient begins to experience sensations of lancinating character which localise in the left eye, but which, in reality, exist in the left halves of both visual fields. These scintillations often give place to a sort of luminous disc whose margins are undefined and appear animated by rapid vibrations. This disc, situated towards the left, enlarges itself generally at the same time that it opens itself out in front and its centre goes into shadow. At the end of some minutes the disc has taken on the aspect of a jagged wheel, cut out upon its inner semicircumference, or of a demicrown of fortifications à la vauban. This indented wheel has the colour of electric light in which appear, from time to time, red and blue points. It is animated with very rapid vibrations. In proportion, as the wheel opens itself and enlarges itself, the centre becomes entirely obscure. At the end of an hour the indented circle is enlarged to the point of rejoining the limits of the visual field and disappearing. The patient declares then that she only sees the right half of objects placed in front of her. The persons whom she looks upon seem to her cut exactly in the median line, and she sees nothing of what is on the left. There exists, in a word, hemianopsia, that is to say, a loss of the left two halves of the visual fields. There are then induced vomitings of biliary or alimentary substances, according to circumstances, but the frontal pain and hemianopsia persist for several hours, and only disappear when the patient goes to sleep. Sequent to a certain number of attacks the patient has felt for several hours a painful sensation of numbing in the left hand and sometimes in the forearm, but never higher; she never experienced aught similar in the face or the tongue. In short, since she was thirty years of age, this subject was liable to ophthalmic migraine. Up to the period of the menopause she never had to complain of other nervous accidents. She has had four children, the last fifteen years of age, all in good health.

"Her menses ceased at the age of fifty without important general troubles. From this moment the migraines presented a certain modification. Immediately after the vomitings ceased, the patient was seized with an irresistible impulsion towards flight—it was with great difficulty she could be restrained by carefully closing all the doors of her apartment. She

retains memory of this impulsion to which she cannot assign any end or object; she has simply the consciousness of an irreistible desire to march right in front of her. This desire disappears with the head pain.

"During tne six months which followed the menopause, Madame P. was greatly tried by the death of her father and mother, and by the entry into a convent of one of her daughters. Her health changed, her appetite became capricious and absent at times, sleep which had always been good was disturbed by nightmares, she had a feeling of choking when walking, her character which had always been even and gay became unequal, changed by sad preoccupations. After about a year she began to experience feebleness in the lower limbs, it was with great repugnance that she mounted a stair even to the first floor. After six months the situation became aggravated by the apparition of pains. Several painful points appeared together almost at once; a little to the left of the median line betwixt the two shoulder blades there exists a painful region corresponding almost to the vertebral prominence about three centimetres broad by ten centimetres long; the patient experiences there spontaneous shootings, and besides the skin is sensible of the slightest contact, deep pressure is insupportable. Another painful zone of the same kind exists below the lumbar region in the same line, it hardly is of the same dimensions as the preceding.. Finally, at the same time as the two preceding zones, there is produced in her another almost round and about ten centimetres in diameter below the left clavicle. These painful zones had already existed for more than two months, when on the 13th January, 1888 she began to experience an extremely violent pain in the tendon achilles of the left side. There was no swelling, but pressure was very painful upon the least movement of dorsal flexion of the foot. The doctor who was called, suspected a blennorhagic synovitis and proceeded to an examination of the genital organs which, however, were found perfectly sound. This examination of which, however, she did not know the object, provoked an excessive excitation, soon followed by a sadness of which she could not rid herself. Her appetite became almost void, she could only take liquid aliments. Sleep troubled her more and more, and at the end of eighteen days she began to experience in the head shocks which were reproduced four or five times nightly.

"Finally appeared other troubles which consummated her dispeace. When her sleep was interrupted during the early hours of the night, about four or five a.m., she was incapable of moving any member. This general impotence was short, at the end of some minutes of effort she came to be able to move her foot and hand upon the right side; the power did not return to the left side until after prolonged frictions. This paresia was accompanied, on the left side mainly, by a sensation of painful numbing with tingling, and the hand especially was cold; the fingers appear to have diminished in volume, the rings no longer retained their place. The impotence, which only endured a few minutes, came at about the end of a month thereof to prolong itself for an hour or more; the patient was not capable of raising herself until after the blinds had been opened wide and friction had been energetically applied. During several hours she remained incapable of making delicate movements or even of simply buttoning her garments. When the paralysis was at its acme the patient represents that she had no

consciousness of the existence of her body, it seemed to her that she had no body, that she was "a pure spirit" according to her expression.

"When I saw the patient on June 20th, 1887, these paralytic troubles had been established for two months. As it was impossible to establish a discipline in her own house, I advised her removal to an Hydropathic home. Under the influences of cold douches repeated twice daily at fixed hours and a tonic treatment (iron, nux, arsenic) and bromide of potassium given every evening in moderated doses (one to three grammes), amelioration set in rapidly. The paralytic numbing of the awakening diminished at once in duration, then in intensity. At the end of fifteen days it had almost completely disappeared. The sensations of shock which provoked the wakening disappeared entirely. The anorexia and painful phenomena resisted longer. At the end of six weeks the pain of the tendon achilles still remained, but it finally disappeared. The cure has since been maintained.*

"Madame P. was seen again in 1890, she is still subject to migraines unaccompanied. Her nocturnal troubles are not reproduced. She has no painful points. Her general and special sensibility is always intact."

These facts which I might multiply, present the greatest analogy to those which have been reported by the authors whom I have cited. They are perhaps better adapted, however, to exhibit the *rôle* of the neuropathic disposition, and depressing conditions in the pathology of night paralyses. These paralyses originate upon the same plane as paralysis of exhaustion, (of which we will treat later on), but, instead of being determined by an excessive labour or by a too excessive sensitive or sensorial excitation or by the mental representation of one of these conditions of exhaustion; they result *from a defect* of physiological excitation, they are paralyses by inirritation.

Gamberini† described in 1844 as a special neuralgia of the forearm, an affection commencing by a pain at the extremity of the fingers of one hand, most frequently the two last, subsequently extending itself the length of the forearm even to within one or two inches of the shoulder, producing itself at night and ceasing completely when day appeared. Pain accompanied itself with a sensation of swelling which did not exist in reality, it could be reawakened by immersion in cold water, it entails a certain impotence of movements and is accompanied sometimes by a "noise of snow" in the sheath of the tendons, a noise which one might compare to that of crepitant synovitis. This last character is not capable of entirely putting aside the idea of the identity of

* *Brain*, 1889, t. xii., p. 320.

† *Il Raccoglitore Medico*, 1844 and 1847.

Gamberini's neuralgia and the nocturnal paralysis of Weir Mitchell, for synovial crepitation can be encountered in neuropaths. I have had occasion now for several years of observing a very remarkable case thereof,* and I have encountered several others since I related it. Always it is a fact sufficiently rare, and the fact that the pain produces itself especially in vigorous subjects whose profession enjoins fatiguing movements of the upper extremities, and that it can be assuaged by blood lettings, must inspire some doubt as to its nature.

In 1846 Mareska observed, in the prison of Gand, an epidemic of permanent contraction of the muscles of the extremities. 'The patients begin by experiencing prickings and numbing in the extremities. Most of them experience these also in the nape of the neck and the head. This tingling persists also frequently even when the cramps have disappeared.' 'The strongest attacks supervene ordinarily at night, towards the morning, diminish sensibly in the forenoon and disappear often frequently during the rest of the day.†

The impotences by inirritation do not attack only the mobility of the members, sometimes they manifest also on isolated muscles of the face. Weir Mitchell reports an observation of Schweinitz and a personal observation in which nocturnal paralysis and paralysis of the awakening manifest under the form of Ptosis. The patients were incapable of raising the eyelid which remained depressed in spite of them.‡ Careful interrogation of hysterios and neurasthenics show that this paralysis is far from being rare.

The muscles of the tongue do not escape nocturnal impotence. The following observation in which motor troubles coincided with a very manifest intellectual depression forms an interesting example thereof:—

Observation III.

"Hereditary Antecedents—Eclamptic Mother—Paludism-Chagrins—Nocturnal Paralysis—Troubles of Speech and Respiration.

"Madame V., 39 years of age, has had no knowledge of any antecedent nervous condition in her family other than that which determined the death

* Ch. Féré *et L. Quermonne (Prog. Med.*, 1882, p. 629).

† *Bull de l'Académie Royale de Belgique*, t. v., 1846, p. 423.

‡ *Some Disorders of Sleep.* (Trans. of the Association of American Physicians, t. v. 1890, p. 120.)

of her mother, who succumbed some hours before giving her birth, to crisis of eclampsia.

"When 38 years of age she had not herself presented any nervous trouble. She had been operated upon for a right congenital harelip. Since the age of 13 years she had systematically menstruated. At Rome three years ago she was attacked with intermittent fevers. It was during the convalescence from this affection that she began to experience nervous affections, headaches with throbbings in the right temple, facial and intercostal troubles without periodic character, and which were not influenced by quinine. During the summer of 1887 a long sojourn in the country brought about the disappearance of these accidents. In the autumn of the same year, some weeks after her return from Paris, she began to complain of chokings (ensoufflements); her appetite was bad, she had tympanites after food and somnolence, her sleep became bad, established itself painfully and was often broken at the commencement of night by spasms of the lower limbs and later on by painful dreams. The patient, usually active, had great difficulty in leaving bed, she is without energy and decision. This disposition of mind postponed a marriage project. The insomnia and digestive troubles increased, the patient, preoccupied with her disappointment, refused every exercise. A fresh sojourn in the country only served to increase her distress. On her return in October, 1888, she had a complete anorexia, the patient only took with disgust an inadequate quantity of aliments. She began to experience rachitic pains augmented by standing. Her courses which had gradually diminished and were become painful for several months, ceased in November and were replaced by a painful attack in the pelvis, an attack which left a painful spot in the right iliac fossa. This pain, which is subject to temporary amendments, never entirely disappears. At the periods, which do not complete themselves, she suffers sufficiently painful recrudescences to entail cessation of walking. At the end of December, in the wake of a cold, she had a slight bronchitis, but by reason of an excessive sensibility which was not habitual to her, she kept her chamber. Some days after this absolute repose, the bronchitis being already on the way of betterness, she had, for the first time, an attack of nocturnal numbing in the right hand. This painful numbing with sensation of swelling, although with no apparent increase of volume, manifested itself towards 5 a.m. on awakening, but only lasted about half an hour. She attributed it to a bad position and did not preoccupy herself further with it. Some days after the cough ceased entirely, but there remained a sensation of permanent difficulty of breathing which became aggravated in the latter part of the night and the morning, and the patient experienced a sensation of powerlessness to dilate the lung. At the same time were produced troubles in the emission of speech, the movements of articulation were easy, memory of words did not seem altered, but the patient experienced a veritable fatigue in making a sound, she separated the words, leaving a syllable behind, at the same time the voice became lower and slower. Several times complete aphonia occurred. All these troubles progressively attenuated, two or three hours after rising speech attained its natural rapidity and normal tone, but the oppression always persisted in some degree exaggerating itself under the least muscular

effort. Madame V., who attributed all her troubles to her worries, did not wish to place herself under treatment. She went into the country in the beginning of March, 1889.

"At the end of a short time appetite returned, the painful troubles became lessened, the morning respiratory effort as well as her menses re-appeared; by the month of August everything appeared in order again.

"During her sojourn in the country she had renewed the former project of marriage, and her friends attributed to her hopes a large rôle in the amelioration of her physical condition. The marriage should have taken place at the end of November. She returned to Paris on the 15th October. On the 20th she learnt that her *fiancée* came to be accidentally killed. At this news she became pale, allowed herself to fall upon a seat and remained for several hours in a state of stupor without a tear, appearing to hear nothing and to see nothing. She came to table at dinner-time, refused to eat, only replying in monosyllables and retired into her chamber. The next day at nine o'clock as she had given no sign of life, someone entered her room. She awoke suddenly and was discovered in the same state of oppression wherein she had been observed during the preceding winter, but all the troubles were more marked. One could hardly understand the words she spoke with effort in a low voice; and besides that both limbs on the right side were inert, flaccid and insensible. When the blinds had been widely opened and when energetic frictions had been practised upon the paralysed limbs, after about half an hour gradually some movements were observed to reappear in the fingers, in the arm, then in the toes and the lower limbs. The patient, who had not felt any shock, complained only of a sensation of numbing and tension as if the members were swollen, although in fact there was no appreciable augmentation of volume. Gradually speech returned as well as limb movements, and the patient was able to rise.

"From this day alimentation was inadequate, sleep was bad, the patient hardly sleeping before two a.m., and every day on awakening, the accidents which have been described were reproduced, varying only in intensity. The patient could only leave the bed very slowly and late, and her hand remained for a long time inadequate for the grasping of small objects, she was often incapable of writing or using the needle before lunch, the arm appeared somewhat restored in its functions. After midday and in the evening the motor functions appeared intact. During all the time the paralysis endures, and somewhat later the extremities are the seat of prickings and formications with or without a sensation of burning or distension.

"January 7th, 1890. Madame V. awoke at two o'clock. She lunched helping herself with her left hand, her right side being still inert. She appeared to open her eyes painfully, and the upper eyelid was only incompletely lifted. The lines are slightly effaced upon the right side, the nostril is fuller, the mouth is more to one side, the tongue is mobile in all directions, but its propulsive force barely exceeds 400 grammes, and lateral propulsion is not more than 200 on the right, whilst scarcely 350 on the left. The respiratory movements are very superficial, but not quickened, they barely exceed twenty per minute. The respiratory murmur is not

associated with any morbid bruit, but is very feeble, mainly upon the right, and respiration is made by stages of three or four times. The patient can only speak in a very low voice and appears to make a considerable effort thereof, sometimes followed, moreover, by a veritable fit of breathlessness.

"The upper limb is extended the length of the body, the fingers can only now make movements of flexion and extension. The lower limb, in extension, has only the movements of extension and flexion in the foot and toes. The rotary reflexes are equal and normal.

Tactile sensibility is obtuse upon the whole of the right half of the body, but the insensibility is less marked in the extremities where power begins to be established. There is analgesia to nipping, pricking, and cold at the same points. The muscular sense is affected, the patient directs badly the index to the point of her nose. She indicates inexactly the position of her lower limb.

"Specially, sensibility is probably also attacked. Even from a superficial examination one determines easily the existence of a narrowing of the visual field, a diminution of acuity of vision and sensibility to colour impressions. The patient cannot distinguish at two mêtres from the right eye characters which she sees at five mêtres from the left; by the right eye she does not see any except violet. Hearing, taste, and odour are also affected upon the right side.

"The patient has recognised, from the beginning, that when her limbs are paralysed, although they are the seat of a swelling sensation they are colder than their neighbours. Two surface thermometers, recently corrected, give at the end of ten minutes, on the right side, 31.4 deg.; on the left 32.2 deg. on the back of the hand.

"During the time of examination (about an hour) the situation became considerably modified. The motility of the lower limb was almost entirely re-established to such an extent that the patient can hold herself erect. The hand and fingers move in all directions, but without force and without precision. Flexion of the fingers only produces displacement of the needle of the dynamometer by the right hand; by the left it gives 38.

"Next day, the 8th, at 4 p.m. the aspect of the patient was entirely different. The patient was not so breathless and she speaks with a certain effort, but her voice is strong enough and perfectly distinct. The movements of her tongue are more energetic, propulsion 600, lateropulsion on the right 350, on the left 500. Respiration 18 per minute, deeper, without interruptions but still somewhat feeble on the right.

"The patient walks without trailing her limb. The upper limb is free. She is capable of executing all movements with the right as well as the left, but the right only yields 16 to the dynamometer whilst the left yields 32. The position of the members is perfectly recognised (when the eyes are shut) and the finger is readily directed towards the point indicated.

Tactile sensibility is certainly less obtuse than when the motor paralysis existed, and the same is the case with special sensibility, the characters which she saw badly at 2 mêtres she now distinguishes at 4 with the right, and she recognises perfectly violet. The examination of hearing, taste and odour, imperfect in both cases, yields a concording result, but less precise.

The temperature taken on the back of both hands is 32.2 on the right, and 32.6 on the left.

The treatment consisted of a cold hydrotherapie, oxygen inhalations, chalybeates, bitters and potass. bromide (3 grammes daily—48 grains). Amelioration only began after three weeks' treatment; gradually the morning paresia diminished in intensity and duration, and so the other troubles. But, up till the end of March every time she awoke, in the morning or when her sleep was accidentally broken in the early part of the night, the paretic numbing of the right side prevailed to such an extent that she was incapable of executing the movements required for her toilet. It was only at the beginning of June that the cure appeared complete."*

We have already seen that asthma and cardiac dyspnœa can be very exactly influenced by darkness. Apart from this influence sleep alone entails sometimes troubles of respiration. Weir Mitchell cites the case of ataxics who, at the moment of going to sleep, suffer a gradual enfeeblement of respiration which proceeds just to the point of complete suspension.

This influence of darkness and sleep upon the mechanical phenomena of respiration is sometimes extremely remarkable in hysterical persons in whom one can observe the troubles characteristic of the Cheyne-Stokes respiration. The diminution of the respiratory activity, which entails a diminution of nutritional activity, can explain the delay of the asphyxia from which sometimes these patients benefit: in several suicides, of the collective character by charcoal, one has been able to remark that the hysterical female survived.

One interesting circumstance is that the nocturnal and matutinal enfeeblement of the respiratory movements in hysterical persons manifests itself sometimes in a manner very exactly predominant upon the most anæsthetic and amyosthenic side. This enfeeblement which reproduces itself in the same subjects under the influence of fatigue expresses itself by an enfeeblement of the respiratory murmur, which might give rise to doubts as to the integrity of the lungs; doubts, which find still farther justification when the feebleness of the respiratory murmur is accompanied by sighing respiration (saccades), which itself can result from enfeeblement of the motility of the thoracic cage,

* I remark that in this case the neuropathic manifestations were produced on the side where existed a congenital harelip. The lateral predominance of the morbid predisposition manifests itself sometimes by the successive localisation upon the same side of neuropathic manifestations, or rheumatismal as the case may be. It is a relation which I have found in several observations I have made, and papers from M. Lepicard (*Nerveux et Arthritiques*, th., 1889).

and which is found again in the post-paroxysmal stage of depression in epileptics.*

With these paralytic troubles of sleep must be compared the facts of the chorea of awakening indicated by Weir Mitchell, and which, in fact, entail an enfeeblement of motility: and the contractions which present themselves frequently with an extraordinary energy in neurasthenics and hysterios, and which, even at the place of resting limited to the inferior limbs, (as one observes in normal people unduly fatigued) can generalise themselves to all the body. The exaggeration of these spasms appears to indicate a more complex suspension of brain action: their analogy to nocturnal incontinence of urine is striking.

Clark Burman has sought to explain the frequency of the nocturnal spasms of hooping cough by the normal recrudescences which produce themselves in the overclouding of the senses during the night: two pupils of Vierordt, experimenting on the sense of hearing, have ascertained that during the first hour, sleep is light, it becomes rapidly more profound at the end of an hour and a half, attains its maximum after an hour and three-quarters, it becomes lighter after two hours and a quarter, accentuates at the end of four hours and a half, to attain a fresh maximum after five hours and a half, then it lightens until the awakening.†

The depression of motility coincides with a concording depression of sensibility. It is a fact which one can readily explain by the exploration in the morning of the sensibility of hysterios.

All these troubles which present themselves with the greatest intensity in hysterios have a great analogy to the phenomena of morning depression which one finds in a large number of neurasthenics. It must be remarked, moreover, that a large number of paralytic troubles exactly defined, which have been referred to the influence of night, are not produced in subjects who present hysterical marks, but who were attacked by neurasthenic troubles acquired by physical exhaustion, or mental exhaustion, traumatic or moral shocks, alcoholic or tobacco intoxication, etc.

Experimental studies on the influence of the excitations of a sense upon the functioning of other senses enable one to see that the

* Les epilepsies et les epileptiques, 1890, p. 168.

† *Ed. M. Fl.*, Dec., 1889 p. 523.

detailed study of special sensibility in these cases of nocturnal paralysis will give interesting results when one can make them under suitable circumstances. But it is not only the cutaneous sensibility and the cephalic senses which are capable of being affected. The genital sense itself can also be. I observed, for several years, a patient, aged 38 years, belonging to the class of degenerates, after Morel, by signs physical and mental, (among which are impulsions, meriting a special study), and who, all his life has been incapable of coitus, and even of having an erection otherwise than in full day, or in a chamber lighted *à giorno :* he did not, however, spare the means capable of supplying the physiological excitation of light.

If, on the side of the paralytic troubles of sleep, there exist motor disorders, spasms and tremblings on the side of anæsthesias, it is requisite also to indicate the sensorial disorders, well named by Weir Mitchell sensorial shocks, which can affect, first, general sensibility under the form of sudden contusive pains or head confusions arising just at the moment of going to sleep; second, audition under the form of dull or sharp sounds; third, vision under the form of lights; fourth, olfaction; fifth, taste under the form of odours and savours making a sudden and, in general, disagreeable (shock or) impression. The sensorial shocks, which present striking analogies with hypnogorical hallucinations, can play their *rôle* in the genesis of deliriums. Finally, the same conditions being present, one observes further emotional shocks, (emotional discharges of Weir Mitchell) presenting themselves in general under the form of sudden fear, sometimes preceding, sometimes following a sensorial shock, but more often alone. These discharges recall the paroxysmal anxiety which one observes frequently under the form of aura in epileptics: it rests upon the idea of death, culpability, ruin, infection, etc. These emotional shocks only differ, in short, by their sudden appearance and by their intensity of physiological moral depression, from those of the night.

These emotional shocks bear often the imprint of the ordinary pre-occupations of the subject, and there may result therefrom re-actions which do not lack interest so much from the practical as from the physiological point of view: for these reactions can give rise to accidents susceptible of being confounded with those of

epilepsy. It is not rare to see, especially in hysterical women, emotional shocks resting upon a foundation of jealousy, provoking, in the middle of the night, noisy explosions which end in unheard of scenes of violence, and actions of assault: I know at least two married people who are exposed from time to time to these kinds of discharges, and one of them is not too assured of the fate in store for him.

It is certain that the ideas of distress which figure most frequently in post-emotional deliriums play an important *rôle* in the great number of morning suicides for which it is impossible to attribute any cause.

Macfarlane* has described, under the title of "Anguished Awaking," a sudden awaking with respiratory anxiety in the midst of frightful dreams, which are mainly met with in neuropaths of defective nutrition, and in the exhausted. These troubles can also be attributed to insufficiency of nocturnal reparation. In some hysterical persons these accidents reproduce themselves every time awakening is not spontaneous: more frequently they manifest themselves only apropos of a sudden interruption of sleep of external origin.

On the side of these motor and sensitive troubles, which produce themselves under the influence of nocturnal depression of the nervous functions, certain vaso-motor troubles may be conveniently pointed out.

Sydenham, amongst the characters of hysterical œdema, as distinguished from the dropsical, points out this circumstance, that it is more marked in the morning: it is a peculiarity, in fact, of frequent occurrence, although recent authors do not refer to it.† Handfield Jones cites a case of paraplegia developed in the wake of an angina where the feet swelled during the night. It is not rare, says the same author, to find cases in which hyperemia of a part that is feeble, or an exudation, are more frequent towards night; the vaso-motor nerves are, like others, more feeble then. It has been noted that the dead finger of chlorotics is specially obvious in the morning (Parrot, Art. Chlorose, Dict. Med. Sciences, ch. xvi., p. 711).

* *Lancet*, 1891, v. i., p. 824.

† *Trintignan*, th., 1890. Charcot L'œdeme bleu (Roy. Med. 1890, 2nd Ser. t xii, p. 259.)

The œdema of the extremities is one of the symptoms which, amongst true hysteries, give rise to the most exaggerated complaints. Even when the augmentation of volume is of little moment, some describe the swelling as a monstrosity, their hands can hardly be outspread enough to figure the colossal proportions of their feet, which, however, rest in a small slippers. They compare the heat they experience to that of burning furnaces. They sometimes come to ground upon these subjective sensations a true delirium: one of them told me quite tranquilly that when she experienced her matutinal numbing with swelling and heat, if she touched a door handle, she heated it to such an extent that, a quarter of an hour after, she saw her chamber maid handle it with surprise.

Certain troubles of secretion can also be associated with nocturnal vaso-motor paralysis, and especially morning diarrhœas.

Observation IV.

"Neuropathic Heredity—Nocturnal Paresis—Speech Troubles—Rhinorrhœa.

"Mme. A. K., æt. 30. Her father suffered alcoholic accidents. Her mother was nervous. She had only one brother, born after her, and before term, and dead at five months. She was suckled full time, near nine months, but only began to speak at eighteen months. In her infancy one could find no other antecedent nervous trouble than nocturnal terrors. She has always been painlessly regular. Married at the age of 22 she has passed several years without having children. Two years after her marriage, in the wake of fatigues she became very anemic, and from that moment she began to experience, not only on sexual proposals, but also spontaneously, very intense genetic sensations, with very abundant secretion, which ended in an extremely painful lassitude, frequently even her limbs remained inert and incapable, for several hours, of supporting the weight of her body. At the same time there was induced a very abundant nasal discharge, moistening several handkerchiefs in the space of an hour. From this period she became very irritable, and the least emotion led to a trembling of the limbs which threatened to overpower her. To these troubles were added loss of appetite and insomnia.

"In September, 1886, following a cold (she had had her feet wet for several hours), she had a paraplegia which kept her to her bed for three months. The following year, on the occasion of a family quarrel, the same accident happened suddenly, and disappeared similarly, after three days. In 1888 she became pregnant, and gave to the world, without accident, a well-conditioned infant. Her general condition was rather better during the pregnancy and lactation which lasted 14 months. The abnormal genital sensations had disappeared. At the end of January, 1890, her infant having taken an angina she passed several nights without sleep. When the infant was well, she became subject to insomnia again, and only overcame it by

opiates. From the first night, upon awaking at two o'clock in the morning, she remarked that her right side was slightly numbed and very cold. Then from the moment she took opium her appetite, already bad, became almost null. Every day the troubles of sleep became accentuated. The numbing became soon an almost complete paralysis, and the two sides of the body became affected, but always with a marked predominance upon the right. It was the hand which was most attacked; it was only in the fingers that the numbing was painful, with sensation of formication and pricklings. The face on the right side was especially affected, the tongue moved with difficulty, the speech was slow and embarrassed. The mind, moreover, was far from being entirely free. Mme. A. did not experience any vexation under the circumstances, whilst the troubles were very marked, her disquietude only manifested itself when the functions began to re-establish themselves. It was not only emotivity which was attacked, the patient understood with difficulty the questions which were put to her, replied often incorrectly, remembered nothing whatever of recent events. This state at first endured for a short period after awakening, but gradually became prolonged throughout the forenoon. From the beginning of the matutinal numbing Mme. A. had experienced gradually on awaking violent sneezings, followed by an abundant nasal flow, which disappeared with the other phenomena. At the end of a few days the sneezings disappeared, but the nasal discharge persisted, and scarcely endures less time than the paralytic phenomena. It is never reproduced during the day. The discharge is entirely watery, like that produced under other circumstances, a large quantity of substantial handkerchiefs is needed to collect it.

"On the 26th March, 1890, Mme. A. presented herself pale, thin, vacant looking, in attitude of despondency, being convinced that she could hardly be cured, and that it was useless to make the attempt. Although the hour was 3 p.m. her morning numbing had not entirely disappeared, she had still uncertainty of movements of the right hand; as one can see, moreover, in this specimen of her writing:—

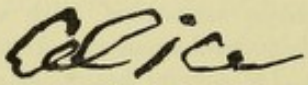


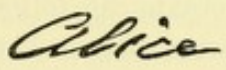
Fig. 3.—Writing of March 26th, 1890.

The dynamometer records 18 on the right and 25 on the left. When the patient, having her eyes shut, is asked to touch her nose with her forefinger of the right hand, she attempts it badly with both hands, but when the left index arrives at the middle of the bridge of the nose, the right index wanders towards the forehead or on the jaws. The tendinous reflexes present no lateral differences. The sensibility of the skin is diminished throughout the whole extent of the skin, but the anæsthesia is much more marked on the right, analgesia and pharyngeal anesthesia. There is amblyopia with achromatopsia on the right. (The other senses were not systematically examined.) A painful latero-mammarian point on side of right ovary. When the patient stands with heels close together and eyes shut only very slight oscillation is induced: these become considerable if she attempts to stand on the left limb only: she tumbles immediately if she makes the same attempt with the right

only. The tongue appears movable in every sense, but she does not resist more than a pressure of 200 grammes from before backwards, nor a right lateral of more than 100, nor a left lateral of more than 200.

"Under the influence of hydrotherapy, oxygen inhalations, iron and arsenic, the general condition became rapidly bettered, the morning troubles became gradually lessened. The nasal discharge disappeared for the first at the end of three weeks: the paralysis did not cease till later.

"On the 12th June there remained no other night trouble nor of the awaking. The patient was able to rise at night and attend to her child without any difficulty: as soon as she awoke in the morning she was capable of going about her affairs. The hysterical stigmata persist: pharyngeal anæsthesia, amblyopia, latero-mammarian ovarian neuralgia, but the motor troubles are considerably lessened: the dynamometer yields for the flexors of the fingers, 30 for the left, 27 for the right: the patient stands easily on the right foot, with closed eyes, the movements of the hand are perfectly precise, the writing having undergone a parallel modification.



Writing of June 12th.

The resistance of the tongue to a lateral pressure of 300 grammes is scarcely equal; it attains to 450 antero-posteriorly. Speech has regained its vivacity, as also facial expression. The right side of the face is, however, less animated and less mobile, the immobility and flattening of the nostril are specially remarkable.

"Mme. A. continued the treatment till October, 1890. She was seen again in March, 1891. The stigmata remained, but the nocturnal and matutinal accidents were not reproduced."*

The influence of defective physiological excitation can be illustrated by the fact reported by Strümpell of a young girl, aged 10 years, affected by a general anæsthesia of the skin and mucosa, of the muscular sense, of odour, of taste, and who had no means of communication with the world except by the right eye and left ear. If one closed these two organs she slept. The history of hypnotism contains a large number of facts of the same kind.

The absence of physiological excitation of the other organs of the senses is not less inconvenient for the general functioning, but it is still less well known than absence of irritation by light. We know badly the influence of the suppression of odour and olfaction upon the digestive functions: the *rôle* of the absence of cutaneous

* The matutinal rhinorrhoeal exacerbations do not appear exclusively among Hysterios. M. Ruanet sent me a patient in whom the nasal discharge, coinciding with crises of sneezing seemed provoked by reflex irritation of a papillary polypus in the right nostril. It shows itself with a very marked predominance towards 3 a.m., diminishing towards mid-day. It yields to opium given continuously (10 centi extract daily), but it will not be influenced by ablation of the Polypus. The person had not apparently any neuropathic defect.

irritation on the respiratory activity is not more precise, but we know at least that it is not nil. The influence of the suppression of sonorous excitations is perhaps still less studied: all the same Liégeois* recounts the curious fact of an hysterical person attacked with left hemiparesia and hemianæsthesia, in whom the occlusion of the ear upon the sound side determined a sudden abolition of the motor functions. Heyne,† Raymond,‡ have reported analogous cases.

All these facts show that the morbid manifestations of night depend upon complex physical conditions, but we are not able to attribute them to a particular mental state§ which is itself, of course, only a consequence.

Irritation of the digestive tube rapidly brings about a deterioration of its functions. Anorexia can follow a voluntary abstinence: I will cite an example thereof:—‖

OBSERVATION V.

Anorexia consecutive to a Voluntary Abstinence.

Mdlle, M., æt. 15, is the only child of aged parents, who submit themselves to all her caprices, and who preserve a reserve subject to caution in respect of hereditary antecedents. Up till 1888 she was healthy always, had never had any nervous trouble: the sole circumstance which had caused uneasiness was that menstruation had not yet established itself. All at once, in the first days of March, it was observed that she had ceased to eat. She said simply that she had no appetite. She first rejected aliments which she did not usually like. The parents soon became alarmed at the rapid loss of flesh, which was unassociated with any other trouble. Constipation notably did not then exist. They exerted ingenuity to find exclusively foods to please her: nothing answered. A doctor was called: his visit induced a nervous fit, the first she had experienced. This was April 15th. From this moment one might say that the rejection of aliments was almost absolute: she said that they all disgusted her: she only accepted at irregular times liquids and jellies, champagne, alcoholic drinks. At the end of a short time an obstinate constipation ensued: the patient refusing all laxatives we attempted without result forcibly to give her injections: one could not procure for her protection for her clothing otherwise than by holding her by the hair: she then took some German brandy. During one of the struggles which we had with her on account of the constipation we established a fact which hitherto had gone unperceived. The patient wears under her chemise directly next the skin, a belt of silk

* *Etudes Physiologiques (Gaz. Med.*, 1860, p. 372).

† Heyne *(Deutch. Arch. fr Klin. Med.* Bd. xlvii., p. 75).

‡ Raymond. *De l'anaesthésie Cutanée (Rev. de Méd.*, 1891, p. 389).

§ Morell. *Dissert. sur la dou leur et sur l'influence que la nuit exerce sur les souffrances physiques.* Dôle, 8vo, 1824.

‖ *Double. Sémćio. Géu.* t. ii., 1817, p. 225. *Dôle* in 8vo., 1824.

about four centimetres broad, which constricts her like the ventral entrave of a monkey. Her corset was, moreover, as tight as possible. One could not dissaude her from continuing this constriction. She pretended, moreover, that she ailed naught. From the time when she had suddenly ceased to eat she had shown a taste unknown to her before for walking excursions: gradually she increased the length of these: it came about that no one could follow her, and she took advantage of this circumstance to assert her good health. But in proportion as abstinence was prolonged wasting augmented and force diminished. Towards the month of September she had to cease her walks, the journey having become almost impossible. Gradually the enfeeblement became such that at the end of November the patient was unable to maintain herself upright, even with the aid of another. Alimentation was almost nil, the patient could not bear alcoholic liquors, she only took some spoonfuls of cold bouillon or milk.

At the end of January, 1889, the parents, fearing a near end, decided upon bringing her to Paris into a Maison de Santé, where they installed themselves with her. At this period the enfeeblement had reached such a point that she was unable to raise her head, which fell on one or other shoulder upon the least movement. The marasmus was veritably skeletonic; besides, the patient, who was in height 1m. 58, weighed 38 kilogrammes: her general aspect was that of an aged person, hollow eyes and earthy tinge: the jaws furrowed by folds parallel to the nasogenial furrow gave the physiognomy a Simian aspect. The skin of the members and trunk was dry and scaly: the extremities were cold, the skin of the hands was moist with a viscous sweat, recalling the integument of a batrachian, the extremity of the fingers offered the blue coloration which one observes in dead bodies. Speech is slow, and provokes crises of inspiration, and sometimes syncope. The tongue is good, there is no fever: the pulse small and irregular, varies from 80 to 100. One finds no trace of organic lesion of the lung. There is besides no cough. There is a very pronounced anemic *souffle*, no ovarian pain, nor other hysterical mark. There is a painful point upon the left side of the nucha, perhaps due to attitude.

The patient, watched by her mother, consents to take douches, but she obstinately refuses solid nutriment. She only takes a quite inadequate amount of fluids. Her state becomes aggravated, the feebleness becomes extreme. The mother, not having any authority over her, we get her to quit the establishment, which she did not do till February 6th. She was replaced by *une religieuse*. In presence of the new attitude of her caretakers the patient had a crisis of despair of the most violent kind, declared that she would let herself die, or would kill herself, refused to take anything, and repulsed all about her. Next day collapse succeeded violence, and the patient, who for some days was too feeble to be carried to the douche, consented to take a little milk every two hours, and submit herself to cold frictions. The pulse and the temperature were daily noted without offering any special feature: the pulse remains about 90, and the temperature oscillates betwixt 37 deg. and 38 deg. C.

The constipation was overcome by injections, and slight aperients, which the patient, become very docile after eight days, took without much fuss. The nourishment was augmented every day in an almost insensible manner:

clear chocolates, arrowroot, then bread, eggs, and beef juice were gradually added with success. Her gaiety returned, but the feebleness was still great. On 15th February the head still fell upon one or other shoulder. The douches were recommenced. Gradually the muscles of the neck regained a little force, and the head had less need of being upheld.

Dating from the 1st March the patient began to put on weight, and might be regarded as in full view of a cure. From the 10th March till the 1st of April she had gained 13lb. Every day the members are subjected to passive movements. From the first days of April the patient began to walk aided by two persons. On the 15th April she walked alone. Dating from this time she took walks alone every day longer.

On May 5th she left the establishment. Her health was excellent. She is fat. Is capable of taking walks of three or four hours duration. Her courses have not yet appeared.

From the mental point of view the modifications are not less marked. Her gaiety has returned. Her *bizarreries* of character have disappeared. She proceeded to leave the establishment, and returned to her family, when the *religieuse* who had watched her, announced, in presence of the patient, that she had a statement to make. She had discovered in the vestments of the patient letters written in her own hand, and which constituted a peculiarly interesting witness from the point of view of causation of her malady. The patient, who felt herself well enough to assent to the revelation, did not hesitate to give the key thereof. The letters were addressed to a relative much more aged than she, and for whom she had, being barely ten years old, conceived a singular passion. This relative having in her presence one day expressed an opinion very favourable upon an extremely lean person, she formed the project of making herself lean to please him: this project found itself detailed in the letters which, moreover, she had never endeavoured to make reach their address. In order to attain her end she began tight lacing, walking much, and starving herself. When the wasting was established, then constipation and an invincible disgust for food supervened. The sequent evolution of events was outside her will power.

If the absence of physiological excitation is capable of provoking local and general functional depressions, excessive excitations can also provoke local troubles, in general, which own for their physiological condition the exhaustion of the organism or the organ. It is useless to insist upon the sensorial exaltation which determines moderate but frequent excitements. We know the influence of education upon the differential sensibility of the special senses, or even upon general sensibility, and the sensation of muscular effort.

All the senses can be attacked by depression or perversion in the wake of excessive excitements. But troubles of sight are perhaps the most frequent. A large number of authors have spoken of amblyopias or amauroses developed in individuals who have exposed their eyes to the direct action of light—solar rays. Troubles

of the same kind manifest themselves in travellers who find themselves amongst polar snows, or are exposed to the reflexions of the solar rays in equatorial regions. In all these conditions visual troubles are, in general, accompanied by irritation of the membranes of the eye or by veritable ophthalmias. We have already cited hemeralopia amongst the visual troubles which produce themselves in these conditions. We have observed also perversions of colour vision: a woman cited by Kesteven* saw objects red and green.

But natural light is not the only one which can occasion such accidents. The industrial furnaces can produce analogous results. M. Favre affirms† that railway firemen yield 24 per cent., Daltonians, whilst ordinary employees only yield 8 per cent.; and Feris that steamship stokers yield 18, whilst other marines only suffer to the extent of 3, 4 per cent.

But besides the action of heat, artificial light can, of itself, alone produce accidents, a circumstance shown by the very extensive modern use of the electric light.

At the Congress of the Sanitary Institute at Brighton Mr. W. H. Preece was compelled to admit the superiority of the electric light from the hygienic point of view:—

"The electric light," said he, "is a powerful health agent. Not only do all those who are served by it, feel themselves better than before, but their appetite augments, their sleep becomes calm and more profound, whilst their doctors' visits become seldomer. The workmen have more heart for their work, and their absences through illness tend to become less frequent. At the Savings Bank, Queen Victoria Street, London, where 1,200 persons are employed, the diminution of absences has been so great that the increase of work executed by the personnel pays for the increased cost of this mode of lighting. The same observation has been made at Liverpool and elsewhere."

If this stimulant action of the electric light can be compared with that pertaining to solar light, the accidents induced thereby have also a great analogy to those determined by solar light.

MM. Charcot‡ and Foucault§ have already indicated cutaneous

* *Unilateral Acanthopsia (Cli. Soc., '82, t. xv., p. 101.* Kesteven.)

† *Reforme des Empl.*, etc. Assoc. Fr., 1873, p. 854.

‡ Erythème produit, &c. C. R. de Biol, 1858, p. 63.

§ Foucault, Recherche, &c. Bulletin de la Société philomathique, 1856, p. 57.

erythemas as resulting from this light. Since then accidents of the same kind have been noted, and apropos of a memoir of M. Defontaine (du Creusot), M. Terrier* has made an interesting report on electrical sunstroke: he relates the existence of an electrical ophthalmia, recognising therein a grave form with retinitis, and a slight form: in one case of ophthalmia it was accompanied with blepharo-spasm.

In certain special conditions, electric light can induce other functional troubles.†

OBSERVATION VI.

Hereditary and Personal Neuropathic Antecedents—Hysterical Manifestations provoked by Exposure to the Electric Light.

Mme. P., æt. 36, reckons many neuropathic and arthritic accidents amongst her maternal and paternal ancestors. She herself had, in her infancy, nervous troubles; nocturnal terrors, migraines, an attack of chorea at 12 years of age. Menstruation was established without troubles: she was married at 20 years, and had three children, at the interval of a year. The third pregnancy had been very painful. She had vomitings during the third and fourth month, and in the eighth she had hemeralopia, which only ceased some weeks after accouchement. At the age of 26, a propos of some deaths in her family, she had insomnias, loss of appetite, marasmus, was subject to slight convulsive crises with loss of consciousness followed by tears. At the end of some weeks of rest she returned to the country.

In the last months of the year 1888 she had been fatigued by cares which she had bestowed on the elder of her infants attacked with rheumatism followed by chorea. She had anew become subject to insomnia, had lost appetite and flesh considerably. Her character had undergone corresponding changes, she was apathetic, irresolute, and could not decide to care for herself.

On the 12th of March, 1889, after having walked some distance, she entered a warehouse where her husband was to meet her. She had to wait in a hall lit by electric light. At the end of about half an hour, she began to experience a sensation of nausea and blurring, followed by obscuration of sight. Several times she experienced a flow of saliva. From time to time it appeared to her that she received shocks in the back of the eye, followed by blindness, and then dulness of sight. Not being able to account for these phenomena, which she attributed to fatigue, she seated herself, but without leaving the lighted hall where she had to wait. All at once she experienced a violent pain in the frontal region, and her vision became obscured to such a degree that she barely recognised her husband when he arrived. When she wished to rise she felt a numbing through the whole right side, which was very feeble, and it was only by trailing the limb that she could reach a carriage. It was with great difficulty she could reach her apartment. The nausea, frontal headaches, amblyopia persisted. This last symptom rather reassured her on the situation on account of her recollection of her hemeralopia, which had spontaneously got better.

She went to bed and fell into a frequently interrupted sleep of eleven

* Terrier. *Bull. et Mém. de la Soc. de Chirurgie*, 1887, t. xiii. p. 76.

† C. Féré. *Note sur accidents produits par la lumière électrique* (C. R. Soc. de Biol, 1889, p. 365.)

hours. Upon awaking the headache and nausea had disappeared, but the double amblyopia persisted, as also the left hemiparesia: most movements are possible, but are effected with difficulty: she is notably incapable of using her fingers to take up small objects. Her intelligence appears intact, but her people are struck with the indifference with which she accepts the situation.

Direct examination reveals the existence of a slight ptosis, especially marked on the left side: the pupils are dilated and little mobile. The nasogenian fold is somewhat effaced upon the left, there is no deviation of the tongue, nor of the labial commissure. All movements of the hand and arm are possible, but weak: resistance to passive movements is barely any, as is also active pressure of the fingers, which are, in reality, useless, being incapable of seizing small objects. The patient can remove her foot, and the various segments of the lower limb; she can also aid herself with the limb in walking, but she cannot maintain herself on it alone, it bends at once under the weight of her body. The tendinous reflexes are not exaggerated upon the left side.

The sensibility to temperature, contact, and pain is diminished over all the left side, but more upon the face and upper limb than upon the lower limb. This anæsthesia arrests itself at the median line. The patient recognises the position of her limbs, but her movements lack precision when she has her eyes shut. The patient has, from time to time, a sensation of numbing and formication in the tips of the fingers of the left hand.

The cornea, the conjunctiva, and the eyelids are insensitive on both sides: the anæsthesia of the skin forms a kind of lunette round the right orbit: in addition to this spot the sensibility of this side is, if not intact, at least considerably more developed than upon the left side.

The left eye only distinguishes black and white, and does not recognise at any possible distance the largest letters of the title of a journal, and the visual field seems to be narrow on this side. Upon the right the patient only recognises red, she cannot read small letterpress at a distance of 30 c.m.: there exists a considerable narrowing of the visual field.

Hearing is affected upon both sides, but especially on the left. The tic tic of a watch, hearable at 1.20 m. or 1.50 m., is only heard by her at 25 c.m. on the left, and 75 on the right. Odour and taste are almost abolished on the left, little sensible upon the right: but the examination of these senses has been insufficient. Pharyngeal anæsthesia.

There exists a sensibility to pressure on the left ovarian region, and another painful region also sensible to deep pressure is behind the left kidney.

The patient was put to bed with the least possible amount of light: she was made to inhale, night and morning, about ten litres of oxygen before food, and she had nux vomica and perchloride of iron. Under the influence of the inhalations the anorexia disappeared entirely,* the patient took food abundantly, and could take two litres of milk in addition to her ordinary meals.

* I have employed several times with the same success inhalations of oxygen in hysterical anorexia. This ought not to astonish one. M. Hayem long ago declared the happy effects of oxygen in gastric and chlorotic troubles. It is equally effective in the troubles of pregnancy. (Pinard, Mayor, "De l'influence des inhalations d'oxygene, &c." Revue Ucd de Suisse Romande, 1883,) and in those which result from abstinence from morphia.

Under the influence of this *régime* she fattened rapidly, and the paralytic and anæsthetic phenomena diminished gradually without any other intervention. On the tenth day, when the patient was allowed to rise, the limb had hardly returned to its normal state, either from the point of view of motility or sensibility: the arm was still less sensitive from the shoulder to the tips of the fingers, which remained feeble and maladroit. Upon the face the cutaneous insensibility remained distributed under the form of lunettes around the orbits, and comprised the integuments of the eye: this anæsthesia is more marked on the left than the right. The amblyopia persists, but has much diminished: the right eye sees all colours, her visual field is more extensive; the patient can read at the distance of a mètre the characters which she failed to distinguish at the distance of 30 centimetres: the left eye distinguishes red, blue, green, and yellow, and even the more pronounced shades of violet: the visual field is considerably extended, and she can read at 50 centimetres what she can read at the distance of a mètre with the other eye. The other senses appear equally sensitive upon both sides, except hearing, which is still feebler upon the left.

The inhalations of oxygen were omitted, the patient was subjected to a cold hydrotherapy, and continued to benefit from the point of view of motility of the arm, which had resumed its utility at the end of three weeks. Still six weeks after the accident, there remains a narrowing of the visual field on the left, a slight anæsthesia of the skin on the same side, and pain in the ovarian and latero-mammary region of the same side. These troubles existed perhaps anteriorly.

These accidents, determined by the electric light, were evidently favoured by the neuropathic predisposition of the subject: but they appeared to me worthy of record; many persons who are not exempt from this same predisposition are obliged by their profession to sojourn in establishments lighted in this fashion: they can be exposed to sudden or more or less gradual accidents, which resemble phenomena which I have several times had occasion to record in the history of the general effects of local excitations.* Electricians know, moreover, very well that accidents of this kind are not rare in perfectly normal subjects: M. D'Arsonval has recorded for us an enfeeblement of hearing from which he himself suffered after having been exposed to a luminous excitation of this kind. From information I have been able to obtain a certain number of persons, exposed to these luminous excitations excessively, have suffered insomnias, digestive troubles, etc.

Magendie has demonstrated by experiments on man that mechanical excitations of the bottom of the eye, of the nervous membrane endowed with special sensibility, give place *not* to tac-

* *C. R. Soc. de Biologie*, 1887, pp. 411, 747, 791. *Sens. et Mouvem.*, 1887.

tile sensations, but to visual sensations. There is no room for astonishment then that prolonged mechanical excitation of the visual organ provokes phenomena of general exhaustion analogous to those which are produced a propos of prolonged visual excitations. It is thus that one can comprehend how prolonged pressure on the eyeball, pressure which also gives place to luminous sensations, can produce an artificial sleep as in the hypnotic procedure named after Lasègue.

In several former works* I have had occasion to record the relations which exist betwixt the state of sensibility of the sense organs and that of the sensibility of the integuments which cover them, as well in the troubles called functional as in the troubles which own for causes gross organic lesions. The alterations of the special sensibility of the organ are often associated with troubles of the general sensibility. It appears that the excessive excitations bearing upon the tegumentary nerves of a sensorial organ can be susceptible of determining phenomena of exhaustion of the special sensibility of this organ.

In an hystero-epileptic, subject to great convulsive attacks, which I have already had occasion to arrest by ovarian compression, I had the idea of employing a procedure which has been indicated by M. Ruault, and which consists in the compression of the suborbital nerves at their emergence.† I had already had occasion several times to experiment with success against the attack: it had only appeared to offer the inconvenience of leaving an infraorbital neuralgia. In the present case it induced a graver accident: as soon as the patient came to herself she noticed that she no longer saw with the left eye: the amaurosis was complete, the eye could not distinguish even day from night. This amaurosis lasted twelve hours: it ceased gradually upon the application of a fly blister to the temple, and the eye became as before, that is to say, there exists an hysterical amblyopia with achromatopsia for violet on this side. It must be remarked, moreover, that the amaurosis is produced upon the side where are situate predominantly the troubles of sensibility: and it is useful to add that this left side

* Ch. Féré. Note *(C. R. Soc. de Biologie,* 1886, p. 178).

† *Cont. a l'étude, etc.* Th., 1882. Notes *(Arch de Neurol.)*, 1882, t. iii., p. 160).

corresponded during the operation to the right hand which perhaps exerted a firmer compression.

Howsoever that may be, it did not appear to me doubtful that the traumatism and the amaurosis stood in relation of cause to effect, and that there emerged a traumatic amaurosis developed on a special field in an hysterical person.

I am not unaware that in the wake of attacks of grand hysteria we find paralytic reliques more or less persisting: but I believe that amaurosis is very rare in these conditions, and I would add that it is never produced in this malady, either before or after the circumstances I have just recorded.

This fact of hystero-traumatic amaurosis appears to me interesting, inasmuch as it throws some light on the pathogeny of the amauroses which supervene in the wake of contusions of the eyelid, or the cheek bone, or other regions supplied by the trigeminus, and of which one has not found any satisfactory explanation. It will be important in future to explore the nervous state of those subjects who offer this phenomenon.*

The retention upon the optic nerve of an excitation borne upon one of the nerves which animate the teguments of the eye would astonish less moreover if one took account of the frequent relations which exist betwixt the troubles of special sensibility of the organs of the senses and troubles of the sensibility of the integuments covering them. It is a point upon which I have had occasion to insist upon several occasions.

There is another point in the pathogeny of this amaurosis which merits fixed attention.

M. Page and M. Charcot think that idea plays an important *rôle* in the production of traumatic paralyses in general. And this *rôle* is very evident, at least in the cases of paralysis where it does not immediately succeed to the traumatism. In the actual case this pathogeny is hardly admissible, for the subject was under the attack when the traumatic action had been brought into play, and the amaurosis had been determined immediately upon return of consciousness.

Moreover, I shall report summarily on this point some experiences of traumatic paralyses upon which I shall have to return

* Ch. F. *Traité d'anatomie Méd. du Syst. nerv.* 2nd ed., '91, p. 447.

later. On certain subjects it is possible to determine paralyses by applying a vibrating diapason to a dynamogenic area, cephalic, or other. One might believe that the vibration of the diapason has what it is convenient to term an arrestive action; but if one regards it more narrowly one will perceive that it is brought about by a more complex phenomenon, apparently at least. In fact, if, before practising with the diapason, we place in the hand of the subject the receiver of a dynamograph, and we make him compress the instrument at the moment of excitation, we will see that there is a very considerable augmentation of the energy of voluntary contraction. We register a very high wave, much higher than the normal and immediately after the contractions become enfeebled in notable proportions; and the experiment is complete at the end of some seconds, that is to say, an absolute paralysis obtains. Consequently there is a phenomenon which precedes the paralysis, and it is an exaggeration of the motor power, an incident which brings the remark that this paralysis is, in fact, a paralysis by exhaustion. When the excitement is very strong the exhaustion is very rapid, and the depression alone can be determined: a circumstance which does not modify, it appears to me, the nature of the phenomenon. These experiments, upon which I shall have to return, can perhaps throw a certain light upon the nature of phenomena of arrest, so-called.

It must be remarked, in passing, that all sensorial excitations of which one makes use when provoking hypnotic manifestations determine an excitement at first: if the excitement is intense it induces exhaustion rapidly, if it is less intense, it acts more gradually, but all the procedures reduce themselves to the production of fatigue.*

The luminous excitations are not the only ones capable of provoking nervous troubles. Esquirol has cited accesses of mania appearing after a strong excitation of the sense of smell during childbed and lactation.† Thus especially, in fact, in the puerperal state it is that these excitements are particularly active in inducing troubles.‡ Velpeau cites the case of a woman of his clientèle who

* *Sensation et Mouvement*, p. 140.

† *Maladies Mentales*, t. i., p. 257.

‡ *Morel, Etudes Cliniques*, t. i., p. 239.

fell into convulsions on entering into a room where there had been flowers of reseda. Scaliger and Boyle have cited patients who had involuntary mictions under the influence of auditory excitements.*

M. Brown-Séquard† has recorded paralyses which produced themselves in consequence of a sudden sound, or a disagreeable sensorial excitement: but his observations lack clearness. In fishing with dynamite we see fish fall into a state of stupor into the pathogeny of which one can hardly allow imagination to play a *rôle*.

Strong excitements of the sensory organs can induce passing troubles of the circulation. M. Capitan has observed that violent excitements of the auditory nerve, of the optic nerve, of the olfactory nerve, and of cutaneous nerves, are capable of provoking a momentary albuminuria.

If the excitations of the genetic sense have a tonic action upon all the functions, they induce an inverse effect when they have produced orgasm and the corresponding nervous discharge, especially if this is too often repeated. Ancient authors recorded the danger of coitus during the travail of digestion, and attributed to the exaggerated or intemperate praxis of this act pernicious accidents, sores, and febrile complications.‡ In neurasthenics in particular, the venereal paroxysms are followed by extremely well-marked phenomena of depression: often in the wake of a comatose sleep one observes supervening in them an aggravation of all morbid troubles.

In individuals predisposed sensorial excitations, without being excessive, can provoke phenomena of a morbid kind which take more after the morbid excitability of the subject than after the nature of the excitant. In the insane a sensory excitement can awaken an hallucination which bears upon the affected sense or upon another: among alcoholics, for instance, one sees hallucinations of sight recalled by a slight noise. Furthermore, in hysterios, where painful phenomena are reawakened by a sensorial excitement (ovaritis, cutaneous dysæsthesia, painful breast). In all these cases the sensory excitement acts as a diffusible excitant like alcohol, ether,

* J. L. Roger. *Traité des Effets. trad. St. Marie*, 1803, p. 199.

† *Sur une nouv. Espèce de paral. loc. ou gén.*, etc. *(C. R. S. de Biologie*, 1886, p. 131).

‡ *Double. Semeiologie gén.*, t. ii., 1817, pp. 313-314.

etc., which determines at the beginning of their action phenomena of sensory hyper-excitability. It is mainly in subjects predisposed after a fashion that excessive excitements provoke exhaustion effects, bearing at the time on motility and sensibility and psychic activity.

Diffusible excitants provoke effects analogous to those of sensory excitements, but more marked. Alcohol, ether, produce at first a certain degree of excitement, then a consecutive depression. The same is true of opium, and its derivatives.

One of the first effects physically of these intoxicants is diminution of motor power, and consequently loss of attention, and obnubilation of the intellectual functions. The hyper-activity of the imagination, which one believes to observe in these cases, is in reality a perversion of the imagination.*

What we have said of alcoholics, of nerve aliments, of diffusible excitants, one can repeat of tobacco, which under its different forms produces at first effects of excitation, soon followed by phenomena of exhaustion and laziness. These secondary effects of exhaustion are not brought about only on the functions of relation, but also on the functions of nutrition.

In fine any excitation, whether perceived or unperceived, differs in nothing from a nervous shock;† it is followed, therefore, by the effects of nervous shock, viz., by exhaustion.

I have already recalled that, under the influence of pain, the blood can undergo an analogous alteration to what is produced under the influence of fatigue; but it is not in that only that the analogy exists betwixt fatigue and pain. Dupuytren remarked that certain patients were seized with nervous accidents before great and painful operations, phenomena called hemorrhages of sensibility. These discharges can determine permanent modifications of innervation: we have seen, in the wake of violent pain *definitive changes of character.*

Excessive pain provokes transitory or persistent troubles of motility. This result ought not to astonish us, for, in fact, pain accompanies itself always with a motor discharge.

* Richet. *Les poisons de l'intelligence.* (Rev. des deux mondes, 1877, t xix, p. 823.)

† H. Spencer. *Principles of Psychology*, v. i., p. 151.

Some experimental facts reported by Vulpian* are of a nature to clear up the pathogeny of excessive excitements: "In the experiments which I have made on the spinal cord it happened sometimes that the excitability of this organ becomes exhausted, so to speak, by the violence and duration of the excitements. It is then impossible for some moments to provoke either pain or reflex actions by irritation of such or such a point of the body: even although the experimental lesion of the cord could have no enduring influence on the conductibility, or on the excito-motricity of this part of the nervous system. Some minutes after the operation the excitability renews, and pinching of the skin produces pain and reflex actions. The excitability of the cord will be momentarily abolished similarly in this frog which I strike sharply in the cranial region. There is, at first, a period of excitation, analogous, up to a certain point, to what we have observed upon the frog which I have poisoned by strychnine: but, at the end of a very short time the commotion of the nervous centres will have produced the same effect as general electrisation. There will be then complete resolution of the members, and one will not any more be able to induce reflex acts."

Miles has noted that in man under the influence of commotion of the spinal cord one can observe the abolition of the reflexes.†

Heidenhain has determined that in animals pain induces a lowering of temperature. Mantegazza has noted that this lowering is prolonged for a long time after painful irritation. He thinks that in man the same effects can be produced: he determined in himself that the thermometer placed under the tongue was lowered.

Moreover, Vulpian observed that under the influence of pain the vessels of the tongue contract. Nevertheless pain is accompanied very often by a vascular dilatation which is not incompatible with this lowering of temperature (Schiff, Cl. Bernard).

Cl. Bernard‡ has established that violent pains, whatever be their seat, arrest the secretion of gastric juice, and Beaumont observed that in a Canadian the gastric mucous membrane becomes dry under the same influence. The diminution of the secretions

* *Leçons*, 1866, p. 450.

† *Effect of Spl. Concussion on the Reflexes* (Trans. Assoc. of Am. Phys, '88, p. 291).

‡ *Exp. sur la Digestion Stomacale* (*Arch. gén. de la Méd.*, 1146, p. 5.)

entails inappetency and inanition. Assimilation is at the same time disturbed, the products of a defective digestion become a cause of auto-intoxication. The nutrition becomes profoundly altered: one can hardly wonder if pain favours all infectious maladies.

It is not only the gastric secretion which diminishes or becomes arrested under the influence of pain. It is the same with the salivary secretion.

Jobert (de Lamballe) attributes to pain the arrest of the urinary secretion provoked by the operation for vesico-fistulas.

In surgical operations, if the pain is strong, the heart beats diminish, become intermittent, and may suspend; there are induced lipothymies and syncopes. Mantegazza observed that pain lowered the sphygmographic trace, the forms of the pulsations become irregular, the ascension is less vertical, dicrotism diminishes. After a general fashion one can say that pain has an hyposthenisant action.

The physiological conditions of pain can exaggerate themselves if there exist other causes of depression. Cl. Bernard has noted that in an animal exhausted by inanition it suffices sometimes for a slight pain to provoke a mortal syncope.

Pain is susceptible also of provoking the most varied sensitive or sensorial troubles. Handfield Jones cites a case of deafness consecutive to a dental neuralgia.

Analogous troubles are observed on the side of respiration, and constitute an important element in the expression of pain. The respiratory movements relax themselves and become superficial: there are produced suspensions, it may be of inspiration, it may be of expiration. These mechanical troubles have for their result the accumulation of carbonic acid, and the depression of nutrition. The accumulation of carbonic acid produces insensibility of the kind induced by pain itself, after a fashion, its appropriate remedy.

The excitements of the genital sense determine a state of general erethism of the nervous system, which can express itself by an exaggeration of the functional activities. M. Brown-Séquard does not hesitate to advise men who have to execute a great physical and intellectual work to put themselves into a lively state of sexual

excitement, avoiding ejaculation, however.* One can discuss the value of these manœuvres from the hygienic and from the ethical points of view, but their physiological effects are incontestible. We know well the relation which exists betwixt the development of the genital organs and physical and moral energy: the defective activity of eunuchs, etc. Where the genital excitation has attained its acme, it provokes, on the contrary, a physical and moral depression: post coitum omne animal triste, nisi gallus qui cantat: and the repetition of the orgasm brings about a state of continuous depression.

But in addition to these common and physiological phenomena genital excitation can provoke a certain number of accidents pertaining to the physical conditions associated with it. During the tonic phase which ends with orgasm there are produced motor troubles, pertaining to the exaggeration of the muscular tension, and which manifests themselves not only in the striated muscles of the life of relation, such as trembling cramps, grinding of teeth, cough, sneezing, etc.: but also in the unstriated muscles of organic life, such as borborygmi, eructations, pharyngeal constrictions. The sensorial erethism expresses itself by subjective sensations which can manifest themselves upon different senses: on sight, as by photopsy, erythropsy: on hearing, by noises and singings in the ear: on odour, by varied sensations of smell: on general sensibility, by pruritus, which is not probably different from laryngeal spasm and sneezing. The augmentation of arterial tension can explain the sudden death or the cerebral hemorrhage which produces itself sometimes in old people. Sometimes genital excitation is accompanied by hypercrinies: in some individuals a profuse sweat appears under the form of a sharp crisis which at once suppresses the venereal orgasm.

The genital orgasm is followed by a sharp diminution of the arterial tension which can induce syncope. The cooling of the peripheral parts can proceed even to the death of a finger; this phenomenon is only an exaggeration of another much more common, the cooling of the very muscular parts, such as the tongue and lips. We observe, besides, other vaso-motor troubles, such as polyuria, diarrhœa, pulmonary congestion with or without hemoptysis.

* C. R. *Soc. de Biol*, 1889, p. 420.

The muscular relaxation can exaggerate itself in some hysterical persons even so far as paraplegia and hemiplegia: it expresses itself sometimes by meteorism more or less persistent.

The sensorial depression expresses itself by an amblyopia, which can go as far as complete blindness, by obtusion or abolition of hearing, by cutaneous anæsthesia: sometimes exhaustion manifests itself by the appearance of neurasthenic spots, casque, rachialgia, or by an invincible sleepiness. One hysterical person, who can only rarely come to the orgasm, because for most of the times the erethism provokes ordinarily terrifying visual hallucinations, falls constantly then into a comatose sleep, from which she does not emerge for some hours, and then with a temporary retro-active amnesia comprising sometimes several hours before the act.

CHAPTER III.

Physical Activity and the Physiological Conditions of Attention.

Summary—General Effects of Physical Exercise—Sensibility and Motility—Fatigue and Anæsthesia—Physiology of Attention—Energy and Speed of Voluntary Movements.

As we have just seen, external excitements determine local and general effects, which reduce themselves, in fact, to transformations of force. Movement, which holds an important place among these effects, and is the indispensable condition of sensation, as well as of states of consciousness of internal origin, even when it is purely passive, can accompany the same general effects and the same states of consciousness to which it is indissolubly bound. The physiological conditions of physical exercise are not, therefore, without interest in relation to our subject.

John Davy observed that during work the temperature of the central parts was raised nearly one degree: an exercise even violent has for its principal and almost unique effect the regularisation of the distribution of heat in the various parts of the economy, in communicating to the extremities a temperature sensibly equal to that of the trunk.* This regularisation of the distribution of heat favours in a general way all the functions of nutrition and relation. Beaumont determined, on his Canadian, that after a violent exercise, the temperature of the interior of the stomach increased.

Moderate physical exercise provokes an exaltation of the respiratory and the circulatory functions, an augmentation of muscular force, together with a simultaneous excitement of mental activity. These effects can be utilised in some circumstances to the advantage of intellectual works. But forced work continued and prolonged, on the contrary, brings about a general depression of the functions of nutrition. Proust observed that if carbonic acid

* Gavarret. *Dict. enc. des Sc. Méd.* (t. xv., p. 75) *Art. Chaleur Animale.*

augments in the expired air under the influence of a moderate exercise, it diminishes under the influence of fatigue. Fatigue entails therefore a depression of nutrition, and consequently a depression of motor energy and sensibility, a relaxation of the nervous processes, and an intellectual effacement.

One can say, moreover, that the physiological activity of a certain function entails a momentary exaltation of the whole. This exaltation is replaced by a depression more or less prolonged every time that the special function exercises itself in an excessive fashion either in intensity or duration.

"The direct effect of exercise," says Cabanis, "is, therefore, to attract the forces, and, if I may so express it, vital attention towards the muscular organs, to accentuate the feeling, and increase the energy of these organs."

"The greatest energy," says Bain, "manifests itself usually some time after one has commenced, a circumstance due solely to the afflux of blood which follows a certain exercise." In certain conditions, the movements determine a sort of "mechanical drunkenness." "Every nervous act issues in the excitation of the vital processes in general, all of them producing some particular vital process (Spencer).*

It is useless to insist here upon the influence of exercise upon the energy of the voluntary movements. I will not return again upon the facts which show the influence of one member upon the energy of the others, the influence of speech upon the energy of the right upper limb, and the movements of this limb upon the exercise of speech.

The reflex movements, like the voluntary movements, are subject to the effects of exercise. Jendrassik, in order to put in evidence the patellar reflex, prescribes the seizure of the fingers of the right hand by those of the left, the arms being extended in front, in the horizontal position, and to raise them up and down as violently as possible; that is to say, in short, to make a general effort. The result is the same as under the influence of certain sensorial (emotions) excitations. Several authors have observed, on the contrary, that the patellar reflex can disappear, under the influence of fatigue (Schreider): Muhr has observed that in two healthy individuals presenting, in the normal state, the tendon reflex, this

* *Principles of Psychology*, v. i. p. 94.

reflex disappeared during twelve hours after a big debauch; Weir Mitchell observed that strong doses of strychnine could cause no spasmodic movement whilst the subject remained in a state of repose: the spasm produced itself as soon as he moved.

Physical exercise favours intellectual activity: Rousseau, Lenain, Mozart, worked when travelling; Goethe upon horseback; Klopstock and Herder walked. Aristotle recommended movement to dramatic authors, with a view to emotionalizing. Victor Hugo loved to work upstanding. We have seen besides the relations which exist betwixt the energy of the voluntary movements and the momentary or habitual exercise of the intelligence. The knowledge of the value of muscular exercise as an excitant is not peculiar to man, he is not the only one to "beat his sides" in order to warm himself for action. "The gorilla, when marching upon an enemy," says Houzeau, "emits a piercing cry, which recalls the war cry of the savage, and he comes upon the scene striking his chest with his elbows."

If the psychic activity heightens itself under the influence of a moderate physical exercise, it is because, under the same conditions, sensibility is exalted in all its forms.

In the course of my researches into the modifications of the energy of the movements upon sensibility and circulation under the influence of external excitations or psychic states, I have had several times occasion to note that the faculty for discrimination of weights varies, like other forms of sensibility; that is to say, that it increases coëtaneously with the energy of voluntary movements.

At the same time as the faculty of discrimination augments, the sensation of resistance diminishes. From the facts which I have observed the intensity of the sensation of weights or of exterior resistance appears to me to vary in an inverse sense to the energy of the adapted voluntary movement.

M. Charpentier, on his part, remarked that when one of the limbs raises a weight, this weight appears so much the lighter as the muscles of the other limb are in action, and he concludes therefrom "that the appreciation of a weight depends, in the highest degree, upon the greater or lesser state of effort in which the various muscles of the organism find themselves."

It appears to me that the state of the muscles not immediately

concerned in the adapted local movement for the raising of the weight is not that most approximate to weight sensation.

In a great number of circumstances voluntary movements are associated with involuntary movements, and these frequently unconscious, in the corresponding limb, and even in the other limbs. Sometimes these associated involuntary movements affect a direction symmetrical to that of the voluntary movements.

On the other hand, we have noted, in a number of normal or pathological facts, that the movement of a limb reinforces the energy of the movement of the opposite side.

One might ask, therefore, if, in the experiments of M. Charpentier, the associated movements did not act upon the sensation of weight, by augmenting the power of voluntary movement specially adapted to sustain the weight.

When we place, for instance, the left arm of a normal subject in the ergograph of Mosso, which has for its object to permit the isolated flexion of the medius finger; and one places myographic tambours upon the flexor of the fingers of the right side, and upon the right anterior muscles of the two wrists, one can observe that when the middle finger of the left hand has raised a certain number of times a weight of three kilos, that it describes a curve upon the tape which indicates fatigue: at this moment, one or two myographs, or even three, begin to inscribe undulations, which indicate that the muscles upon which they are applied make involuntary movements which can appear to have for their end to come to the aid of the voluntary movements of the left medius. These associated involuntary movements come more quickly in fatigued subjects by an epileptic paroxysm.

I have just said that the associated involuntary movements, in the muscles not interested in the weight raising, can appear to have for their end the re-enforcement of the movements of the medius; I would show by other facts that their interpretation is complex. Always one can demonstrate that the associated movements can really have this effect.

Frequently, amongst hemiplegics, a movement impossible of execution solely upon the side affected can be made when the patient effects a similar movement upon the sound side: the dynamometric force of the paralysed side augments greatly by the same

procedure. Hysteria affords a number of examples of the same kind. But the augmentation of the force of a limb by the exercise of its neighbour or of another limb can be placed in evidence on a sound subject in the following way.

The left hand is placed in the ergograph; the myographic tambours are placed upon the flexor of the fingers, and upon the front aspect of the right wrist. The left middle finger executes movements of flexion by raising weights of three kilos. Soon fatigue supervenes, the movements diminish in extent, the ergograph inscribes curves upon the paper indicative of exhaustion. If at the moment when the movements of the left middle finger become very painful, and cannot be increased, in spite of the most vigorous effort, he makes movements with the fingers of the right hand, which inscribe themselves upon the myograph placed upon the flexor, we see at once the ergographic curves increase in extent. They lower themselves at the beginning very rapidly; but if then we add to the movements of the fingers and hand movements of the right wrist also, we see at once the ergograph make a fresh ascension, but not so strong or durable as the first. It must be observed that the augmentation of the force of the middle finger is not always perceived by the subject under experiment: he only feels sometimes that he raises the weight more easily if he takes no note of the ergographic tracing.

The state of consciousness which constitutes the sensation of the weight is a phenomenon superadded to a physical condition, objectifiable, measurable, the variation of the local energy which can be augmented by various proceedings (external excitation, emotional state, etc.), and *inter alia* by putting into activity muscles not common to the movement primarily localised.

These facts appear to me to show that the sensation of resistance is conditional upon the energy of the moving power;* and the intensity of the sensation varies in an inverse sense to the motor energy. It appears, moreover, that in general we appreciate the resistance of our environment in proportion to the power which we ourselves are capable of opposing to it. Every modification of

* Another lady whom I know (says Spencer "First Principles," 2nd ed., p. 135) attributes the sentiment of lightness which accompanies vigour, to real diminution of weight, and believes that in walking she is less heavy on the ground. She affirms that if she was to place herself in the weighing machine she could make herself lighter by an act of will.

motor energy entails a modification of the appreciation of the resistance of the environment.* It might be objected to me that general paralytics have ideas of satisfaction. But these patients are not an exception to the rule for they are not paralytics: dynamographic researches have shown that the enfeeblement in the movements of the voluntary muscles does not exist in them even at a very advanced stage. The ergograph has shown me that they are frequently capable of repeating effort with a great force of resistance. In most melancholics, on the contrary, it is possible to objectify the depression of the forces, and to put in evidence the relations which exist betwixt powerlessness and pessimism.†

Cutaneous sensibility weakens also under the influence of fatigue: and the same may be said of all the forms of special sensibility.

M. Willbrand, at the International Congress of Berlin, has described oscillations in the visual field which narrows under the influence of fatigue, and remains concentrically restricted in neurasthenics.

It is clear that all conditions susceptible of depressing nutrition, the lack of respirable air, cold, defective alimentation, or physiological excitants hasten the induction of fatigue, and add these effects to those peculiar to themselves.

What muscular fatigue can do every excessive nervous activity can reproduce: the work of digestion also equally with mental. All these voluntary and involuntary discharges entail as their objective character, the enfeeblement of nervous acts, the delay of reactions.‡

By reason of these motor and sensorial troubles the psychical functions are considerably affected by fatigue.§ Holland reports the following fact: "I descended, the same day, two deep mines of the Hartz Mountains, remaining several hours in the bottom of each. Whilst I was in the second, exhausted at once by fatigue and inanition, I felt myself entirely incapable of continuing to speak with the German inspector who accompanied me, all the

* *Impuissance et Pessimisme.* Ch. Féré. *Les Epilepsies et les Epileptiques.* Rev. Ph., 1886, 1890, vii.

† It must be noted that in the procedure of exploration of the patellar reflex (Jendrassik) the voluntary contraction of the muscles of the upper members augments the reflexes of the lower. A sensorial excitation induces similarly.

‡ Galton. *Researches upon Mental Fatigue.* Rev. Sci., 1889, 3rd series, t. 43. p. 98.

§ Holland. *Chapters on Mental Physiology*, 2nd ed. 1858, p. 167.

phrases had disappeared from my memory, and it was only after I had partaken of nourishment and wine, and had remained for a short time in repose, that I recovered them."

The influence of fatigue upon the psychical activity can be brought into evidence by the study of the influence of motor energy upon the attention.

The state of the muscles has for a long time struck all who are occupied with the physiology of attention. "When the soul desires something all the body becomes more agile and more disposed to move itself, so that it would not be apart from it," says Descartes. For others, all the musculature takes part in the act. "In attention," says Gratiolet, "all the body bends towards the object which determines it, whence the danger of regarding an object from an elevated spot, especially if it be a moving object:" if there exists a predominance of local activity in the muscles annexed to the organ most interested this predominance is only one element of the phenomenon. For others, on the contrary, like Duchenne of Boulogne, the physiological attention will be specialised in the activity of some muscular fibres of the face. This narrow localisation has few partisans. If the muscles of the face are more easily put into motion in attention, and in the expression of the emotions, that proceeds from special physiological conditions: the muscles most near to the centres react more rapidly to the nervous action:* the motor activity is always in relation to the irrigation of blood: the facial nerve appears to enjoy a more intense excitability than most: it is it which, after death, responds the latest to faradic excitation: regarded in their central connections the motor nerves of the face are nearer the sensorial ganglia than the other motor nerves, a circumstance which ought to facilitate reflex action.

Even upon a superficial examination one can determine that the frontal is not the only muscle of the face which contracts during attention, as Duchenne observed. In voluntary attention, and in individuals habitually applied, the orbicularis orifice is usually contracted, the free border of the lips is compressed, one hardly sees their mucous surface, and the buccal orifice forms a line almost

* A. James. *Tendon reflex and clonus phenomenon and ankle clonus in relation to the height of the individual* (*Physiol. and Clin. Studies.* Edh., 1888).

straight, and horizontal. In attention provoked by a sonorous excitation, the mouth opens itself by a reflex excitation, which forms audition. When attention is very strong it produces sometimes convergent or divergent strabismus: this fact appears to have been known to Aristophanes, who, in the "Thesmophories," causes Mnesilochus to say "I have become squint-eyed through fixing my eyes on the side whence I expected help."

The diffusion of muscular activity in attention is shown by the fact, that, under its influence, and whatsoever be its orientation, the contractures, the functional spasms, the professional cramps, etc., exaggerate themselves in a very evident way.

Now attention seems to associate itself to movements.

In his recent book M. Ribot* has collected the actual notions respecting the physiology of attention, *which is constituted solely by motor phenomena.* These motor phenomena consist in facial movements which assume a particular expression, in movements of the limbs which present themselves in various attitudes, and finally in movements of the chest indicative of a suspension of respiration.

The absence of a precise study of the muscular phenomena which accompany attention has led quite recently to the contestation of these muscular phenomena. M. Sully affirms, without bringing any appropriate experiment, that there exists no movement in the facts of attention that he has observed: † nevertheless he generalises too easily when he affirms, at the same time, that the sensations or representations of colour do not determine any muscular phenomenon: experiments clearly demonstrate the contrary.‡ All the sensations or representations are accompanied by tension of the muscles; but this tension of the muscles, these reflex movements constitute the accessible phenomena of attention called spontaneous.

But physiology is not only in the position of assurance of the existence of the movements: it can further study the quality of these movements, their energy, form, precision, and rapidity. M. Wundt has shown that, under the influence of attention, the time

* *La Psychologie de l'attention*, 1889.

† *The Psycho-physical Process in Attention* (*Brain*, pt. ii., 1890).

‡ Féré. *Sensation et Mouvement*, 1887, p. 32.

of simple reaction diminishes to such a point that it can become negative. I do not think that anyone can contest the rule frequently verified by M. Wundt and the experiments of M. Munsterberg, in which the subject replies by a movement of one of the fingers to an excitation, inevitably associated with the movement of this finger, without augmentation of the time of reaction. These experiments indicate that attention is not even narrowly local, as some suppose.

The following experiment appears to me of a nature capable of establishing harmony betwixt the facts. The points of the index, medius, and ring fingers are brought to rest upon the membranes of three tambours, which repose on a plane sustaining also the hand of the subject. Each of these fingers ought to respond respectively to the signs, 2, 3, 4. The signal inscribes itself by the distension of an elastic tube, which resumes its form when the mouth of the experimenter, who holds it betwixt his teeth, opens itself to give the word. The tube signals and the three receptive drums are in relation with lever tambours: the time is taken with the chronograph. When the subject has well associated the movements of the fingers with the arranged signals, they come, in fact, to react almost at the same moment, whether the figure named be seen or not: the difference frequently does not exceed one or two hundredths of a second. But the inscribed curves show well that the question of time is not everything in the study of the movements. Whilst when the subject reacts to an arranged signal, three, for instance, with the medius, one finger only, the medius, has produced a single curve by its isolated flexion; when the attention is diffused, when the subject does not know in advance with what finger he must press, three curves are produced, the three fingers flexing upon the signal. It is of interest to consider the appearance of the three curves: the ascension of the curve which corresponds to the finger designed by the signal precedes the two others by one, two, or three hundredths of a second, and it is sharper, more energetic, more raised. If the subject studies to avoid his associated movements the period of reaction is considerably lengthened.

I have shown, on the other hand, that under the influence of

attention the energy of movements augments.* This augmentation of energy, coinciding with augmentation of the rapidity of movement, has as effect the modification of the graphic curve of the movement whose line of ascension is not only more elevated but more sudden. This concordance betwixt the characters of the movement appears, moreover, a general fact.†

Whatever distracts the attention diminishes the energy of movement and lengthens the time of reaction. But all the external excitements are not of a nature to distract attention: observation shows, on the contrary, that a good number of intercurrent excitations favour the physical effects of attention. One luminous excitation, for example, can augment in considerable proportions the energy of movements and the time of reaction of the hand to a cutaneous contact: inversely, the deprivation of light determines in perfectly normal subjects a lengthening of the time of reaction, which can exceed a quarter or even a third of the normal time. It is easy to establish that other physical agents (heat, sound, electric tension) determine an inevitable tension of the muscles which puts them into a state such that they act more energetically and more rapidly to a given signal, that is to say, that they determine the physical effects of attention. "Sound is one cause of excitation —it suddenly brings the organism from repose. It suddenly determines a sort of general tension," says Gratiolet,‡ who brings the muscular effects into evidence.

The happy effects of peripheral excitations upon intellectual activity are, moreover, brought into light by the care that certain individuals take to surround themselves with objects which flatter the senses when they travel (work), like Buffon, Hadyn, etc.§ This care for sensorial excitation manifests itself, moreover, in those who make moderate use of tobacco, or substances of the same kind, or in those who seek bizarre sensations, like Schiller, who could only work when he felt the odour of rotten apples which filled the drawer of his table.‖

All these excitations which are, in fact, *condiments of attention*

* *Sensation et Mouvement*, p. 39.

† *L'energie et la vitesse des mouvements volontaires.* Rev. Ph., July, 1889.

‡ *La Phys. et les mouvements d'expression*, p. 236.

§ Carpenter. *Principles of Mental Physiology*, 6th ed. 1881, p. 278.

‖ Goethe. *Conversations*, t. i., p. 403.

realise the conditions of attention of external and of reflex origin. We go on to see that there is no reason for admitting that attention called voluntary,* attention evoked by representations of external irritations, reflex attention also, has any other physiological bases.

This modification of energy and rapidity of movements is in relation with modifications of the circulation and nutrition. I have already reported numerous experiments which set in relief the relations which exist betwixt nutrition and the activity of psychical phenomena. I would add a group of facts which are not without interest. Not only do these modifications of energy and swiftness of movements manifest themselves under the influence of the ingestion or inhalation of diffusible excitants, which can be considered in a certain measure as sensorial excitants, but one sees it also produce itself under the influence of modifications of atmospheric pressure.

We have noted for a long time that under the influence of the rarefaction of air (mountain or balloon sickness) there is produced a diminution of muscular force, and a remarkable state of cerebral torpor; under the influence of an augmentation of pressure on the contrary, we have observed a state of excitement, and even a sort of intoxication. The degenerate, the neuropaths, and perhaps especially the men of genius, as Lombroso† observed, when citing Giordani and Maine de Biran, appeared more sensitive to these influences of pressure. The example of Goethe‡ is perhaps more interesting: "Thus," says he, "I work more easily when the barometer is high than when it is low; as I know that when the barometer is low I search with a greater tension of mind to combat the evil influence."

Thanks to the kindness of M. Dr. Dupont, director of an æratherapic establishment, I have been able to submit myself, with one of my helps, to augmented pressure varying from 0.25 to 0.35, and we have determined that when equilibrium is established the re-

* Most classical books of physiology and hygiène regard condiments as accessory aliments or as general excitants: they act sometimes by adding their flavour to that of the principal aliment, sometimes by provoking the secretion of the glands annexed to the digestive apparatus, sometimes inducing a general stimulation. The exaltation of the sensation of taste which one attributes to them, applies itself to the alimentary bolus and not to the special aliment which the condiment is intended to season. In this matter, as in several others, the popular expression "relever ou rehausser le gout," which is a metaphorical expression, is in advance of the opinion of most physiologists. Condiments do not act only by raising the tone of the gustative sensation provoked by the alimentary bolus considered as a whole: it provokes a particular sensorial excitation whence results a more distinct special taste of the principal aliment, the seasoned aliment.

† *L'homme de Genie*, p. 135. ‡ Goethe. *Conversations*, t. ii. p. 223.

action time diminishes by 3-15ths, 4-16ths, 5-21sts, whilst the energy of the same movement is augmented by 5-45ths, 8-60ths, 6-52nds.*

The modifications of the time of reaction, which are produecd under the influence of external or internal excitations or modifications of nutrition, compared with the concording modifications cf the energy of the muscular work, and the form of the curve, which represents this curve graphically, appear to show that these diverse causes determine a particular state of the muscles, an inevitable tension which constitutes in some sort a reflex or organic attention, vital, as Cabanis says.† But these same modifications of time, of reaction, and energy of movements reproduce themselves under the influence of the attention called voluntary (by external excitation, representation). It appears then likely that this attention has a physiological condition analogous to that which is determined by the constitution of the environment, or by external excitations, and that this must be an inevitable muscular tension.

With a view to my rendering plain the *rôle* of muscular tension in attention I have undertaken upon a dozen subjects (the medical and administrative personnel of my service, infants, epileptics) experiments which have shown some very interesting results.‡

After having simply immobilised the forearm and left hand of the subject, as for experiments with the ergograph of Mosso, the eyes being shut, we have taken a number of times the simple reaction of the right hand to a contact on the thenar eminence. After a rest, the subject being in the same position, we have suspended to the left middle finger, being free, a weight, exercising by means of a pulley, a traction corresponding to the axis of the member, whilst the time of reaction has been taken in the same manner. After a fresh rest, during which the weight was removed, a new traction was exercised under the same conditions with a heavier weight than the first, and so on in succession, if there was occasion. The weights employed for this mechanical traction have varied from one to ten kilos.

* M. Dupont remarked to me that whilst patients remained in the apparatus, about three or five slept, but it must be noted that they are in general anaemics and asthmatics who do not sleep at night and who have their dyspnoea relieved by the augmentation of pressure.

† *Rapports du Physique et du Moral*, 1832, vii., p. 192.

‡ *Note sur la physiologie de l'attention.* (C. R. de Biol, 1890, p. 484.)

We have seen, in the previous experiments, that moderate exercise of a member provokes a tension of the muscles of the corresponding limb, whose voluntary energy increases.* If the tension of the muscles is provoked by a mechanical traction the result is similar. The artificial tension of the muscles has still another effect, it modifies the duration of the time of reaction. In proportion as the weight which exercises traction on the left hand has not induced fatigue, it determines, in proportion as it increases, a diminution of the time of reaction of the other hand. That is to say that a purely mechanical artificial tension determines the ordinary effects of attention termed voluntary.

These experiments appear to show that general muscular tension constitutes really the physiological condition of attention.

I have, moreover, instituted another experiment, which although not being entirely free from all reproach, constitutes a sort of counter proof of the preceding. The forearm and the left hand of the subject are disposed as for the experiment with the ergograph of Mosso: a weight of two kilos exercises a traction, as in the preceding, on the left medius in demiflexion. The registering drum is put in motion: whilst the metronome inscribed the seconds, the pen of the ergograph inscribes the extension of the muscle. At the end of 30 or 40 seconds we offer to the subject a sheet of paper on which are inscribed three numbers and three figures, which he is to add up mentally: we note the beginning and ending of the operation. The trace shows that during the period preceding the calculation, the extension of the muscle is sufficiently rapid: during the mental effort, on the contrary, the extension is very slight, and sometimes even one observes a notable raising of the curve, that is to say, a contraction of the muscle.

This experiment confirms those which I have reported previously, and in which one observes that a moderate intellectual exercise accompanies itself to an exaggeration of the energy of the movements. It will not astonish those who know the physiological conditions of thought-reading, which, in fact, is nothing more than the reading of movements.

The influence upon the rapidity and energy of the reaction of a muscle group, of the artificial or voluntary tension of another group

* *L'énergie des mouvements volontaires et la sensation des poids* (C. R. de Soc. Biol., 1890, p. 235).

leads me to a study of the simple time of reaction, in the conditions which have not yet, I believe, excited the curiosity of the experimenters. I have studied the reaction time of the hand successively in dorsal decubitus (complete horizontal in bed), in the sitting posture, and upstanding. In several subjects the difference in duration of time has been more than a third betwixt the reactions made in decubitus and upstanding: the upstanding reaction has always been more rapid. The difference betwixt the reactions in the sitting posture and upstanding is less marked, but is constantly met with, except in a subject, who, taking twelve grammes of potass. brom. daily for several months, has feebleness of the limbs and oscillations, especially when the eyes are shut: this patient has a greater rapidity of the reactions of the hand in the seated than in the upstanding position.

This result could be foreseen clinically: we know, in fact, that spasms of the face, and neck especially, are exaggerated by standing, and still more by marching.

We see that tension of the muscles favours the cerebral reflexes, as it favours the spinal reflexes in the exploration of the rotulian reflex by the method of Jendrassik,* in which an artificial tension of the muscles of the upper limbs is made to intervene, a tension which accompanies itself with a general augmentation of the tonicity of the muscles comparable to what is induced under the influence of a sensorial excitation.†

The general exaltation of the motor activity in the physiological process of attention it was important to establish experimentally. It seems to demonstrate the erroneousness of the hypothesis of arrest, of inhibition, brought in to explain the physiology of attention. We see that whilst the tension of the muscles made default at one point, attention weakened: the general tension is the necessary support of the local reaction. There exist conditions in which a very intense excitation, which comes from the exterior or within, brings about a suspension of such or such a local activity, as in fear, astonishment: but this local suspension

* *Sensation et Mouvement*, p. 7.

† The energy and rapidity of voluntary movements are subject, in the normal state, to the same variations as those of the reflexes. Orchansky has seen that, under the influence of exercise, the tendinous reflexes were exaggerated and could be diminished even to abolition under the influence of fatigue. The variations of voluntary and reflex activity under the influence of fatigue, mark a particular condition of muscle, renoted lately by Mosso; a diminution of elasticity a greater extensibility of the muscle under the same traction.

is in reality an effect of nervous exhaustion consecutive to an excessive discharge, or a motor activity has been able to manifest itself under diverse but well-known forms. One is not entitled to say that this local suspension of activity is an effect of the will, nor that it favours such another activity. Fear has sometimes local effects exactly predominant against which the subject can struggle in a certain manner: the Marshal of Luxemburg was seized with fever and diarrhœa during the battle. "In these moments," said he, "I let my body do as it listed in order to preserve my mind for the action." The same facts can be observed in drunkenness. The Marshal of Villars was addicted to wine, even in his old age. Going into Italy to put himself at the head of the army in the war of 1734 he went to make his court to the King of Sardinia so filled with wine that he could not maintain himself erect, but fell to the ground. In this predicament, however, he did not lose his head, and he said to the king, "See me brought quite naturally to the feet of your Majesty." In these circumstances of which one might multiply instances, attention persists in spite of the paralytic phenomena, which nevertheless weaken the effects.

Every act which employs a certain quantity of energy diminishes the general tension, tends to destroy the maintenance of the attention directed towards a certain point, and to destroy its active effects. Two activities cannot exercise themselves simultaneously at their maximum intensity. The acts of the function of nutrition have, in this respect, the same value as mechanical work of the muscles of the life of relation. We are disposed to forget that the silent work of nutrition requires perhaps more force than many people can afford thereof in neuro-muscular work.*

The suspension of the other activities, which manifest themselves a propos of a local attention, is only one application of the law of the equivalence of sensations. It has nothing to do with the will. It has been verified that when one excites the attention of a dog with a bone or the sight of meat it becomes more difficult to obtain the ordinary effects of the excitation of the cortical motor centres: also when the centres of mastication are in activity, the excitability of the motor centres of the limbs diminishes.†

* Cliff. Allbut. *Gulstonian Lects on Visceral Neuroses*, 1884.

† Tarchanoff. *Sur les centres psychomoteurs des animaux nouveaux nés (Rev Mens de Med et de Chir* 1878.)

Bubnoff and Heidenhain have observed, on their side, that a painful excitation weakens the excitability of the cortex, whilst a moderate sensorial excitation exaggerates it.

On the other side, Exner has declared that electrical excitation of the muscles favours the excitability of the cortical centres of these muscles. This experiment shows that the artificially provoked activity of the muscles favours the action which the brain exercises upon them. It is, under another form, the experiment reported above.

Psychologists appear to have confounded with repose, voluntary immobility, which, from the mechanical point of view, is far removed from it; for Béclard has shown that static contraction produces more fatigue, and causes the temperature of the muscle to increase more rapidly than dynamic contraction. Voluntary immobility results from very intense muscular activities; it has for its physiological condition general tension of the musculature, which puts the subject into such a state that it can react the most quickly and energetically possible to any excitation from whatever point it comes. *It is the physiological condition of attention.* One cannot prolong voluntary immobility, that is to say, attention, except on condition of having good muscles, well innervated, and well nourished. One can say that the exercise of immobility is the exercise most favourable to the development of intelligence: an education which would neglect this exercise would suppress attention, it would be a retrogressive education.

If the voluntary or involuntary tension of the muscles favours attention and psychic activity in general, the relaxation of the muscles, on the contrary, tends to suppress attention and psychic activity. It is by the relaxation of the muscles that certain individuals can procure sleep at will: in these subjects who usually exploit great activity, either bodily or mental, decubitus alone can bring sleep: the effect is induced so much the better as the subject is withdrawn from external excitements, but this last condition is not indispensable.

All the conditions which interpose an obstacle in the way of effort induce at the same time attention, and consequently diminish intellectual activity. All the conditions which bring trouble upon

the respiratory functions are of this sort. Guye* has observed troubles of attention and memory supervene in infants as a result of obstruction of the nasal fossae, and disappear by an appropriate treatment.

Attention makes default or is enfeebled in all the conditions where there exists a depression of forces, fatigue from normal or pathological discharge (epilepsy), convalescence from acute maladies, chronic maladies, neurasthenic states, congenital or acquired, hereditary or symptomatic hysterias, infancy or old age, etc. It makes default also in all conditions where a part of the energy finds itself spent in detail in voluntary or involuntary discharges, labour, maniacal excitation, chorea, etc. Enfeeblement of attention in all conditions of general enfeeblement has besides been related since long ago.†

The physiological oscillations of attention have themselves for their physical condition oscillations of motor energy. M. Lambard has observed on several subjects (three out of nine) spontaneous oscillations of the energy of muscular contractions.‡ Moreover, muscular fatigue explains this fact, that the effects of attention do not increase in proportion as it is prolonged, so much as it is wanted.§ The intermittences of the sensations at their lower limit, easy to establish for audition (Urbantschitch, Gellé) have, without doubt, the same physiological condition.

In some circumstances one could believe that not only is movement the condition of attention, but that attention is capable of preventing a projected movement. It is thus that Holland‖ remarks that attention brought to bear on the act of swallowing interferes with the movements thereof, and Darwin has observed that sneezing can be obstructed by the desire to see itself induced.¶ But in these cases the movement is obstructed not by a diminution of motor activity, but by the exaggerated and immoderate spasmodic contraction of the muscles which one would wish to enter into contraction. The exaggeration of the troubles of motility

* Guye. *On aprosexia* (Journal of Laryngology, 1889, p. 499.)

† Chrichton. *An inquiry into the nature and origin of mental development*, 1798, t. i., p. 280.

‡ *Amer. Jl. of Psychology*, 1890, p. 41.

§ Dwelshauvers. *Psychology*, in 8vo. Brussells, 1890.

‖ *Chapters on Mental Physiology*, 2nd edition, 1885, pp. 85, 86.

¶ Darwin. *L'expression des Emotions*, p. 39.

under the influence of attention in subjects who are attacked with congenital or acquired impotences of the muscles of articulation, is due to no other cause. One can only maintain that in these cases of functional spasm the exaggerated contraction of certain muscles may be due to a defect of inhibition: frequently one can recognise the existence of paralysis of the antagonizing muscles.

The destruction of the excitable centres entails suppression of the activities proper to these centres: this economy of activity profits the centres remaining intact which react more energetically. The ablation of the brain suppresses the normal activities provoked by visual or auditory excitations, but it does not suppress what is provoked by cutaneous excitations; the excitations of the skin then determine exaggerated reflexes, more rapid and more energetic movements, that is to say, the ordinary effects of reflex attention. This is what appears to transpire in the experiments of M. Fano, in the tortoises from which was taken the whole encephalon, except the cerebellum and medulla oblongata, and which walked without stopping till they died. The principal effects of attention are not suppressed by ablation of the brain. The brain appears to disseminate the effects of attention. The excitable centres which it contains, specialising and multiplying themselves therein, take under their care more and more numerous activities in proportion as the individual is raised in the animal scale. Each of these activities, placed in tension by its normal external excitants, assists in the diffusion of energy: so that such activity considered in particular only discharges under the influence of an excitation capable of breaking the equilibrium. The multiplicity of the sensations, excitations, motives to action, retards mechanically the discharges, whilst diminishing the local tension of the energy, which ends always, however, by disengaging itself in the direction commanded by the strongest excitation.

In proportion as intelligence develops itself the reflex movements become less imperious, the multiplicity of the motives of action gives the illusion of freedom of choice. At the same time as one has suppressed experimentally one part of the excitable centres of the brain, the excitability of the lower centres manifests itself with more energy; also, when the excitable centres are incompletely developed, which expresses itself by a relative insensi-

bility, the impulsions and the reflexes in general, whose centres are better evolved, are more violent and more incoercible: this is what one observes in women, in infants, and especially amongst the degenerate. The default of attention in these conditions ought not to be explained by the defect of development in certain hypothetical inhibitory centres, but by the default of development of the *experimentally demonstrated excitable centres.*

The energy and the swiftness of movements are not the only physical effects of attention. In the experiments destined to control the results yielded by the chronometer of D'Arsonval, I have registered the reaction to the same cutaneous excitations, the subject pressing a little caoutchouc ball. These experiments have shown me, as I have besides observed previously, that attention modifies the graphic curve of the movement, which presents an ascent so much the sharper as the movement is more rapid and energetic. The chronometer of Marey yields besides, in these conditions, the figures of time which confirm the results furnished by the chronograph of D'Arsonval.

If one certain previously necessary muscular activity favours the execution of movements, this same muscular activity favours also the arrest of the same movements. Duchenne (de Boulogne) has taught us, and the experiments of M. Beaunis have confirmed them, that in every movement the activity of the muscles which determines the direction of the displacement is not the only one in play; the antagonistic muscles play also a *rôle* in the phenomenon, which does not produce itself except under the condition that there exists a tension of these last muscles. In arrest of movement it is the intervention of these antagonistic muscles which plays the predominant *rôle:* there is no inhibition, there is no suppression, but simply derivation of activity. The activity which arrests movement is of the same nature as that which provokes it, and it requires a comparable time for its manifestation.*

When, in an individual attacked by paralytic enfeeblement of one side of the body, one provokes by a signal for inscription a bilateral movement of pressure executed by the thumb and index, for example, and one causes also this movement to cease at a signal, we observe that on the feeble side the pressure is late of beginning,

* Orchansky. *Arch. fur Anat. und Phys.*, 1888.

and inscribes itself by a gradual curve: the same delay and the same gradual curve is found again upon the same side when the subject arrests pressure. The default of motor activity expresses itself by a delay and a default of energy at the beginning as well as at the end.

In the case of hemiplegia these two effects of enfeeblement of the muscles, defect of energy and slowness of movement, as well at the beginning as at the arrest, coincide with a default of precision: the slower and more feeble hand attains its object less precisely. The necessarily previous tension of the muscles favours then not only the energy and rapidity of movement but precision besides.

The same fact discovers itself again in voluntary attention. One can render this plain by the following experiment. We trace upon a chart a demicircle of 10 c.m. diameter: on this demicircle we inscribe a series of circles of 1, 2, 3, c.m. diameter. All these muscles having their common centre in the same demicircumference are at an equal distance from the centre. If one makes to run, at a signal, the distance which separates the centre of the demicircle from each mark, we see that according as such and such a mark has been, or has not been, named in advance, the time needful to traverse the distance has been less or longer; and that the precision of the movement varies at the same time as its rapidity: that is to say, that under the influence of attention contact establishes itself most frequently in the smallest circle of the figure, whilst when the subject is not warned he moves frequently in the greater circles or even beyond.

In short, in attention all the qualities of movement are modified: its rapidity, energy, precision; and there exists a general tension of the muscles which appears to constitute the physiological condition of the process. This muscular activity, which plays a great *rôle* in the physiology of attention, coincides with other activities which have been less studied, but are not less interesting. Attention brought to bear upon the gustatory sensibility is accompanied by an increase of the saliva secretion; water comes to the mouth under the influence of gustatory representations to such an extent that Eberle could, by simply fixing his attention upon an acid flavour, procure himself sufficient saliva for his experiments. This effect of attention is produced in animals equally well as in man.

When Thénard wished to obtain saliva for his analyses he took a dog an hungered for 24 hours, and placed before it a gigot of mutton: the animal, gagged and unable to eat, gave issue to an enormous quantity of saliva. Cl. Bernard has employed an analogous stratagem with the horse, and he provoked "so abundant a flow and so continuous as the flow from a caraffe."

The plethismograph can show that when attention is directed to the extremity of a limb, there is induced an augmentation of volume. We know well that in hysterios attention can determine sanguineous exudations (stigmata), or serous (vesication, etc.), or localised swellings of the breast (Dumontpallier), of the thyroid gland (Luys), associated with sensations more or less intense. I have already cited the case of an individual who made a trade of exhibiting his genital organs and provoking at will, without any movement, erection and ejaculation.

These different forms of activity accessible to observation explain sensations termed subjective, but in reality objective, which can produce themselves under the influence of attention: "On fixing my attention," says Hunter, "on a certain point of my body I am sure to give birth to a sensation."

If attention can increase in one part the vital process and sensibility, it can, when one detaches it from this part, diminish the normal or abnormal sensibility thereof. It is thus that when Kant suffered from gout he had the habit of fixing his attention upon some arduous problem, and came to forget his evil.

It is by modification of the vital processes which accompany attention that one can explain the more or less enduring success of suggestions; of the medicine of the imagination.

When one studies the time of simple motor reaction upon a subject that lifts a weight, we observe notable differences, according as it is foreseen, or not, what weight will have to be lifted. These differences* are not without interest from the point of view of the physiology of attention. The time of reaction is prolonged in proportion as the weight is heavier, when the weight is not known in advance. When, on the contrary, the weight is known in advance, the time of reaction is still subject to variations, but much less; in place of being double, it does not vary more than half for the

* *Le travail et le temps de réaction* (C. R. Soc. de Biol, 1892, p. 432).

same series of weights, and besides, it can happen that the heaviest weights may be raised in the same time as the lightest. The aptitude to equalise the time for the various efforts appears to me quite proper to form a measure of attention. If in place of advising the subject of the real weight which would have to be lifted, one made a false announcement, the trouble is at its height, and one observes still better the *rôle* of attention: if one announces a lesser weight the time taken is prolonged: if a heavier, it is, on the contrary, hastened; and whilst, in the first case, the graphic ascension curve is very oblique, in the second it can be almost vertical.

In normal individuals the relation which exists betwixt the energy and rapidity of movements of voluntary muscles is established by numerous facts. We know that, under the influence of fatigue the movements are less energetic and the time of reaction greater. Under the influence of moderate exercise, of attention, of sight, of movement, an inverse modification is induced. And I would add that as in hysterical and epileptic persons, the dynamographic curve schematises this relation by showing, for instance, under the influence of fatigue, the ascension in place of being vertical, as in the normal condition, mounting in steps, showing that the muscular contraction is made slowly and painfully.

On the other hand if the time of reaction is shorter in some individuals of cultivated intelligence, numerous observations show that the energy is also more considerable in the same individuals.

But some new experiments still better evidence the relation subsisting betwixt the energy of movements and their rapidity.

The energy of the hand movements has up to the present been only very imperfectly studied for lack of a suitable exploring instrument. The dynamometer of Regnier, of which others are only more or less happy modifications, only serves to measure the movements of flexion executed simultaneously by all the flexor muscles of the fingers. One is hardly absorbedly concerned in measuring separately the force of each finger, which can, however, be appreciated by this instrument. Moreover, the study of the energy of isolated movements of the other segments of the fingers is also altogether less advanced. The dynamometers constructed for the study of the movements of the forearm, of the arm, of the leg, of

the wrist, like the universal dynamometer of Onimus, for instance, have especially for their aim the exploration of movements of flexion. Also the notions we possess of the comparative energy of the diverse movements of the same segment of a member are very superficial. We know in general that the movements of flexion are in general more energetic than the movements of extension, but we do not know exactly in what measure. It has seemed to me that more precise information upon this point might be useful, not only from the point of view of physiology and pathology, but also from the point of view of psychology.

I have had constructed by M. Aubry a dynamometer which permits the exploration of movements of flexion or extension of most of the segments of the extremities: it furnishes particularly the measure of 50 different movements of the hand. I beg to call special attention to the importance of these movements of the hand;* the facts which appear to me especially worth relation are the following:—The predominance of the movements of flexion over that of the movements of extension is much greater than one could have foreseen: the first was to the second as three or ten are to one. The energy of the movements of the fingers considered separately is very different according to the individuals. It is thus that in individuals addicted to intellectual works the movements of the thumb present a remarkable force. The professional exercises have an influence on the energy of the other fingers: it is thus that the habit of playing the piano can modify considerably the energy of the two last fingers to the extent of making them almost equal to the others. In individuals of an obtuse intellect, as are a large number of the epileptics in my service, one or several movements may be entirely wanting, or produce themselves with a force almost nil: such are the separate extension of the little finger, the isolated flexion of the little and ring finger, the isolated flexion of the two last phalanges of the fingers and the terminal of the thumb. The absence or feebleness of this last movement is specially worthy of remark, for this movement is owing to the action of the long flexor of the thumb: but Gratiolet has shown that this muscle is characteristic of the human hand, and that it only exists in the superior

* *La distribution de la force musculaire* (*C. R. Soc. de Biol.*, 1889, p. 399). *Les Epilepsies et les Epileptiques*, 1890, p. 405.

apes; and, upon the other hand, Duchenne (de Boulogne) has observed that it is this muscle which plays the most important *rôle* in the most delicate movements of the hand.

To this variety of energy of the different movements of the fingers correspond differences in the time of reaction. After a general fashion the movements of extension which are more feeble yield a much longer reaction time: and the reaction time reckoned for each finger is prolonged in proportion as the motor energy diminishes.

I shall only give here some figures relative to the movements of flexion and extension of the right hand, the two last extended phalanges, noting the reaction time for the two movements of each finger. The signal is given in every case by a contact on the back of the hand, the eyes of the subject being shut. Each figure of time indicates at least ten to twenty reactions (d'Arsonval's chronometer).

1st. M. P. Interne.

	FLEXION.		EXTENSION.	
	Dynamon.	Time of React'n.	Dynamon.	Time of React'n.
Thumb	4.200	0.163	1.200	0.19
Index	4.000	0.191	1.000	0.261
Medius	3.500	0.193	.900	0.28
Annular	2.000	0.200	.600	0.299
Little one	1.900	0.203	.400	0.31

2nd. M. L. Surveillant.

	FLEXION.		EXTENSION.	
	Dynamon.	Time of React'n.	Dynamon.	Time of React'n.
Thumb	2.700	0.23	1.000	0.355
Index	3.300	0.16	1.100	0.26
Medius	2.200	0.18	.400	0.277
Annular	2.000	0.195	.350	0.296
Little one	1.800	0.246	.300	0.309

3rd. Epileptic. Intelligent. Having had no recent fit.

	FLEXION.		EXTENSION.	
	Dynamon.	Time of React'n.	Dynamon.	Time of React'n.
Thumb	2.800	0.282	.600	0.34
Index	2.600	0.329	.400	0.516
Medius	2.500	0.346	.300	0.515
Annular	1.700	0.316	.100	0.639
Little one	1.400	0.515	.200	0.517

These figures are sufficiently significative not only if one com-

pares them in the same individual, but also in different subjects, although one cannot establish fixed relations. As we know exercise can modify the energy and time of reaction. One of my internes who has acquired great facility with the piano offers interesting peculiarities of distribution of the muscular force in the hand and in the time of reaction of the different fingers.

4th. M. L. Interne.

	FLEXION.		EXTENSION.	
	Dynamon.	Time of React'n.	Dynamon.	Time of React'n.
Thumb	4.100	0.17	1.100	0.22
Index	3.000	0.191	.600	0.21
Middle	3.200	0.182	.700	0.19
Ring	2.200	0.181	.700	0.183
Little one	3.100	0.171	.500	0.1416

One sees in this example that, in general, the time of reaction of the extension movements remains longer than the time of the movements of flexion, but the difference is much smaller than what exists betwixt the dynamometric pressures. These figures appear to indicate that, in the piano exercise, one cultivates mainly the agility of the movements of extension and energy of movements of flexion, and especially in the two last fingers, which are the lowest from these two points of view in unskilled individuals. The predominance of the energy of the flexor muscles, whether in the normal state, or under special conditions of education, explain why in professional cramp the spasm affects the flexor muscles.*

The relations which one encounters betwixt the energy and swiftness of the different movements of the hand discover themselves again when we examine both hands in their movements together. When we examine the energy of the total flexion of all the fingers of the two hands, whether simultaneously or successively with the ordinary dynamometer of Regnier, we find in general that the right hand gives a stronger pressure by five to ten kilos. The sum of the pressure of the two hands varies, moreover, according as the pressure is simultaneous or successive. We rediscover the same differences in the duration of the time of reaction: even in subjects perfectly free from every neuropathic defect the time of reaction of the left hand is in general longer than that of the right. These differences are brought into light by the following

* Ch. Féré. *Note sur un cas d'impotence fonctionelle chez un flûtiste* (*C. R. Soc. de Biol.*, 1889, p. 90.)

mode of experiment. A Marey signal registers the time, and three registering drums are furnished with a caoutchouc tube closed at their free ends, the subject of the experiment takes the extremity of a tube betwixt the finger and thumb of each hand; the third tube is held by the experimenter; the subject is warned that when the experimenter closes his tube, he ought to close one of the tubes which he holds, or both together. The apparatus is so arranged that the least displacement of air in the three tubes registers itself upon one vertical line known by a line of mark.

These experiments show us that, in general, there exists not only a lateral difference in reaction time, but further that the time of reaction of the two hands is shorter when each of them acts separately than when they act simultaneously.

In the experiment represented by fig. 7 the right hand, acting alone, gives a delay m0.12 sec., whilst, when it acts simultaneously with the left hand, it gives a delay—ef—0.14 sec.; the left hand, acting alone, gives a delay—jk—0.16 sec., whilst, in the simultaneous reaction, it gives a delay of—fg—0.14 sec.:—0.04 sec. 0.18 sec.

In the experiment represented by fig. 8, and which has been made upon a left-handed person, one observes that jk, which represents the slowing of the left hand is smaller than hi, the delay of the right: and that these two cards of which the first, jk,—0.16 sec., and the second, hi, 0.19 sec. are smaller than ef—0.18 sec., and than ef—fg—0.18 sec. —0.03 sec. —0.21 sec.

These facts are confirmed by the general law of the relation which exists betwixt the energy and swiftness of the voluntary movements: but they are more interesting from another point of view. They show, in fact, that the energy and rapidity of movement are more considerable when the movement is limited: it appears, therefore, that on a given point, the rapidity and abundance of the nervous avalanche are so much the greater as the ways of escape are less numerous, a fact sufficiently conformable to physical laws; and permits the physiological formula of the law of division of work; the artisan instructed in a narrow speciality works quicker and better.

It is necessary always to recollect the existence of exceptions. I have already said that some individuals would furnish a sum of

pressure more considerable when they act with the two hands simultaneously than when the two hands act singularly. In some of these individuals I have found the same fact in the study of the time of reaction, which is shorter for the two hands when they act simultaneously, and which occasionally at the same time as it quickens tends to equalise for both hands. I must add that these circumstances have not been encountered amongst the medical or administrative personnel of my service, who obligingly lent themselves for experiment, but in patients, epileptics, and especially the more defective from the intellectual point of view.

There is in this circumstance an indication that the power of directing rapidly upon a special point a large quantity of force is a phenomenon of perfection, and which, moreover, is plainly shown in the instance of the pianist.

The history of movement in the inferior animals shows us that at the bottom of the ladder every irritation provokes a change of general form. Moreover, even in man most movements, howsoever limited they be, accompany themselves to associated movements more or less strong, especially remarkable in infants who, even in their first months, have hardly any other than symmetrical movements. We understand now that the general reaction which is most spontaneous, most reflex, and which exacts least discernment, may be quicker in less developed or less cultivated subjects. Moreover, this greater rapidity of the general reaction exhibits itself even in some of the subjects who appear least endowed: if in place of directing the force upon a small number of points they react with the four limbs or with two limbs of the same side the time of reaction diminishes.

It is not alone by the hand that one can discover the relations existing generally betwixt the energy and swiftness of the movements. Whilst in the upper limb they are the flexion movements which predominate, in the lower limb they are the movements of extension: in normal subjects the exceptions are rare. There also the extension movements give the shortest reaction time.

	FLEXION.				EXTENSION.			
	Dynamometer.		Reaction Time.		Dynamometer.		Reaction Time.	
	Right.	Left.	Right.	Left.	Right.	Left.	Right.	Left.
K.	9·000	9·500	0·34	0·31	9·500	10·000	0·25	0·20
D.	8·500	9·000	0·25	0·33	9·500	9·800	0·31	0·29

The same law verifies itself in other movements, as in those of the limbs.

The opinion generally held that troubles of articulation can exist without alteration of the motility of the tongue ought to be absolutely rejected: it cannot be maintained except upon entirely superficial observation. If, in fact, in a considerable number of troubles of articulation, the tongue appears capable of executing normally all movements it is only in appearance. An examination of tongue movements can only yield positive results when it comprises the force of their energy and the measure of their swiftness: it is, moreover, a general rule which ought to be applied to the scientific exploration of all movements.*†

This study can be easily made by the aid of very simple instruments: one can also inscribe the stability of the movements as well as their graphic form, which shows in cases of enfeeblement, an oblique and stair-like ascension, and a tremulous plateau. One can explain the relation of the energy to the swiftness of the movements of the tongue by casting a glance of the eye upon the following table, which takes note only of the propulsive movements: —

	Habitual State.		Post Paroxysmal.	
	Energy.	Reaction Time.	Energy.	Reaction Time.
Epileptics with permanent affections of articulation.	550	0·53	458	0·655
	650	0·299	500	0·355
	600	0·275	450	0·378
	550	0·32	350	0·471
	650	0·391	300	0·572
	500	0·33	250	0·628
	600	0·36	400	0·48
	450	0·42	250	0·72
Chronic Alcoholics.	400	0·425		
	400	0·322		
	200	0·496		
	300	0·435		
	350	0·427		
	400	0·303		
Precocious dement.	400	0·357		
Aphasics.	300	0·30		
	250	0·42		
	350	0·325		
Stutterers.	200	0·33		
	250	0·39		
Deaf mute.	150	0·54		
Mean of normal subjects.	850 to 500	0·10 to 0·18		

* and † Ch. Féré. *Note sur l'exploration des mouvements de la langue (C. R. Soc. de Biol.*, 1889, p. 278. *Les Epilepsies et les Epileptiques*, 1890, p. 168). *Etudes physiol. de quelques troubles d'articulation (Nouv. Iconog de la Salpêtrière*, 1890), *Soc. Méd. des Hôp.*, 1890, p. 801.

These facts show, among other things, that troubles of language have for their condition, physically, troubles of motility. These troubles of motility are found again, moreover, in defects of expression by writing. In an agraphic, aged 77, and who has only slight enfeeblement of the general movements of the right hand (14 for right and 19 for left by total flexion), but a slight abolition of the isolated movements of the thumb phalanx, and a notable enfeeblement of the other movements of this finger, the time of reaction for flexion of this finger was 0.04 sec. longer than that of the left, usually on the contrary the slower of reaction. The time of reaction of the left hand was, moreover, almost normal, a fact which appeared to prove in a peremptory fashion that in an aphasic agraphic without sensorial troubles, the intelligence can be in a certain measure retained. This demonstration was not lacking in importance for this man who was under the ban of an interdict.*

The energy and the swiftness of the movements of voluntary muscles vary altogether, not only in different individuals, but in various physiological conditions, where one can study an identical individual. This is a fact which is not only important from the physiological point of view, and especially in the psychological direction thereof: it has a practical interest of its own.

Although Sauvages and Itard appear to have suspected, or even recognised, the existence of a certain feebleness of the tongue in stuttering, they admit, however, that in general it is a spasmodic trouble, or at most a special incoördination of the movements of articulation. It results therefrom that the treatment of stuttering consists chiefly in a special gymnastic adapted to the movements of articulation.†

I have shown that in stutterers there exists feebleness and slowing of the most simple movements, and I have expressed the opinion that exercises of force and swiftness of those movements, which apparently have nothing whatever to do with articulation, must be capable of favouring precision of the movements of articulation.

An occasion presented itself of giving an experimental demonstration of the legitimacy of this opinion.

* The existence of paralysis of the tongue which I have indicated as constant in hysterical hemiplegia has been established since, by my method by Decroizilles and Du Pasquier (*Bull Méd.*, 1891, p. 553.)

† Ch. Féré. *Note sur, etc. (C. R. Soc. de Biol.*, 1890, p. 676).

An infirmarian of Bicêtre, aged 26 years, has been affected since the age of 12 years with a very intense stutter, which had rendered him subject to the mockeries of his comrades: under the influence of considerable mental effort he came to be able to modify his vice of articulation, but this modification did not in reality constitute any benefit. T—— came to speak by fits and starts, the repetitions of the stuttering were replaced by silences, following which he resumed the discourse with hesitations which still further unfolded the nature of the affection.

In order thoroughly to establish the situation from the beginning we instituted a series of methodical explorations: 1st. force of movement of propulsion; 2nd. measure of swiftness of this movement; 3rd. graphic inscription of the duration of the persistence of the propulsion during which the point of the tongue was maintained in contact with a drum; 4th. inscription of the duration of the silences during a speech of $2\frac{1}{2}$ minutes.*

After the first examination the subject was put to a renewed gymnastic of Demosthenes, which consisted in agitating a billet of ivory in the mouth with the tongue.

At this first examination (October 18th) the stability of the tongue was impossible when propelled: the trace exhibited incoordinate beats (secousses). The silences lasted in general 20 to 30 seconds, and were not separated by the articulation of three or four words at most.

The list of pressures and of reaction times (mean of ten explorations) go to show the evolution of the case.

Dates.	Weights.	Time of Reaction. sec.
October 18th.	300	0·37
October 25th.	450	0·355
November 3rd.	475	0·32
November 10th.	625	0·273
November 17th.	650	0·2245
November 24th.	750	0·2118
December 1st.	800	0·174

On December 1st, the propulsion of the tongue, which could not

* When the silence supervenes the observer applies to the moving cylinder a style which it leaves raised when the speech is resumed. This proceding can hardly be regarded as rigorously exact, for Orchansky has shewn that the time necessary for the interruption of a voluntary movement is equal to the time of reaction.

be maintained on October 18th, persisted during more than three minutes with a scarcely perceptible trembling: the silences which filled almost the whole time of the experiment of speech and lasted 25 to 30 seconds were lessened to eight, and lasted at most two seconds.

Dating from this I began to make exercises of articulation which could without doubt perfect the acquired result, but did also interfere with the study of the physiological facts to which I desired especially to call attention: the influence, namely, of *non-adapted* exercise to the energy of the movements upon their rapidity and precision.

This example shows that simple exercises of force can influence happily the aptitude for movements of articulation: and that these exercises ought consequently to enter into the practice for the treatment of the troubles of articulation which are due to an impotence of the organ. I would recall that this impotence appears still more marked in mutes than in stutterers. These exercises have the advantage of being able to be utilised apart from all oversight and in all places.

Muscular exercise, so long as it is moderate, and does not induce fatigue, exalts the function of nutrition: it exalts aptitude for movement and sensibility under its various forms. It actuates the intellectual functions and impresses upon them important modifications: "Each movement, be it voluntary, or reflex, or communicated, is retained upon the nerve centres, and modifies the course of our ideas and sentiments."*

According as muscular exercise is moderate or excessive, fatiguing, it entails different sentiments. In the first case the movement entails a general sensation of well-being as in play: in the second it entails a painful sentiment with or without a tendency to reaction. This influence of physical exercise upon the sentiments varies, moreover, according to individuals: whilst in one it developes a tendency to expansion and goodwill; in others, on the contrary, we see a painful irritability and a tendency towards aggression manifest itself; certain degenerates are incapable of yielding to exercise of any violent type without becoming quarrel-

* Ch. Richet. *De l'influence des mouvements sur les idées.* (*Rév. Phil.*, t. viii., 1879, p 610.)

some at once. I know a melancholic amateur pedestrian who, frequently, after forced walks, undergoes a maniacal access.

The exercise of physical activity evokes the pleasure of power which plays a part in all pleasures and presents very diverse morbid deviations. "I fear," says Bain, "that the pleasure of power under its grosser form, the most brutal and most stimulating, may be the pleasure of making others suffer, of accomplishing without pretext what anger does with justification."*

It is thus one can explain the taste which certain individuals, and especially neuropathically predisposed infants, have for inflicting evil treatment upon unoffending animals, or upon the feeble in general.

* *Emotions and Will*, p. 189.

CHAPTER IV.

Insufficient or Excessive Physical Exercise.

Summary—Immobility—Fatigue and Paralyses by Exhaustion.

Pathology can be perhaps better utilised for placing in relief the effects of defective or exaggerated exercise.

The default of exercise of the organs of the senses or of the organs of movement entails functional debilities which can proceed even to atrophy of the organ. The senses which are not exercised become dulled; immobility of the members entails impotence of the movements, and even atrophy of the muscles. These facts are sufficiently known.

But the default of exercise in general has a manifest effect upon the whole of the organism.

Legallois had already observed that immobility is a cause of cooling in animals. Claud Bernard has made confirmatory observations: he has observed that an animal maintained in a gutter cooled itself even to the extent of ten degrees in 24 hours.* This immobility is associated with a painful sensation, and some have utilised it as an aggravation upon criminals: Damiens, the assassin of Louis XV., was, before being executed, subjected to an absolute immobility. The necessity for movement comes to determine a veritable anguish, which perfectly normal individuals frequently experience (nurses, schoolboys, etc.), but which manifests itself in the highest degree amongst neuropaths, hysterical persons, etc., who present, moreover, sensations of cooling which one can appreciate effectively.

Immobility retards the absorption of medicaments introduced under the skin.

Under the influence of confinement to bed we have observed relaxation of respiration and circulation: in over one hundred men æt. from 20 to 50 years Guy observed the pulse descend from 70 to 65,

* Cl. Bernard. *Physiologie Opératoire*, p. 179.

from 66 to 62. This depression of the vital phenomena is accompanied by a mental depression, and Roller has prescribed repose in bed in order to calm the agitation of lunatics: Neisser has insisted afresh upon the utility of this treatment.*

The accidents of excessive physical exercise have been less studied. The influence of excessive muscular work is not evident in all cases of progressive muscular atrophy. Nevertheless excessive muscular labour entails motor impotences, as we will proceed to see when studying some exhaustion paralyses.

The action of overwork does not manifest itself alone by exhaustion of the nervous actions and by general depression of nutrition: it expresses itself further by alterations of the blood which can be subjected to a direct analysis. Hunter observed that in deer stalked to death from fatigue the blood had lost its power of coagulating: and the same alteration of the blood is induced by pain, as the physiologists of Alfort have determined.† Claud Bernard noted that under the influence of fatigue, recurrent sensibility and the glycogenic function disappeared.

Coulomb has brought into light some interesting facts relative to effort from the industrial point of view. He has shown that the useful effect of muscular contraction diminishes rapidly with the increasing greatness of the power overcome, and that the useful effect becomes nil when the charge is excessive; and fatigue, which puts an end temporarily to the development of the mechanical force, manifests itself so much the more quickly as the expenditure of this force is more rapidly made.

The effects of fatigue do not make themselves only felt upon the motor functions: the sensibility is likewise altered, under all its forms. One must pay attention to get the sensation of muscular effort; the sensation of movement may be affected specially under the influence of fatigue: this form of sensibility is, in fact, affected, but as we will see not in an exclusive way.

The exhaustion paralysis, that is to say, developed in consequence of a nervous discharge, local or general, can produce itself in sufficiently diverse circumstances. Amongst others which have been more studied one must cite those which succeed to epileptic

* *Bull. de la Soc de Méd. Ment. de Belgique*, 1890, p. 451.

† Ch. Richet. *Rèch exp. et clin. sur la sensibilité*, 1877, p. 264.

paroxysms: we see them vary from simple localised enfeeblement up to complete and diffuse paralysis.

Briquet has related also that the convulsive attacks of hysteria are capable of determining paralyses, and that frequently the paroxysms augment a paralysis already existing. Amongst other causes of the paralyses which develop in hysterical persons he indicates lively moral affections, excessive fatigues, forced marches, prolonged standing, as, for instance, in laundry women and country girls who work at harvest, excessive evacuations: "I have seen," says he, "a paraplegia succeed to a diarrhœa which had lasted six months: I have seen paraplegias of which the paralysis always increased after loss of blood which each monthly period entailed, and which did not recover from this enfeeblement until after the lapse of seven or eight days."

Handfield Jones has also observed a paraplegia follow, in an hysterical person, after prolonged walks. Todd has seen hemiplegia supervene upon a general fatigue in an hysterio. But these paralyses can also develop themselves apart from hysteria, and under the influence of causes of depression where movement plays no part.

Trousseau has observed hysterical paralysis in convalescence from enteric fever. Gubler has cited examples of paralyses supervening upon acute ailments, and whose cure was effected under the influence of a tonic treatment indicating their nature well. Gull has observed paraplegias consecutive to sexual excesses. Some have observed them sequent to uterine losses, to profuse diarrhœas.

These last paralyses, due to inadequate nutrition of the nervous elements, have been pointed out by many other authors, notably by Abeille* and Landry;† they can be compared with others, as when sometimes originating in a moral shock, but they are not those which we have especially in view.

The cases to which I especially desire to call attention are paralyses supervening in the wake of movements of voluntary muscles unduly prolonged or repeated too often, recognising a local exhaustion whose manifestations are more or less diffuse.

* *Abeille. Etudes cliniques sur la paralysie indépendante de la myélite*, 1854, p. 100.

† *Landry. Récherches sur les causes et les indications curatives des maladies nerveuses*, 1855, pp. 41, 42 and 47.

Observation VII.

Neuropathic Antecedents—Paralysis by Exhaustion.

On April 20th, 1885, P., aged 32 years, presented himself at my consulting room at the Salpêtrière. He was a builder's locksmith, and attacked, since waking, with an impotence of the right side predominating in the upper limb.

This individual, a native of Limousin, belonged to a family in which he knew of no neuropathic antecedent. In his infancy he was subject to night terrors and had had, towards seven years of age, an attack of chorea which endured six weeks, sequent to a fright occasioned by a bull. He had never had rheumatism nor any other malady. He had filled five years of military service and had always had good health. Since he had left the service he had always worked regularly at his hard labour of forgeman. He was celibate, but not addicted to excess either with women or drink; he was generally well nourished.

Upon last Sunday, day before yesterday, he had wrought two extra hours in order to accomplish a work in a house under construction. One hour before quitting his work he remarked that the hammer seemed to him excessively heavy, and when he returned home his right arm appeared as if asleep. Overcome with fatigue he went to bed without food and had slept profoundly a calm sleep. But when he awoke on Monday morning his right arm was entirely flaccid and swaying, and when he wished to lift it up his right leg bent under him. He called across the corridor to one of his comrades who slept in the opposite room, this man gave him an energetic friction over the whole side with sedative water. This manœuvre appeared to reanimate the forces, at least in the lower limb. As for the arm it remained inert. The patient had not experienced either pain or fever or digestive trouble. Things remained pretty well thus when he came to La Salpêtrière. P. is a man of high stature, well muscled, fair to pale complexion, his hairy system is little developed, he has a barely visible moustache, and some hairs disseminated over the rest of the face. His mucosæ are pale, his sclerotics blue; moreover one hears at the cardiac base a very intense anemic souffle. No anemic bruit in the lung. No vice of conformation.

The left labial commissure is somewhat drawn above and behind. The left palpebral opening is a little narrower, the nasogenian fold is more marked on the same side. The tongue is not devious.

The upper right limb is entirely flaccid and swaying alongside the body: it is entirely inert, the arm can neither be brought in to the trunk nor carried before nor behind, the forearm cannot any more make any movement. There remain some traces of mobility in the hand; they are slight movements of flexion and extension of the four last fingers, which moreover can only act together; the thumb remains entirely immobile.

The patient, who lives in Jeanne 'Arc St., came on foot to La Salpêtrière: it is nearly two kilomètres (1¼ miles): that is to say, that the functions of the lower limbs were far from being so much altered as those of the upper. All the movements are possible, they are only enfeebled; in walking, flexion of the leg on the pelvis is inadequate; the same for the thigh; the point of the foot is insufficiently raised, the outer border of the foot trails on the

ground. Finally the exercise is associated to an unwonted fatigue sensation.

General sensibility is altered over the whole of the right side. If one compares the sensibility to contact, temperature, pinching, to pricking at homologous points on the right and left, one finds a right hemianaesthesia. The insensibility is not always uniformly found on the right side of the body, whilst the sensibility to contact is hardly once less on the right than on the left, although it is lessened in the same manner on the trunk; it is scarcely enfeebled on the face. The upper limb, on the contrary, comprising the shoulder is entirely anæsthetic: even deep prickings do not provoke any blood flow. The patient can move his lower limb in darkness and he recognises changes of position which we make upon him. On the contrary, he knows nothing of the position of the upper limb when it is not exposed to his view. The special senses appear intact. There exists, however, a slight concentric narrowing of the visual field on the right side and a slight diminution of visual acuity, not achromatopsia. The rotary reflex is somewhat exaggerated on the right side.

There exists a slight testicular excitability on the left and a zone superficially painful and also on deep pressure, at the level of the spinal apophyses of the three last dorsal vertebrae.

The characters of this paralysis bearing at once upon sensibility and motility, supervened gradually without injury and apart from all the conditions which preside over organic paralyses, a diagnosis favoured moreover by the presence of some hysterical stigmata and anaemic symptoms. I advised the patient to carry his arm in a sling, to live in the open air, without walking so far as to fatigue his weak lower limb. I prescribed for him moreover daily cold douches and 5 drops of Tr. Ferri Perch and Tr. Nux Vom. 3ce daily before each meal.

When he returned on the 27th April the paresis of the lower limb left no trace except a slight exaggeration of the rotary reflex. One could no longer distinguish facial deviation. The sensibility of the face is normal, the slight contraction of the visual field has disappeared, the sensibility is equal for the two lower limbs and the two sides of the trunk. The upper limb only remains paralysed as in the preceding week and it is altogether as insensible. The anaesthesia extends to all the region of the shoulder, behind it to all the region covering the scapula even to slightly below the lower angle of that bone, in front it reaches just to the middle of the clavicle. The left hand yields a pressure of 52 to the Dynamometer. The same treatment to which was added massage and passive movements of the various parts of the paralysed limb, by sittings of five minutes duration repeated night and morning.

On the 4th May the paralysis of the upper limb was, in its turn, diminished considerably. The arm could be averted from the trunk so far as to form an angle of 30 degrees, the elbow could be thrust back to the posterior plane of the thorax and in front it passed the anterior plane. The movements of flexion and extension of the forearm were made almost in their normal extent when no resistance was made to them. Those of pronation and supination remain very restricted. Those of flexion, extension, opposition, adduction, and abduction of the thumb are as extensive as those of the opposite side. The movements of extension, flexion, adduction and

opposition of the fingers are also in great measure returned, nevertheless the first closes itself incompletely and feebly, the dynamometric pressure for the left being 50, 12 for the right. The cutaneous anaesthesia has preserved the same extent as at the time of the last report, but it is less intense. Moreover, if the patient is besides incapable of telling exactly the situation of his limb he can recognise its general direction; he cannot tell how far it is away from the trunk, but he feels that it is away more or less and that it has been carried fore and aft.

On May 11th the patient returned for consultation, having only slight difficulty in raising his arm above the horizontal. The movements of the hand and forearm have become almost normal. Dynamometric pressure 56 on the right, 48 on the left. Cutaneous sensibility completely restored, as is also the muscular sense. The patient preserves his testicular sensibility and the dorsal hypaesthenic one. He proposes to begin his work to-morrow. I have enjoined him to continue his hydrotherapic treatment and the iron and to return to see us, but I have not seen him again.

The course and termination of this paralysis only confirm the diagnosis of dynamic paralysis, and the characters and distribution of the anæsthesia ought to bear comparison to the hysterical monoplegias so well studied by M. Charcot in these last years. In the following case, it is still less doubtful that the paralysis developed itself upon an hysterical soil.

Observation VIII.

Neuropathic Heredity—Nervous Antecedents, Chorea, Hysterical Stigmata, Paralysis by Exhaustion.

Mlle. D., belonging to a nervous family, a brother of her father is in an asylum, her mother is subject to violent migraines and to varied hysteriform fits. She has had two brothers younger than she, who succumbed in their first year to accidents called meningitic.

She herself has had convulsions in her infancy on several occasions. From the age of eleven years she had hysterical fits, I had then to treat her for a rhythmical chorea supervened in the wake of a painful emotion and which lasted three months, and on that occasion I ascertained the existence of a left ovaritis with slight general anaesthesia of the same side and painful spots over the spine and on the vertex.

She is actually 14 years of age. She is a pretty girl, who appears more than her age, as much by the expression of her physiognomy as by reason of her physical development. She is well nourished, her skin is very white, her hair of a pale blond.

She has altered from the age of 12½ years regularly and without pain. But for a certain degree of anemia and some palpitations, her health is good, her appetite regular enough. She has no taste for any study except the piano, which she cultivates with success and to excess; it is frequently necessary to make her desist from her favourite exercise.

On the 19th of last July, it was proposed to keep on the following day the anniversary of her grandfather, a great and talented amateur musician.

She was allowed to study to a very advanced hour of the night. It happened that she had been at the piano very nearly nine hours of that day. She had, moreover, scarcely got into bed when her left hand became numbed, heavy, and unwieldy. Whilst undressing she remarked an unsensibility of the hand; she was obliged to look at the buttons and hooks which her fingers no longer felt. She adds, moreover, that it has already happened to her to have sensations of this kind in the same hand and under very analogous circumstances: there was nothing remaining of it on the following day on awaking. She therefore went to bed without anxiety: it was about two o'clock when she slept. When she was awakened as usual at 8 o'clock in the morning she was much surprised to discover that she could make no movement with her left arm and it was entirely insensible. Her lower limb also was feeble and heavy, but she could move it in bed whilst the upper was entirely flaccid and inert.

July 20th. When I saw the patient at 11 o'clock she had taken with appetite her morning meal, she was perfectly calm and without fever. Her entourage was struck with the perfect calm of her spirit, she accepted without protest a painful situation which prevented her taking part in the manifestation which she had prepared with so much zeal and which ought to have been altogether in her honour. There was no facial deviation. Some movements of the shoulder could be made when no resistance was offered to them. She could separate the elbow from the trunk about 26 centimetres and carry it slightly fore and aft. As for the movements of the forearm, of the hand and fingers, they are almost nil.

When the patient is in bed the point of the foot is rotated outwards. When she is upstanding, she leans on the right limb; and when she walks the outer border of the left foot trails against the ground and the limb bends under the weight of the body, but not enough, however, to prevent her maintaining herself. If one wished to make her stand on one foot, she maintains herself much less long on the left; if the experiment is repeated with closed eyes, we see that standing on the left leg is entirely impossible. The gluteal fold is slightly effaced upon the left side. The patellar reflex is not notably modified.

The sensibility of the face and the special senses do not appear lessened by the fact of the actual accident: it is somewhat feebler on the left, but that is the habitual state of the subject. The difference of cutaneous sensibility is most marked to the prejudice of the left. Nevertheless, the notion of position is retained, she recognises the positions imposed upon her and can alter them spontaneously with eyes shut: although, as we have seen, closing of the eyes impedes stability.

As for the upper left limb it is entirely insensible to touch, nipping, and temperature even to the lower third of the arm. Above, insensibility gradually lessens, confusing itself with permanent hemianaesthesia towards the point of the shoulder.

I could not precisely define the limit of anæsthesia. She feels when one separates the arm from the trunk, when one carries it fore or aft, but she has no notion of movements of flexion or extension of the forearm of the hand or fingers; she had no notion of change of position except when one involved the shoulder in the movements. There exists no

modification of the colour of the hand. The same surface thermometer applied to the back of each hand during the same time yields 36.2 on the right and 36 degrees C. on the left.

After having shut the patient's eyes I asked her to try to show her left hand executing alternately movements of flexion and extension; she was incapable of them. She shews perfectly the right hand executing very complicated movements on the piano; but on the left it appears to her that her arm loses itself in the crowd and she cannot bring back the form thereof to herself.

The patient maintained rest in bed, submitted to cold affusions night and morning, took 4 drops tincture of perchloride of iron and 10 drops of tincture of nux vomica before each meal and 32 grains of pot. brom. in the evening.

On July 23rd, the fourteenth day from the accident, there was no change. It was then that passive movements of flexion and extension were begun of all the segments of the two limbs alternately of the right sound side and of the left of the patient. These passive movements were repeated night and morning by seances of ten minutes each.

It was not till after the sixteenth seance (July 26th) that some movements of flexion began to shew themselves in the thumb of the left hand. These movements were notably more extensive when they coincided it might be with voluntary movements of the right thumb or further when the patient saw the same movement executed by another person.

The movements of flexion of the fingers began to make themselves. The dynamometric pressure exhibits well the progress of this restoration.

July	28.	Right hand	26.	Left	10.
,,	29.	,, ,,	25.	,,	10.
,,	30.	,, ,,	25.	,,	12.
,,	31.	,, ,,	23.	,,	14.

After movements of flexion repeated with the right hand we obtained for the right hand 24 and the left 16. Upon the 2nd August, right 21, left 17. All the movements of the fingers of the hand of the forearm established themselves from top to bottom.

Since, there has been no modification of the dynamometric force which appears returned to its normal state. Mlle. D. resumed her exercises at the piano fifteen days after cure, but she has been able to do it without effort, and since there has been no new trouble. I have repeated the experiment of imagination of movement of the left hand, which reacted however quite as well as the right.

It is unnecessary to insist upon the numerous analogies of these two cases. The etiological conditions are the same—exaggerated exercise. The diffusion of the phenomena is almost identical; the same muscular impotence, the same distribution of anæsthesia, the evolution and the termination are alike.

I would relate also among the symptoms, a fact, which, although inadequately studied, is not, however, unworthy of attention.

The dynamometric explorations made in these two patients indi-

cate that whilst the paralysis is most pronounced, the muscular force appears greater upon the sound side than it is later when the cure is complete. Although these differences were slight enough, they merit being taken into consideration, so much the more as I have already made the same remark in several cases of paralyses by suggestion in hypnotics. In hemiplegias of cerebral origin, on the contrary, there exists in general a diminution of the muscular force of the sound side (Pitres, Dignat, Friedländer). It will be interesting to ascertain if this augmentation of the muscular force is a general fact in dynamic hemiplegias. The general augmentation of the muscular tonicity of the opposed side can perhaps best explain the extreme deviation of the traits exhibited, as Charcot has shown,* in some hysterical hemiplegics, who appear attacked by contracture of the face on the side opposed to paralysis of the members.

This sort of balancing of nervous action is not very easy of explanation: I would recall, however, that the fact is not unique: Claude Bernard had pointed out an analogy to it in the course of his studies on the great sympathetic. "But," says he, "at the same time as the galvanisation of the upper end of the sympathetic lowered the temperature of the corresponding ear one might see the temperature of the other ear raised. It is, moreover, a constant fact."† It is only needful to recall the conditions of temperature to find that they concord in these experiences with vascular conditions, sensibility, and muscular tonicity.

M. Descubes remarked that when in certain hysterical persons by bringing into play neuro-muscular hyper-excitability, we provoke a contracture of the flexors of the fingers, whilst the subject has a dynamometer in his or her hand, we determine an augmentation of force (ten to twenty), whilst there is induced a diminution upon the opposite side (seventeen in place of twenty-one).‡ This observation has a bearing upon the phenomenon of compensation of the same order as that which I have just indicated apropos of dynamic hemiplegia.

* *Brissaud et Marie. De la déviation faciale de l'hémiplégie hystérique (Prog. Méd.*, 1887, 1st series pp. 84 and 128.)

† C. B. *Léçons sur les prop. phys. et les alts. paths. des liquides des organisme*, 1859, t. i., p. 151.

‡ Descubes. *Etude sur le contractures provoquées chez les hystériques à l'état de veille. (Thése de Bordeaux*, 1885, p. 23.)

But the circumstance most interesting in the two cases is without contradiction their etiological condition. Since Charcot has shown experimentally the important *rôle* which suggestion plays, in the development of hysterical paralyses, and especially traumatic paralyses, we come through it to explain by suggestion all dynamic paralyses consecutive to a shock.

The two paralyses, whose history I have just given, did not recognise for their cause either shock or idea, but fatigue, exhaustion. Nevertheless, I believe that they are capable of clearing up the question.

If Briquet and the authors I have cited have attributed a certain number of hysterical paralyses to exhaustion, other authors have not been able to avoid indicating fatigue at the beginning of paralyses developed, so to say, by idea. Thus, in Russell Reynolds' case,* which is a good example of paralysis by an idea, the evolution of the psychic process has been prepared by a corporeal fatigue.

They are not only local paralyses which have been attributed to fatigue; one can cite a certain number of cases where the paralysis determined by exaggerated exercise of a lower member extends itself more or less to the half of the body.

Mr. Frank Smith of Sheffield has described under the name of hephæstic or hammer palsy a paralysis supervening in forgemen, and principally in those who have to wield rapidly a hammer of small volume. This hemiplegia, which shows itself especially in anemic men, predominates in the arm; and is associated with paresia of the arm and face, sometimes with aphasia and ptosis, general anæsthesia and deafness, and even muscular atrophy. It is usually cured in two or three months under the influence of a tonic treatment. There is no room for astonishment that Frank Smith did not find among his eight patients any hysterical mark: at the time when he wrote, the hypothesis of an hysterical hemiplegia amongst forgemen would have appeared altogether unlikely.

Howsoever that may be these facts have the greatest analogy to those which I have just reported, mainly to the first from the view of their genesis.

* Remarks (*Br. Med. Jl.*, vol. ii., 1869, pp. 378, 835.)

I would recall, moreover, the cases of Sutherland* relative to the forms of paralysis capable of being referred to an excessive expenditure of nerve force. He cites notably a lady who had a paralysis of the hand enduring for a year after having played difficult music on the piano during an entire rainy day; and another who had a paralysis of the index and medius after having passed nights in writing letters which her husband, attacked by general paralysis at the beginning, dictated to her.

In one of Frank Smith's cases we note a peculiarity which merits relation: there existed at the same time as a very marked paresia, a sensation of numbing and cramp, together with an impossibility, almost absolute, of writing: this sensation of cramp accentuated itself in the highest degree when he attempted to lift a hammer. This case appears adapted to show the relations which exist betwixt professional cramp and paralysis by exhaustion.

The denomination of paralysis by exhaustion appears to me the most convenient for indicating these kinds of functional impotences. Idea plays a *rôle* in its production, this *rôle* is also accessory. Idea, in fact, only develops in consequence of special physiological conditions upon an appropriate ground. An idea of depression is only capable of appearing in an organism momentarily enfeebled, as a depressing delirium only develops itself in an organism deteriorated for a greater or less time: in melancholics the sad ideas and the delirious pre-occupations which flow therefrom, only appear after troubles of nutrition are already manifested by phenomena more or less numerous and apparent. In order that an idea of paralysis may be able to develop itself it is requisite that the organism should be prepared, it may be by a gradual deterioration, it may be by an emotional state more or less suddenly determined by a physical or moral shock. This emotional state is the indispensable condition of the development of the idea of powerlessness; we find it again, for instance, in the young girl of Russell Reynolds' exhausted by the long seasons of London. In the suggestion paralysis of hysterics and hypnotics, we determine, at first, by an affirmation of illness, a painful emotional state, entailed by this circumstance that the subject revolts herself more or less; and it is only when

* S. *Exhaustion Paralysis (Jl. Ment. Sci.*, 1861, p. 1685.) Interpretation: also we must hold that it serves us to indicate troubles which are not in relation to known anatomical lesions but with affections of nutrition of the nervous system.

the subject is depressed by this emotion that the powerlessness appears and localises itself. Similarly in therapeutic suggestion the first effect of the announcement of solace is a tonic emotion, which expresses itself at first by an exaltation of all the vital phenomena. Then motion gradually re-establishes itself. When one suggests a paralysis to an individual, howsoever apt she may be to submit, one experiences a greater or less resistance. When one affirms, at first, that it is a paralysis of the arm, she does not accept it at once, it is needful to repeat the affirmation. If, on the contrary, we prepare the subject by warning her that a great calamity is about to overtake her; if, in a word, we provoke at the outset a depressing emotional state, the suggestion of a local impotence is much more quickly accepted. Inversely, in the reparative suggestion, if we commence by announcing a certain happy circumstance inducing a general erethism, the cure of the paralysis is more prompt.

The pathogeny of the dynamic troubles* determined by shock ought not now, therefore, to be construed as due to the process of suggestion: but, the effects of suggestion can only explain themselves by and through the intermediary state or process of shock, which according to the state of the subject determines it may be a shock, it may be an exhaustion. This mode of understanding things can oppose spiritualists; but it is not the less physiological upon that account. Ideas can only be modified by a modification of the interior environment, of which one can, generally, find the exterior causation.

Exhaustion appears to me to be the indispensable condition of dynamic paralyses, and I believe that this condition can suffice. When the idea intervenes it is only consecutively. One can explain thus how, in a good number of dynamic paralyses of traumatic origin, which only appear a certain time after shock, idea can play an important *rôle*, whilst those which supervene immediately before the return of consciousness are due purely and simply to exhaustion.

Moreover, exhaustion paralyses do not present themselves neces-

* Cl. Bernard has criticised the expression "functional troubles," which seems to be applicable to troubles which have no substratum in an organic lesion. The expression "dynamic trouble" can give rise to the same interpretation: also we maintain that it serves for the designation of troubles which are not in relation to anatomical lesions so far as known, but with affections of the nutrition of the nervous system.

sarily amongst women and hysterical folk. If they are favoured by a neuropathic state they can also be prepared by all the causes of depression which act on the organism in general.

OBSERVATION IX.

Functional Cramp in a Flutist.

M. D. is a man of moderate height, apparently of good constitution. He is often very pale, his hairy system is scantily developed; he has always been incapable of muscular efforts above the feeblest. He knows of no antecedent neuropathy in his family, and himself has never experienced any trouble of this order either in infancy or adolescence. He is to-day 44 years old, and has had no grave illnesses. He dreams but little, is easily moved: he has always had abundant taste for music, and has become sufficiently adept at the flute as to have taken the chief places in grand orchestras. Up till lately he had always been able to play as long as his multiple functions required without any fatigue: but, sequent to annoyances of various kinds, he has become more irritable, his sleep was troubled, he became thin, and, at the same time, he began to experience a certain difficulty in his play. This difficulty resided mainly in the two last fingers of each hand, but especially of the left. The fatigue, which he only experienced at first in public, and when he set himself to play solo and difficult pieces, became gradually constant to such a degree that it manifested itself when he played solo at home. He had been obliged to stop several times in public, and he felt himself in a measure unable to renew his engagement. It was then that I saw him for the first time in the beginning of November, 1888. He was sent to me by Dr. Jagot, Angiers.

M. D. did not then present any other neuropathic phenomenon than the functional trouble which I have just described; no troubles of sensibility, no painful points, no hysterical marks. There existed dyspeptic troubles, redness, meteorism, somnolence after food, eructations: sleep is disturbed, interrupted, dream disturbed. Extreme irritability, suicidal ideas. He is very anæmic.

The functional troubles are as follows:—Barely a few minutes after M. D. has begun to play his instrument, he experiences a difficulty in raising the two last fingers of both hands, especially in rapid movements. When the effort is repeated, spasms produce themselves in the thenar eminences, on the surface of which we see a characteristic corrugation. These spasms are accompanied by an incomplete flexion of the two last fingers, but more marked in the last: they are sometimes painful enough to compel the patient to drop his instrument and to utter a cry. During some minutes he remains incapable of renewing the attempt. The story of the patient shows well that the initial phenomenon is impotence of the extensors, but direct examination is still more conclusive. When he tries to lift simultaneously the three last fingers of the hand, even if this movement is initial, the sound reveals that the movement is not exactly synchronous for the three fingers, but that there are between the three movements two appreciable intervals.

M. D. has only been able to sleep some hours: he has been subjected to exclusive massage of the extensors of the forearm and hand twice daily for

five minutes, to cold hydrotherapy, to suralimentation, to chalybeates, and to bromide of potass. At the end of fifteen days he was capable of taking, tant bien que mal, his part in the orchestra of the theatre, where he plays each night since. In spite of exercise the amelioration has continued since, the cramps have entirely disappeared at the end of six weeks. Actually M. D. has fattened by four or five pounds, has no more gastric troubles, his sleep is calm, and he plays almost without fatigue, not only at the repetitions and soirees of the theatre, but in the concert: he is quite master of his movements whilst playing solos, but he says that an educated ear could still recognise in certain circumstances that the last fingers of the left hand especially do not act quite synchronously. The movements of extension are then not completely restored.

This case appears interesting to me: 1st. because it illustrates a professional impotence as yet little studied; 2nd. because it exhibits well the relative *rôles* of impotence and cramp; 3rd. because it has been cured by a local treatment, which is generally inadequate by itself; 4th. because the cure appears especially in relation to the establishment of the general health in spite of professional exercise; this last circumstance appears to me to come near the opinion of Gallard relative to the cramp of writers, indicating that fatigue plays a minor *rôle* than general predisposition.

Another type of paralysis by exhaustion is that of tambour players, which limits itself sometimes to the long flexor of the left thumb, but can be seated also in the proper flexor and adductor, or the extensors of the fingers.

Bucknill and Tuke report the case of a coachman who in a carriage accident had to employ a considerable force to arrest his runaway horses, and who suffered accidents which can be attributed partially to excessive effort and fear. This person, besides homicidal impulsions, presented paralytic phenomena, the localisation of which to the face and upper members (ptosis, diplopia, amblyopia) might be fairly attributable to exhaustion.

It is interesting to note that the visual troubles are only the exaggeration of phenomena which pertain to normal fatigue. In fatigued subjects the eyelids droop, convergence of the eyes becomes difficult, the position of the eyes lacks stability, the look is vague, and directed afar off into the void. The default of convergence, which is one of the conditions necessary to fixed attention, coincides with incapacity for intellectual travail.

In certain cases of exhaustion paralyis, the latter is prepared for

by an anterior local condition. Rosenthal reports the observation of a blacksmith who after having been struck by lightning had a paralysis of the right hand: he was cured of this paralysis during six years, but it was suddenly reproduced sequent to a violent effort to raise a hammer.

Paralyses of apparently quite different origin appear to me now to have been able to be traced to exhaustion.* Falret, Moreau de Tours, Brierre de Boismont, have spoken of hallucinations, which begin during sleep, and reproduce themselves consecutively during several nights, *and end by being considered realities during the day.* Faure and Richter (of Pankow) have presented cases in which dreams have been the point of departure of persisting deliriums during the day. Impulsions to homicide and to suicide have been remarked after two or three nights of dreaming; one dream only sometimes suffices to give birth to a mental trouble which manifests itself on the following day. Laségue has insisted upon the relations which exist betwixt dreaming and alcoholic delirium. I have had myself occasion to show the analogy which exists betwixt hysterical delirium and alcoholic delirium in their relation to dream states.

And it is not only with delirium that dream state has intimate relations. Nothnagel and others have justly remarked that dreams can play an important *rôle* as the determining cause of epileptic seizures. The nightly fits observed sometimes in hysteria are in general caused by frightful dreams, which are usually in relation to a moral shock which determines in the patient the first access. In a case which I have seen at the Salpêtrière the first hysterical attack was occasioned by a dream of alcoholic origin. One day the brothers of a young woman who had never before shown signs of hysteria made her, for fun, drink to excess. She fell into a profound sleep, during which she had frightful visions of fantastic animals which made to devour her: without awaking she passed into the hysterical state, which endured for two days, and was followed by frequently repeated attacks. I desire, however, to call attention to a particular accident which resulted from a frightful dream in an hysterical person.

* Ch. Féré. *A contribution to the pathology of dreams and of hysterical paralysis* (*Brain*, vol. ix., p. 488)

OBSERVATION X.

Hysterical Paralysis sequent to a Dream—Aphasia, Paragraphia, Blepharospasm, etc.

"Eugenie P—— came to my consulting room at the Salpetrière on the 4th September, 1886. Her mother, aged 46, is strong, vivacious, although she denies having ever shown any nervous symptoms: a minute cross-examination elicits nothing more. The father is not a kinsman of his wife, but he is of a nervous temperament, irritable, without remarkable neurotic history. He is a wine merchant, and his sobriety is questionable. One cannot obtain any precise information respecting the collaterals. He has had three children: the eldest, aged 18, is a girl of excellent health, the second is the patient, the third was a boy who died at 18 months of age from meningitis.

"E. P. is 14 years old. She was born at full time, she has spoken and walked since she was 14 months old: she altered at the proper time, has never had convulsions nor any nervous symptom. She suffered from migraines when very young, between the sixth and tenth year: these attacks were so violent as to suggest the idea of meningitis, and she seems to have had delirium after several short attacks of fever. She was also subject to nightmares and nocturnal terrors. The menstrual flux appeared for the first time last January, and appeared regularly up till July. The August period was suppressed without any concomitant symptom, although since this epoch E. P. has had numerous nights without sleep: she dreams much and grows rapidly. During the night of the 20th or 21st of August E. P. dreamt that she was followed in the Place d'Odéon by men who wanted to kill her: she ran with all her might and escaped them. She awoke exhausted and bathed in sweat. The following day the mother observed that when she walked out with her her limbs bent under her from time to time, although she did not complain of being fatigued. The dream recurred the following night and the day following, Sunday, the phenomena observed previously manifested themselves anew: besides the child was inattentive, not replying to questions as usual: at certain times during the day, she appears afraid, and says that it is her dream which comes back.

"The same dream renewed itself the following night: the patient awoke again, in the same manner, perspiring and exhausted. The feebleness of the limbs became more marked, she fell several times during the day. The day dream became more marked, the terror movements more frequent and intense. She sees men who follow her and hears them call to her: she feels them seize her hair. Frequently she breaks, or allows to fall from her hands, an object which she holds in her hand in order to prevent her being carried away.

"The relatives make her walk in order to distract her and make her sleep better. But they find that every walk becomes impossible, because the patient, who does not complain of any pain in the limbs, staggers and faints in the sun.

"This condition of daily and nightly dreaming persisted without any change up till the 7th September, when it lessened in intensity. She was not much frightened by day, she was calm, and enjoyed sleep on the 9th. During the forenoon of the 10th her sister called her, for the purpose of trying on a dress, from the upper flat. She went to the top of the stair, but when she

got there her limbs ceased to obey her, and she fell without violence to the ground. From this moment the limbs remained flaccid till the evening, when she began to make certain incoordinate movements. She appears, moreover, to have no consciousness of her state. During the night following she had the dream no more. On the morning of the 11th the patient was brought to the Salpetrière, two persons carrying her in their arms. E. P. is somewhat tall for her age, of dark complexion, heavy, which gives altogether at first the impression of a good constitution.

"When she is in repose, the physiognomy appears regular, but on regarding it closer, we remark that, when she laughs, the mouth deviates a little to the left: moreover, when it is in repose the naso-labial fold is more marked on this side. It appears that the figure is a little slighter upon the same side. The two iris are of the same colour: but the right pupil is smaller. There is some tenderness over the right ovary, as also hemianæsthesia, slight in the arm, very marked in the leg. The special senses are equally implicated on this side; she hears the watch at a slight distance; taste is little developed, odour and sight are less quick; the visual field, equally, measured grossly, appears to be somewhat contracted on the same side. She does not feel so well on the left leg as on the left arm. She is incapable of standing up and falls when the support is withdrawn. The reflexes of the knee are exaggerated, especially of the right side: when she is seated the great toes hang. The tendon reflexes of the wrist (right side) are exaggerated, whilst the dynamometer registers 18 on this side and 24 on the left.

"When, whilst supporting her, we make her attempt a walking movement we see the feet advanced, but when the heel is nearly touching the ground a sudden spasm of the calf of the leg which causes the toes to strike the ground and the heel descends an instant after. We remark this kind of dicrotism at each step. I prescribed a tonic *régimen;* 46½ grains K.Br. at night at bedtime; and two seances of passive movements each to be of ten minutes duration. These passive movements are accomplished whilst the patient reads with a loud voice so as to do away with the resistance of the gastrocnemii which are always under the influence of the will. On the 15th September E. P. was seized with a fit of choking and tears with the loss of all consciousness, and some spasms accompanied by abundant micturition and defecation. On the 20th she returned for consultation. She has had no more dreams, and she has resumed her habitual character. She walks supported upon the arm of her mother, although the limbs may be also very feeble and the dicrotism persists always. The same treatment is continued with cold douches on the trunk and limbs for half a minute at the same hour each morning. On the 27th amelioration was still more marked; E. P. could walk quite alone in her chamber, the movements of her hips show that the muscles of the trunk are necessary still to supplement the still paretic muscles of the limbs: the patient has thus a dancing walk. The same treatment, walking exercise as prescribed twice daily for fifteen minutes. On the 4th October E. P. came on foot without assistance to the gate of the hospital, a distance of 300 mètres. For some days she went out a little, walks alone, although always with the same style.

"On the 9th, after her douche, her mother, having need to go out, undressed her and put her to bed, with a view to prevent her gadding about

during her absence. E. P. went into a terrific excitement, cries and speaks in an extravagant manner during two hours, after which she fell into a sound sleep. When her mother awoke her at midday on her return E. P. could not say a single word. She understood what was said, moved her tongue suitably, but no sound issued from her mouth. An effort was made to get her to write, but she could not, although the movements of the fingers were perfect: she tries to trace the form of letters, but she is incapable of making even one regularly. In the course of the evening she began to articulate some sounds. Upon October 11th, when she came to the consultation, the patient spoke interruptedly (par secousses), and did not attempt to syllabyllise; her tongue is the seat of choreiform movements. Though capable of making a flourish she cannot with the utmost effort write her own name: she hesitates before writing a letter, and the trace thereof is unsteady. She walks well enough, cannot run: the peculiar movements of her hips is always remarkable, but the dicrotism only presents itself on the right side, which is the feebler and has stronger tendon reflexes. On the 18th October the period lasted three days and was more abundant than in the past. Speech and writing power have returned, and her gait is improved. On October 25th her gait is still further improved: the right limb only gives a little after a long walk. Yesterday, however, after a fright caused by the fall of an article, another symptom developed. This is spasm of the eyelids, which winked sometimes as often as 100 times a minute. This spasm is associated with a convulsion of the upper right which remains contracted during 15 to 30 seconds each time: the globe of the eye is entirely drawn upwards so that vision is impossible. This spasm disappears in the space of two days.

"On 18th November I saw the patient again, when every trace of these symptoms had disappeared, except some traces of hemianæsthesia on the right."

This case of paralysis consecutive to a dream merits fixed attention. I think we may give another explanation of the origin of the paralyses which we call psychic, such as are described by Russell Reynolds and Charcot. We suppose that these paralyses proceed from an idea or suggestion: in other words that the trouble of movement comes after its mental representation. This theory has even been applied to the paralyses accruing from traumatic causes.

The circumstances in which the symptom has shown itself in my patient appears to me to resemble the theory of paralysis by exhaustion, which I have proposed for traumatic paralyses. The feebleness of the limbs is really produced by the gradual influence of fatigue due to the exhaustion of the motor centres following a rapid succession of useless discharges in attempts to produce movements. This same patient, moreover, offered us a further example of fatigue paralysis when she became deaf after the discharge of another centre.

I can add that by provoking dreams of running in hypnotisable subjects during their normal sleep I have been able to produce similar paralyses accompanied by the same dicrotic walk which, as we have seen, was due to preponderance of flexor action.

In a certain number of cases of paralyses called psychic the symptom supervenes after prolonged cerebral activity, and not after a subjective representation of fatigue or loss of force. Let us remark also in this case the tremulous writing which is an exceptional symptom in the history of hysterical aphasia. But the main object of this article is to direct attention to the influence of dreams in the development of certain psychic troubles. Our observations tend to show that to dream, and especially to dream repeatedly ought not to be reckoned an indifferent phenomenon, but constitutes frequently the prologue to a morbid drama, and, as such, merits the attention of the physician.

This observation of paralysis provoked by a representation of forced exercise in dream recalls the history of the Sybarite Mynderides, of whom Seneca speaks, who perceiving a man lifting his pickaxe somewhat prior to striking the earth, felt himself fatigued, and excused himself from continuing to work in his presence.

It is not only the limbs which can be affected by paralysis as a result of general fatigue, whether due to a forced march, a painful digestion, etc., the muscles of the eyes can also be attacked: thus we see sometimes asthenopia and strabismus.* Crichton reports the history of a lady who, under the influence of the depression provoked by preparations of antimony, presented a paralysis of the motor muscles of the eye with diplopia.

Sensibility itself can be attacked otherwise than by a passing dulness: Favre has pointed out Daltonism in the wake of severe fatigue, either owing to excessive labours or any other cause of exhaustion.† Handfield Jones cites the case of an artist who during convalescence from a fever saw all the reds green: under the influence of quinine and iron the perception became normal.

The same author tells also, a propos of a deafness resulting from heatstroke, that fatigue augmented it and wine lessened it.‡ Lever

* Inquiry into Nature of Mental Derangement, 1798, t., p. 147.

† *Loc. cit.*, p. 49.

‡ *Loc. cit.*, p. 532.

observed deafness supervene during a pregnancy, and cease after accouchement, but reproduce itself in the wake of fatigues of lactation.* Different forms of amaurosis have been observed in the wake of lactation. I know an hysteric who, on several occasions, has presented in the wake of forced walks attacks of amaurosis enduring for several weeks. Fatigue in these subjects realises a veritable nervous hemorrhage entailing functional troubles whose localisation can vary according to the place of least resistance. One can cite as analogies the facts of total and incurable amaurosis which have been observed in the wake of hematemesis.

Physical fatigue can provoke an enduring anorexia of the same sort as pain or chagrin disturbing at the same time the mobility and the secerning gastro-intestinal faculties. More frequently an excess of physical labour provokes indigestion.

The modifications of motility and sensibility which produce themselves under the influence of exhaustion entail very varied psychic troubles. It is sometimes a simple enfeeblement of memory of which Holland relates the existence during the first stage of epidemic influenza. Thucydides had already indicated amnesia as following the pest of the Peloponnesus.

In neuropathics muscular exercise without being exaggerated can provoke phenomena of general excitation. We know that in Thomsen's malady the putting into action of certain muscle groups determines a sort of local contracture which can become generalised. In certain functional cramps one can observe facts of the same order: in spasms of the neck, for instance, the fit produces itself often under the influence of the slightest effort, of the setting out to walk, and ceases under absolute repose, or when the head is steadily supported.

The analogy which exists betwixt the physiological effects of fatigue and those of the excessive action of some physical agents is brought into light by the resemblance which exists betwixt their pathological effects. Paget has reported the history of a man of 28 years, a hysterical person, who, following upon a cold stroke, had remained for awhile with his feet in cold water, and suffered attacks constituted by a chill with numbness and marble blanching

* Lever. On some disorders of the nervous system associated with pregnancy and parturition (Guy's Hospital Reports, 1847, 2nd series, t. v., p. 1).

of the extremities, which reproduce themselves after a short course.

In all the conditions of physical depression, the functions of nutrition are diminished, and *especially absorption:* Tessier (of Lyons) has observed an hysterical person in whom the hydrobromate of quinine was without effect when it was injected under the skin of the anæsthetic side. Moreover Cl. Bernard has related that enfeebled animals resist more the action of poisons. Bourdon reports that of two young persons who were exposed together to the vapours of charcoal, the one who had been attacked by enteric fever was longer in losing consciousness and could be revivified.

If fatigue constitutes a condition of predisposition to infection, infections favour also neuroses, of which the fundamental element is depression of the nervous system, at the same time that they awake hereditary or congenital affections.

Paludism, for instance, frequently leaves as sequelæ neurasthenia and hysteria. Infection and fatigue add their effects by provoking the explosion of certain neuroses, notably puerperal madness.

If, equally well from the point of view of nervous ailments as mental, one can say that the effects of over exertion hardly show themselves in sound subjects, but only among the degenerate, it is none the less true on that account that fatigue induces a condition of irritable feebleness, which is peculiarly similar to that of the neuropathic states. It is a fact which we can demonstrate experimentally.

I have already called attention to an objective phenomenon which permits the comparison of hysterical states with the habitual states of normal individuals under the influence of fatigue. Frequently, without any necessarily previous labour, hysterical people yield to dynamographic exploration a curve gradually descending by steps, a curve which does not manifest itself in normal subjects except when fatigue has been brought about by the repetition of effort. But this phenomenon is not the only one which can serve as justification of this comparison. Besides the motor impotence which can objectify itself, not only by the graphic form of the effort, but also by the diminution of its intensity and duration, we can cite the diminution of general and special sensibility under all

its forms, and of the power of discrimination, the elongation of reaction time, and of time of association.

Besides, hysterios have a remarkable aptitude for the perception of subjective sensations, sensations of simultaneous or successive contrast, illusions, hallucinations; all phenomena which develop themselves with the greatest facility in normal subjects, under the influence of fatigue from whatever cause, whether due to physical or intellectual labour, to a physical pain or a moral pain.

There is no room for astonishment at the identity of the functional troubles, which manifest themselves under the influence of fatigue and pain: we have seen since long ago that fatigue and pain can determine the same manifestations in the blood: the defect of coagulability which Hunter had observed in deer overrun in stalking, has been found again in animals subjected to painful operations.

I have observed recently other facts which place still more in evidence the analogy which exists betwixt fatigue and the permanent condition of hysterios.

We know that in hysterios the symmetry of movements manifest themselves in a very characteristic manner in numerous circumstances* interesting from the point of view of automatism. I have remarked that in normal subjects this same symmetry is found again under the influence of fatigue: we find it again in epileptics after the fit. Upon the graphs which I show you we see that in a normal subject the work by ergograph does not accompany itself at the beginning to the associated movements of the flexor of the opposite side: at the moment when these automatic associated movements begin that modification of the ergographic curve characteristic of fatigue appears: besides the pneumographic tracing becomes more irregular and indicates effort. It appears that fatigue, exhaustion, may be the physiological condition of automatism.

We have seen, on the other hand, that the association of voluntary movement of another member to a movement of a member whose work one is measuring is capable of increasing the energy of this work. This phenomenon which shows itself readily, as we

* Binet et Féré. *Rech. exp. sur la physiol. des mouvements chez les hystériques* (*Arch. de Phys.* 1887, t. x., p. 320.)

see on the graphs, on fatigued subjects, is much less evident after repose. In hysterios it is frequently extremely well marked without any necessarily previous labour.

Finally, (a phenomenon which shows itself very markedly in grand hysteria), there is that special excitability which makes itself, it may be under the influence of a peripherical excitation, or even feeble mental representations, or excitations which are not perceived by normal subjects, (as that which induces the lover); we see the energy of the voluntary movements submit to rapid and transitory movements, co-existing with parallel modifications of sensibility and circulation. This excitability, which one can compare to the excitability with insensibility of morphinised animals, or the excitability preceding that, in several circumstances, the momentary or definitive loss of tissue properties; this excitability, I say, can be placed in evidence in fatigue; graphically, it inscribes itself in the most exact fashion.

The ergographic tracing exhibits the labour of the left medius in a man of hale and vigorous health. A myograph inscribes the automatic associated movements of the flexors of the forearm on right side: we see there besides the tracing of the pneumograph above that of the metronome which beats the second. In proportion as the ergographic tracing lowers itself the myographic tracing mounts marking the tension of the muscle, and becomes more undulating, and the respiration is disturbed; when fatigue is sufficiently intense for the movements of the medius to become painful we make a painless sensorial excitation (musk, red light, etc.), then the ergographic curves remount, the myographic tracing lowers and regularises, without change of the respiratory curve, that is to say, without manifest effort.

When we practise the same experiment upon one of the more hyper-excitable hysterios, who has not been necessarily previously exercised, the chart shows that under the influence of the same sensorial excitations the ergographic curves which were very low assume suddenly an elevation which compares them to the normal: the myographic trace, which presented, at the beginning of the experiment, considerable oscillations regularises itself, like the respiration, which itself expressed fatigue. In fine when we compare what passes with the hysterio to what passes in the normal

fatigued individual, we only find differences of intensity of the same excitability.

We see now that, as much from the point of view of motility, and sensibility, as of excitability, fatigue can realise the permanent physiological conditions of hysteria: the fatigue constitutes a veritable passing experimental hysteria: it establishes a transition betwixt the states which we call normal, without having to define them exactly, and the diverse states comprised under the name of hysteria.

Similarly in certain experimental conditions one can bring a cold-blooded animal to function like a warm-blooded one; and reciprocally one can change into an hysterio a normal individual by fatiguing him, and by adapted excitations one can momentarily bring an hysterical person to the normal condition.

In fatigue, as in hysteria, (chronic fatigue), the individual is reduced to the condition which Claud Bernard calls the "oscillating life."* Without being entirely dominated by external physico-chemical conditions as in the condition of latent life "the individual remains nevertheless there rooted in such manner that he is subject to all the variations thereof: active and vivacious when the conditions are favourable, inert and listless when they are unfavourable." The continued accommodation of the internal to the external conditions which characterises life is imperfect (Spencer).† This condition can explain very diverse functional troubles which I have designated under the name of paralyses by in-irritation, and which one might with at least as much reason call paralyses of in-irritability.‡

As well in hysteria as in fatigue the state of sensibility and intelligence is subordinate to the state of motility: no intelligence without sensibility, no sensibility without motility. We have already seen that every diminution, every perversion of motility begets either reflex or voluntary attention: and that attention is the condition of sensation: fatigued subjects like hysterios have an obnubilation of intelligence because their muscular impotence renders them incapable of attention, and consequently of sensation.

* Cl. Bernard. *Léçons sur les phenomenènes de la vie communs aux animaux et aux vegétaux* t. i., p. 346.

† *Principles de Biologie*, 2nd ed., 1880, t. i., p. 96. Spencer.

‡ Ch. Féré. A contribution to the pathology of night (Brain, 1889).

It is the *default of attention* which is the cause of the insensibility of hysterios, and it is the instability of attention which is the cause of the variability of their sensorial and motor troubles: the proof thereof is in this incontestable fact that one can sometimes suppress an anæsthesia by adaptably re-enforcing the attention to it. In hysteria, as in fatigue, the energy is insufficient to attend at once to the musculature of all the sensorial organs. This condition of debility is no other thing than a physical condition, and the proof lies in this that it only yields to modifications of a physical order, repose, alimentation, etc., and which, in fact, alter the constitution of the organs. The hysterical phenomena, and especially the anæsthesia, are only temporarily modified by suggestion, they are never definitely cured save by a restoration of the organic state. For us to say that hysterical anæsthesia is not an organic malady, that it is only a mental or psychological malady is a biological heresy; all the neutral maladies and all the troubles of sensibility are dependent upon organic troubles.*

The establishment of physiological conditions common to hysteria and fatigue is not without importance from the point of view of the pathogeny of hysteria. Recent clinical studies† have shown how numerous are the provocative agents of hysteria: but all these agents, infections, intoxications, traumatisms, moral shocks, etc., can be referred, from the point of view of their pathogenic *rôle*, to a single physiological process, fatigue, depression of the vital phenomena. And as for epilepsy one can say that the necessary intensity of the condition determining it varies in an inverse sense to the predisposition, that is to say, to the congenital or necessarily previously acquired predisposition or feebleness. Physiology enables us to understand how, behind every heredity, every apparent predisposition, a violent shock or any other cause determining an intense nervous discharge can develop the physiological conditions of a traumatic neurosis, a neurasthenia, which one can hardly dis-

* P. Janet. *L'anesthésie hystérique* (*Arch. de Neurol*, 1889, t. 23, p. 352).

† *La fatigue et l'hystérie experimentale, theorie physiologique de l'hysterie.* (Ch. Féré. *C. R. Soc. de Biologie*, 1890, p. 282.) "We do not know how better to understand nor define the nature of women than by calling them "êtres malades" because they resemble us perfectly when we are in a condition of sickness. This unequal, excessive, inconstant force is precisely a symptom of illness. Nervous tension adds to the natural feebleness of the fibres and muscles. Likewise dethrone the imagination and everything is on the ground: put away the violins, extinguish the lights, dissipate joy, and these eternal dancers would not be able to walk thirty steps from home before having to return overcome with fatigue. Carriages and cabriolets are for them a necessity, were it only for the crossing of a street.' (L'Abbé Galliani. Dialogue sur des femmes.)

tinguish from hysteria, since one can refer them to the same physical conditions.

This physiological notion is not barren from the practical point of view. Not only does it indicate the basis of a prophylaxy of neurasthenia and hysteria, but it can serve as a support for a rational therapeusis: it renders especially plain the success of the treatment by repose, and suralimentation. Finally, it justifies physiological and psychological experimentation on hysterios, the results of which are legitimately applicable to the healthy man.*

Cicero† remarked that the Greeks did not establish in their tongue, its richness notwithstanding, any distinction between pain and fatigue, which they used the same word to express.

According as a sensorial organ is in a state of repose, or is already under the influence of an excitant, the effects of an excitant can be altogether different. When a nerve is under the influence of a very strong excitation, a new excitation for a time exhausts its excitability. Claud Bernard indicated long ago that when one excites a nerve one puts the organ into which it renders itself into a state inverse to that in which it was prior to the experiment. An experiment of Cayrade merits citation in support of this law, and is peculiarly interesting from the point of view of expressive movements: in order that an excitation should produce symmetrical reflex movements, it is requisite that the members should be placed in a symmetrical position: otherwise, the other member takes an inverse position to what it occupied at first.‡

Fatigue determines frequently an irritable feebleness, an excessive irritability, which can express itself by reactions, either general or specialised, according as the development of the individual is normal, or there exist enfeebled points of least resistance, which manifest especially or even exclusively their defect.§ The local neurasthenias which can emerge from local accidents have most frequently for causes anomalies of development.

* Tuscul., liv. ii., xv.

† *Sur la localisation mouve. de l'réflex.* (Jl. An. and Phys., 1868, vol. v., p. 346).

‡ P. Weill. *Des Neurasthénies locales Th.*, Nancy, 1892.

§ Cl. Bonnet. *Essai analytique sur les facultés de l'âme.* Copenhagen, 1760, p. 255.

CHAPTER V.

The Physiological Conditions of the Emotions.

Summary—The Physical Conditions of Cerebral Activity—The Mental State of the Dying—The Pleasure of Activity—The Physical Conditions of the Emotions—The Pulse, Arterial Tension, Peripherical Circulation; Electrical Resistance, Respiration, Temperature, Digestion, Secretions, Sweat, Electric Tension, Excretions, Composition of Blood, Motility—Expression of the Emotions—Sympathies.

That the states of consciousness of internal origin, which, in fact, are only reproductions, are accompanied by phenomena analogous to those which accompany states of consciousness provoked by external irritation, by the environment, is a fact which did not escape the philosophers.* Ch. Bonnet says, quite correctly, "An idea reproduced or recalled, differs essentially in nothing from this same idea excited by the object; the reproduction of the idea infers therefore the reproduction of movement in the fibres proper to this idea." Emotions, which are only very intense reproductions, are especially proper for the study of these movements.

If, says Leibnitz, "Men observed and studied with more zeal the external movements wherewithal the passions are associated, it would be sufficient to dissemble." All the psychic manifestations, in fact, necessitate phychical conditions, of which a large number are accessible to our senses, but some of these conditions, though less easy of ascertainment, are not the less interesting therefore.

Abercromby cites the case of a young man weakened by a disease of the stomach who was deaf either when sitting or upstanding, but who heard perfectly in the horizontal posture. If being seated, he bent forward, he could hear, and if he raised himself he heard still, so long as the congestion of the head endured.

Lombard had established that cerebral activity coincides with an elevation of the temperature of the head taken on the outside. Broca, Amidon, etc., have brought a large number of facts to bear

* *Byasson, essai, &c. Thèse, 1868. Mairet, De la nutrition du système nerveux, &c. (Arch. de neurologie, 1865, t. ix. pp. 232, 260, and t x. p. 76.)*

upon this attestation, in perfect accord, moreover, with this law formulated by Claud Bernard, "that there is a perfect relation betwixt the whole of the nervous functions and those of the circulation." Moreover, experiments more rigorous than those of Lombard, undertaken by Schiff, have shown that the elevation of superficial temperature corresponds really to an elevation of brain temperature.

Tanzi has studied in the dog and the monkey, by the aid of a thermo-electric apparatus, the influence of external excitations upon the temperature of the brain and the marrow in the lumbar region. The excitations, even unilateral, which give place to emotions, induce variations of the temperature of the brain, which consist in alternations of elevation and lowering, alternations which appeared to him, moreover, independent of the variations of the brain circulation.

Brain activity is characterised by a greater activity of nutritional exchange, and by a more abundant elimination of oxydation products.* The experiment of Preyer, inducing sleep by the injection of sodium lactate, serves to control this observation. Sanctorius had already noted that mental exercise, like physical, caused variation of the body weight, a determination often renewed since.† Byasson has shown that it is less by cutaneous perspiration than by the urine that the loss takes place.

Schiff observed that localised movements determined a warming of the brain, predominant in a certain region, but tending to extend itself to the whole hemisphere of the opposite side, and even to the two hemispheres. We have seen, on the other hand, that the exercise of a group of muscles develops the energy of an entire limb, and that this functional exaltation can extend itself to the other member of the same side, and then to the members of the opposite side.

M. Gley‡ has verified the elevation of the carotid pulse and slight augmentation of central heat under influence of intellectual labour.

Davy admitted that the augmentation of heat produced by intel-

* Stackler. *Indications therapeutiques tirées des pesées faites au cours de la fièvre typhoide normale* (*Bull. gen. de. therapentique, Jun. 30th, 1888, p. 351.*)

† Gley. *Et. exp. sur l'état du pouls carotidien pendant le travail intellectuel, 1881.*

‡ Gley. *De l'influence du travail intellectuel.* (*C. R. de Soc. Biol.*, 1884, p. 265.)

lectual work, limited at first to the brain, subsequently extends itself to the whole body.

We have shown that, contrarily to the opinion of Mosso, under the influence of mental activity, there is produced an augmentation in the volume of the members, entailing an augmentation of afflux of blood to the periphery. This augmentation in volume of the members coincides with an augmentation of the muscular force and sensibility. The persistence of the nervous activities has for its necessary condition the maintenance of the heat which cannot in general exist without a suitable circulatory activity. One can, however, observe local elevations of temperature without augmentation of circulation (Schiff and Claud Bernard), or nervous activities without augmentation of circulation. Section of the sympathetic can elevate the temperature in spite of obliteration of the veins: the excitation of a nerve on a dead animal can provoke a muscular contraction at the same time as an elevation of temperature (Schiff): psychic acts, and complex movements can be accomplished by choleraics, whose opened arteries do not allow one drop of blood to flow (Majendie); but these activities are not enduring.

"Meditation weakens as excessive evacuations make it," says Tissot.*

Under the influence of intellectual fatigue—as under the influence of physical fatigue—we can observe that the diminution of sensibility and voluntary motility have for condition a diminution of volume which one can only verify with difficulty in the members, but which shows itself grossly in the face by the depression of the soft tissues of the orbit.

Broca has verified the fact that the mean temperature of the left side of the head, is, in a state of repose, about one-tenth of a degree higher than the right. Under the influence of intellectual labour an equilibrium on both sides tends to establish itself. One can see on the other hand that moderate intellectual activity tends to establish an equilibrium betwixt the muscular force on the two sides of the body with a variable bilateral augmentation. Sensibility exalts itself at the same time. One of the facts which show best the relations of intellectual development and its organic conditions is that we observe the energy of muscular effort vary ac-

* *De la santé des gens de lettres*, 1784, p. 43.

cording to the intensity of intellectual activity in the same individual, and in the races according to the development of the intelligence.*

Dorta, renewing Schiff's experiments, observed that sensitive and sensorial excitations determine an augmentation of the temperature of the brain.†

Several men,‡ given to mental labour, have employed, in order to excite themselves, and put themselves into emotion, means which could act in no other way than by exaggerating the flow of blood to the brain, and in it. Schiller plunged his feet in ice;§ Milton and Descartes buried their heads in cushions or covers; Cujas worked lying flat-belly on his books; Leibnitz, Thomas, Rossini also worked in the recumbent posture. Rousseau meditated with bare head in the full glare of the midday sun.

If it is true that *in general* the functional activity of the brain is in relation with its nutritive activity, there are certain conditions in which the relation appears at least doubtful. We come to recall, for example, that in the algide period of cholera, we observe an evident psychic activity persisting, also that the opened arteries contain no blood: but this activity is of short duration. The conditions of psychic activity, at the moment of death, may also leave room for debate. The mental state of the dying has been especially studied from the medico-legal point of view (Legrand du Saulle, Salivas),‖ but the facts more or less curious, which have been recorded, contained few details of a nature to enlighten us on the physiological conditions of the modifications which produce themselves.

It is necessary to point out two groups of facts according as the subject is sane or insane.

When the dying person enjoys functional mental integrity, his intelligence very often experiences naught, very often presents naught, except a gradual depression bordering upon dissolution. Very often this dissolution does not appear to accompany itself to any painful sentiment. Fontenelle, asked what he felt, replied,

* *Sensation et Mouvement*, p. 3.

† *Etude cr. et exp. sur la temp cérébrale.* Th. Genève, 1889.

‡ Lombroso. *L'homme de genie*, p. 30.

§ *De l'influence sur l'état ment. par l'approche de la mort.* Thése Bord, 1883.

‖ *Physiologie du Gout*, 4th ed., 1834, t. ii., p. 119.

"Nothing but a difficulty of living." Brillat Savarin* relates that he came to assist an old aunt of 93 years who was dying, by giving her a glass of water to comfort her: "Many thanks," said she, "for this last service: if ever you come to my age, you will know that death becomes a necessity like sleep." The intellectual perversions which supervene at the hour of death appear kith to certain troubles of circulation: we have cited facts indicating that lesions of the *central* orifice (mitral of the heart) accompany themselves most frequently to delirium of the depressive sort, whilst aortic lesions more often bring about excitation. The ultimate deliriums of maladies are, in general, less active. It is a subdelirium, as one says, where it is rare to find terrifying hallucinations.

Frequently the dying give proof of an exaltation of memory. "A Lutheran clergyman of Philadelphia informed Dr. R. that the Germans and the Swedes, of whom there is a considerable number in his congregation, when they are near death, always pray in the language of their country, although some of them, as he perfectly well knows, have not spoken this language for fifteen or sixteen years."† This exaltation of memory can itself be observed in cases of habitual mental debility. Miss Martineau cites the case of a congenital idiot who had lost his mother when he was under two years old, and who consequently could not know anything about her: and who nevertheless, when he died at the age of thirty years, turned his head suddenly, assumed a lively and sensible expression, and cried out in a voice he had not been known to have: "Oh, my mother, how beautiful she is," and still looking around him he died.

In a certain number of cases of death from submersion this exaltation of the memory manifests itself by a rapid reminiscence in which the subject sees unroll itself before him a tableau of his whole life. "I know," says Macario, "this phenomenon by experience. One day bathing in the Seine I felt myself sick. In this supreme instant all the acts of my life showed themselves as by enchantment to the frightened regard of my spirit."‡ Munk cites

* *Principles of Physiology.* Carpenter. 6th ed., 1881, p. 437.

† *Du sommeil, des rêves, et du Somnambulisme.*

‡ *Euthanasia,* 1887.

very interesting facts of the same kind, which can reproduce themselves in hanging.*

Sometimes this panoramic representation appears to comprise all the events of existence: at other times it only bears on episodes of no importance possibly. This kind of reminiscence induces itself sometimes in epileptics, constituting then a particular form of intellectual aura. Hughlings Jackson has insisted lately on this form of warnings,† of which I have observed several examples. These reminiscences of epileptics and the nearly drowned have perhaps played a *rôle* in the establishment of a belief in a last judgment.

These two etiological conditions can make believe that these reminiscences are kith to a rapid modification of the brain circulation. But I proceed to cite two facts which induce one to believe that they constitute a phenomenon perhaps frequent in natural death.‡

In the month of September, 1883, I attended a patient who was dying of consumption with a sacral ulcer developed in the course of a transverse myelitis. He had fallen into a considerable depression from which several hypodermic injections of ether had momentarily relieved him: finally he lost consciousness for several minutes, respiration was superficial and rare, the pulse was extremely feeble, he appeared about to expire. Two successive injections of a gramme of ether brought back at the end of some minutes respiration and pulse, the eyes opened, and the patient, who was inclined to the left side, raised his head slightly, and pronounced with volubility words which were not understood. He expressed himself in Flemish which no one round about him understood. After some movements of impatience he motioned a desire to write. He was offered a pencil and a sheet of paper on which he wrote very rapidly three or four lines also in Flemish. This effort made he allowed his head to fall back upon the pillow, and at the end of some minutes his heart definitively ceased to beat. This man, originally from the neighbourhood of Anvers, dwelt in Paris for a long time, and neither spoke nor wrote in any other than French;

* Forbes Winslow. *On Obscure Diseases of Brain*, 2nd ed., p. 14.

† *Brain*, pt. 42, p. 179.

‡ *Note pour servir a l'histoire de l'etat mental des Mourants* (*C. R. Soc. de Biol.*, 1889, p. 108).

but it appears that in this emergency he could not serve himself in French. They afterwards found that the writing recalled a debt of 15 francs contracted in 1868 towards an individual in Brussels and unpaid.

This fact is peculiarly interesting, inasmuch as it shows that a person in agony officially verified can be momentarily recalled to life, and can manifest his will in an intelligent and clear manner.

Some months ago I had occasion to recall an analogous example. It concerned an ataxic who died of pulmonary phthisis. He had had several lipothymies, and did not now reply to interrogatories: the respiration was infrequent and superficial, the pulse hardly sensible. Six or seven minutes after an injection of ether, the pulse was raised and respiration took on fresh energy: he turned his head towards his wife and said sharply, "You will not find that pin, all the floor has been swept," in allusion to a circumstance which had taken place eighteen years previously. This said, he died.

These facts, which are, doubtless, not isolated, appear to indicate that reminiscence is an incident normal to the moment of natural death, and that an artificial excitation can favour its expression. These two examples show us, moreover, sharp recollections and sudden, spasmodic after a fashion, and analogous to those which produce themselves in cases of submersion or aura.

In these cases we may admit that the functional excitation of the brain coincides with nutritive exaltation provoked by the subcutaneous injection of ether. But in the absence of this intervention can one invoke an augmentation of the brain circulation preceding natural death?

This relation of a psychic exaltation with an augmentation of circulatory activity in the brain can bring itself to the support of certain facts. If, as Spurzheim,* Zimmermann,† Thurnam,‡ Brierre de Boismont,§ Morel,‖ etc., have noted, this return of reason sometimes takes place in aliens, and mainly in maniacs,¶ at the point of

* Spurzheim. *Obs. sur la folie*, 1818, p. 242.

† Zimmermann. *Traité de l'expérience*, 1822, t. ij., p. 86.

‡ Buckmill and Tuke. Psychological Medicine, 4th ed., p. 126.

§ Brierre de Boismont. *Du rétour de la raison (Gaz. des Hôp.*, 1844). *Des Hallucinations*, 3rd ed., 1862, p. 370.

‖ Morel. *Etudes cliniques*, 1852, t. j., p. 142.

¶ Griesinger. *Traité des maladies mentales*, p. 133.

death: the same fact produces itself also apropos of acute ailments, fevers, which appear to realise the conditions of an exaltation of the brain circulation. S. Tuke has observed a temporary cure during a typhoid fever.* "An idiot," says Griesinger,† "attacked with madness, related a very complicated fact of which he had been a witness a long time previously, and which appeared to have made no impression upon him." Langdon Down has observed three idiots whom one had never heard speak, and who in the course of pneumonia and scarlet fever pronounced correct words.‡

Moderate physical exercise entailing a general excitation of the nervous system is associated to a feeling of well being, of pleasure, such as pertains to most games. Excessive labour, on the contrary, like inaction, induces a general depression of the nervous system, accompanied by malaise and a tendency towards sad emotions.

"Pleasure accompanies moderate activities, when these activities are of a nature (or tendency) to be excessive or defective: and when the activities are not susceptible of excess, pleasure increases like the activity itself, except when the activity is constant and involuntary."§ "*Ennui* is the unsatisfied need of exercising physiologically one or other or all the centrifugal activities which accumulate themselves in the nervous system centres."‖

The intellectual activity, which can only exercise itself concurrently to a certain muscular labour, has identical effects. Moderate it associates itself to a general sentiment of pleasure: even when it induces an exercise which by itself offers no interest.

Dumont¶ cites the case of a valet depicted by the Russian romancer Gogol, who found pleasure in reading, even without comprehending aught of what he read. It is a fact which we observe frequently enough in imbeciles: I have known one of them at Bicêtre who frequents for several years the library of the internes, where he reads everything that falls into his hands. I found him one day reading Virchow's "Cellular Pathology," and appearing

* Buckmill and Tuke. *Loc. cit.*, p. 126.

† Griesinger. *Loc. cit.*, p. 431.

‡ Langdon Down. On Some of the Mental Affections of Childhood and Youth, 1887, p. 105.

§ H. Spencer. *Principes de Psychologie*, t. i., p. 283.

‖ Mantegazza. *Physiologie de la Douleur*, p. 180.

¶ *Théorie scientifique de la Sensibilité*, 1881, 3rd ed., p. 162.

highly interested: he was completely incapable of understanding one word of what he read. Another, who lives with his family, passes his time reading English books, he knows exactly six words of that language: he never gives any sign of ennui, although he has at his command selections of the works of Byron: if one attempts to substitute French works, he becomes furious. He is 26 years of age: for more than a dozen years he has read the works of Byron without understanding them, during several hours daily.

"Those who have never known the charm of study," says Dumont, with reason, "are led to believe that savants, philosophers, yield to the love of glory, vanity, desire of the advantages which success can procure for them. It is an error: pleasure of study finds its proper end in itself." We have often more pleasure in the conception and in the execution of work than in its contemplation. The pleasure of psychic activity, which draws itself by external phenomena, put in evidence by experimentation, is the basis of our taste for games of hazard, which put attention into the highest degree of activity.

This relation which exists betwixt activity and pleasure, betwixt inactivity, or fatigue and pain, is found again in the physical conditions of the emotions considered in general.

The emotions express themselves by diffuse manifestations, and by local manifestations, which are not the effects, but truly the physical conditions of these states of consciousness.

The diffuse manifestations can only serve to characterise a group of emotions, and not such or such an emotion particularly. The general exaltation of the motor functions entails sthenic emotion: the depression of the forces, on the contrary, entails an asthenic. But these diffuse phenomena cannot enable us to recognise such a sthenic or asthenic emotion in particular, not even if it brings about a primitive or secondary emotional state. The same conditions of the muscles can be found in joy and anger.

The local manifestations which differentiate each emotion recall the excitations which are provoked by external excitations, attraction, or repulsion.

Under the influence of agreeable excitements we observe a considerable elevation of the pulse;* the same holds good of sthenic

* *Dégénérescence et Criminalité*, p. 18.

emotions. This fact did not escape Descartes, says he, "I remark in love, when it is alone, that the beating of the pulse is equable, and much greater and stronger than usual: that one feels a gentle heat in the chest, and that digestion of food completes itself more promptly in the stomach, so that this passion is useful for health."

It is by the characters of the pulse that Erasistratus recognised the love of Antiochus for Stratonice, and Hippocrates that of Perdiccas for Phila. The heart beats are also more energetic. With increase of the force of the heart beats and pulse coincides a notable increase of frequency. M. Rarey, the great horse trainer, remarked that an angry word augments the pulse of a horse by ten pulsations per minute. The pulse is not only higher and more frequent, but also more resistant, that is to say, that the arterial pressure is augmented. These changes of circulation are easy of verification in hypnotics, in whom sthenic emotions are readily induced, joy or anger; but one can also observe them in others.

Epileptics are, as we know, prone to movements of anger, in the wake of every kind of official morbid manifestation, and apropos of the least provocation. In several circumstances of this kind I have been able to observe an augmentation of pressure which attains almost the figures one observes in aura: thus F——, who has a normal pressure of 800, had on the 14th February in a period of fits 1,050: on the 11th May in an access of anger brought about by a dispute with a superintendent the pressure was 1,100. This verification enables comprehension of the *rôle* an emotion of this kind can play in the production of a paroxysm when the patient has not been discharged by a recent fit. This character, common to the emotional state and to the epileptic paroxysm, justifies the reproach which has been made, notably by Echeverria, betwixt anger and the psychic paroxysms in epileptics.

But these modifications of arterial tension in anger are not special to epileptics. I have taken the arterial tension of an imbecile, not epileptic, who came in anger, to explain his grievances against a patient: it was 1,000 grammes instead of 850 as in the normal state. Exploration having had a lowering action of the most obvious kind, I made comparison with the patient: the pressure mounted immediately to 1,100. A coachman whom I examined

at the conclusion of a quarrel had also 1,100; it was only 800 one hour previously.

These figures show that under the influence of anger, arterial pressure can augment more than a fourth. One can thus understand the *rôle* of this emotion and of the analogous emotions in the production of ruptures of the vessels or of the heart when there exist necessarily previous alterations of structure.

The rapidity of movements of the heart and the increase of tension yield, when the change is rapid, to a special sensation which expresses itself in popular language by the saying "my blood only makes one journey."*

This augmentation of vascular tension expresses itself in parts where the vessels are easily dilatable and superficial, by the redness of skin which manifests itself especially on the face. This effect is not peculiar to man: we find it again in certain apes, and especially in the mandrill: anger determines in the turkey turgescence of the cutaneous appendage, which arises below the beak; and every adjacent portion of the skin of the neck. The turgescence of the vessels of the face entails prominence and congestion of the eyes, and a lacrymal secretion which gives to the eyes a special brilliance: we say that the "look is inflamed" by anger. The metaphorical expressions, "fiery look," "burning eyes," "having no coolness of eye," entail the presumption of an elevation of temperature which is at least likely. I have already remarked elsewhere that most metaphors have a physiological basis.

Certain individuals are capable of acting voluntarily upon their heart in an indirect fashion, especially by inducing painful ideas or reminiscences (Botkin's case).†

A. Bloch‡ has entertained the idea of utilising therapeutic cauterisations for the study of the physiological conditions of pain in man. He observed a variable relaxation (slowing) of 1-20th to 1-3rd of a second of the heart movements, according as the subject was more or less moved. Always the slowing preceded excitement. I have repeated a large number of times the experiment in individuals who are subjected for months or even years to twice a day

* Brissaud. *Histoire des exp. pop. rel., etc.*, 1888, p. 75.

† E. A. Pease. *Voluntary Control of the Heart (Bolton M. and S. Jl.*, 1889). *La Relation du cas fameux d'arrêt volontaire du cœur (The English Malady*, 1783, p. 77).

‡ Comptes. *Rendu Soc. de Biol.*, 1884, p. 148.

applications of actual cautery to the hairy scalp. In some individuals who bear the operation without the least apparent emotion, this necessarily previous lowering is entirely wanting, but in most it exists in a manifest way: nothing can better prove the analogy which exists betwixt painful emotion and painful sensation which express themselves by an identical physiological condition, not only on the heart side, but also on the side of the thoracic movements and muscular tension.

In hypnotics the emotions provoked can produce an effect two or three times more marked, but in fact, in this circumstance, as always elsewhere, there is only a difference of degree.

The increase of arterial tension which is produced under the influence of tonic emotions is not only the effect of the greatest energy of the heart contraction and the probable contraction of the small arteries: it is still more due to augmentation of muscular tonicity in respect of the muscles of relational life, which provoke a delay of the circulation of the blood of the capillaries in the veins. The modifications which produce themselves under the influence of joy are less intense than those which show themselves under the influence of anger.

Besides these modifications of heart beating and pulse the sthenic emotions associate themselves to modifications of circulation of the small vessels of the periphery, and consequently of the volume of the limbs, which we have already verified by aid of the plethismograph of Mosso. These modifications, which entail constantly an increase of volume in relation with the emotional intensity, can explain modifications of the vital properties of the tissues and the organs, of augmentation of the motor energy and of sensibility.

These modifications of the peripherical circulation, like augmentation of tension of cardiac origin, express themselves in the face mainly by redness and paleness, one reddens from shame, one pales from fear; sometimes the redness shows itself on the trunk in the form of roseola.*

Certain congenital dispositions or certain pathological lesions determine a local predominance of these vascular effects of the emotions. Vulpian has observed in a female emotional redness of the skin manifest itself afterwards in points which had been occupied

* Vulpian. *Leçons sur les nerfs vaso moteurs*, t. ij., p. 572.

by an erysipelas.* In certain subjects with fine skin emotional redness extends to the trunk, and even sometimes to the root of the limbs: I have observed very frequently this fact in an epileptic who rarely fails to put himself into a furious anger when we examine him entirely naked.

The redness does not manifest itself only on the skin, but also on the mucous membranes; the lips take on a more pronounced red tint. The conjunctiva takes part in the phenomenon, and probably also the lacrymal glands (Darwin), the redness also frequently is accompanied by winking. Shame makes a steady look impossible, causes lowering of the eyelids and the eyes by a phenomenon purely reflex.

To the variations of volume variations of electrical resistance correspond which indicate well the nature of the phenomena.

The study of the electrical resistance of the animal tissues presents serious difficulties by reason of the multiplicity of the influences capable of disturbing the results of exploration when it bears upon the observation of one individual at lengthened intervals, or of different individuals.† Frequently M. Vigouroux, who is one of us specially occupied by the study of this question, has been able to show that there exist very considerable individual differences to serve as clinical signs;‡ it is thus that he has established that the electrical resistance is considerably diminished in exophthalmic goitre, and that it is, on the contrary, augmented upon the anæsthetic side in hysterios. In this last category of subjects the same observer has noticed that the increase of resistance changes from the side when "transfer" is provoked, by one of the various devices appropriate to this manœuvre. M. Vigouroux concludes from this last fact that it is not the state of the epidermis which commands the electrical resistance, but rather the state of the superficial circulation. I have effected some experiments, which, while not giving precise results from the point of view of absolute resistance, are not the less worthy of interest on that account. These experiments have been made upon hysterical persons of the cate-

* *Loc. cit.*, t. j., p. 337.

† Ch. Féré. *Note sur les modifications de la résistance électrique sous l'influence des excitations sensorielles et des émotions (C. R. de Biologie*, 1888, p. 217).

‡ Vigouroux. *De la résistance électrique comme signe clinique (Prog. Méd.*, 1888, Nn. 3 and 4). E. Castex. *Résistance électrique des tissus et du corps humain*, Th. Montpellier, 1892.

gory of those who offer specially intense reactions to the peripherical excitations, and which I have especially studied in my former researches.

I place two electrodes, of the same diameter, at a certain distance the one from the other, let it be the anterior surface of the forearm, or the outer surface of the thigh, and I cause a variable current to pass for each subject, but so that the needle of Gaiffe's galvanometer settles itself betwixt the second and third divisions. I practice then various sensorial excitations, visual (green colours), auditory (tuning fork) gustative, olfactory, etc. There is induced then a sharp deviation of the needle of the galvanometer which may exceed 15 divisions (milliampéres) to the strongest excitations. The same deviation produces itself also under the influence of sthenic emotions; that is to say, that it produces itself under all conditions where I have indicated previously an augmentation of volume of members, placed in evidence by the plethismograph. The absence of excitation, on the contrary, augments resistance: in one subject the deviation of the needle diminishes by the simple closing of the eyes.

Since these facts have been pointed out to the Society of Biology I have had occasion to make more regular experiments, employing therefore the procedure indicated by M. Vigouroux, and I have verified that, under the influence of painful or tonic emotions, the electrical resistance can vary in hysterios instantly from 4,000 to 60,000 ohms.

These experiments seem therefore to indicate verification of the hypothesis of the diminution of the electrical resistance with an increased irrigation of tissues. They can serve for control to the observations which I have made previously upon the general effects of the sensorial excitations, and they show, moreover, that the study of electrical resistance can find an application in psycho-physiological researches.

Electrical resistance does not vary only with the proportion of the liquids contained in the tissues, it varies also according to their quality: we know that distilled water offers a very considerable resistance, which diminishes by the addition of salts and acids.

Modifications of electrical resistance under the influence of sensorial excitations, even in chosen subjects, are much feebler in

the lower than in the upper limbs. They have been usually insignificant in the normal individuals upon whom I have experimented. However, as the phenomena which we observe in hysterios differ only in intensity from the normal individual, there is room to take account of these facts in a general way in the study of electrical resistance.

The modifications of vascularisation which produce themselves in the periphery upon occasion of physical excitations or emotions are certainly brought about by modifications of the nerves: but one can ask if these are not secondary to modifications of tissue activity: a good number of physiologists admit that the nervous system acts directly upon nutrition.

It is interesting to remark that under the influence of the emotions the modifications of the peripherical circulation and the movements of the heart are not always identical. If it is true that, in general, in the sthenic emotions, we observe an increase of energy and frequency of heart beats at the same time as an augmentation of volume, and an increase of tension; and that in asthenic emotions the concording phenomena are produced in an inverse way: it is true also that we see sometimes, in anger, an acceleration of heart beats *simultaneously with pallor of skin.*

Experimental physiology has shown us that the cerebral cortex influences respiratory movements. Under the influence of direct excitements Messrs. Rochefontaine and Lepine have observed quickening; whilst Messrs. Danilewsky and Charles Richet have seen lowering, sometimes followed by arrest. The experiments of François Franck are especially interesting in this relation, for he has noted that, in the dog, excitations of the anterior marginal convolution of the brain, are accelerators or moderators according as they are weak or strong."*

I have shown, on the other hand,† that under the influence of moderate and agreeable sensorial excitations the respiratory movements becomes more ample at the same time that the physiognomy expresses satisfaction, the respiration becomes tremulous, roughly resembling the expiratory type characteristic of laughing. Gratiolet had already remarked the illusion of ascension in relation

* *Leçons sur les fonct. motrice du cerveau*, 1887, p. 140.

† *Dégénérescence et Criminalité.*

to deep inspirations.* In hypnotics deep inspirations combined with the straightening of the body easily induce ideas of grandeur.

Under the influence of painful excitations, on the contrary, the respiratory movements become enfeebled and simultaneously more superficial and slower. This enfeeblement, moreover, manifests itself in all states of nervous depression whatever may be the cause thereof: in the wake of epileptic discharges, not only the form of the respiratory movements is altered, but the lung capacity is diminished.

One is choked with pain, oppressed by chagrin: under the influence of *ennui* respiration slackens, becomes more superficial, and from time to time the need of a deep compensatory inspiration is felt. It is the physiological process of sighing which produces itself in all the conditions which depress nutrition,† fatigue, inanition. An intense emotion suspends, cuts respiration, by exhaustion of brain action.

As Chas. Bell has observed all the muscles which concur in the respiratory function are affected synergetically in the emotions. When the muscles of the lung are violently agitated by anger the nostrils dilate themselves and quiver: this is what we observe especially in the horse. In violent individuals, the nostrils frequently present in their habitual state a great mobility, and maintain themselves much dilated. In the depression of sadness, on the contrary, the nostrils efface themselves and appear immobile.

When, under the influence of anger, the air is expelled rapidly from the nasal fossæ and the mouth, and when it is heated by the exaltation of the phenomena of emotion, the watery vapour with which it is charged issues from the orifices of the face in such density as to affect the transparency of the air, so that one says of a furious person that he "fumes" with anger, that he is always "fuming." Under the same conditions the air strongly agitated with saliva in the cavity of the mouth forms a soft slaver so much the more abundant as the saliva itself is increased; one "froths" with anger, fury.

The conditions of the circulation and respiration in relation with the emotions is accompanied by modifications of temperature.

* *Anatomie Comparée du Systeme Nerveux*, t. ii., p. 569.

† *Baillements, etc. (Nouv. Cong de la Salpêtrière*, 1888, p. 165.) *Les Epilepsies et les Epileptiques*, p. 68.

These modifications have been registered in metaphorical language: we say that one is warm with hope, that one burns with envy; one is, on the other hand, cooled by difficulties, entranced by fear, frozen by terror, etc. These metaphors are not the expressions of representations purely ideal; under the influence of shame one feels heat and colour mount to the face; fear induces passing rigors, and provokes horripilation, which constitutes one of the physical signs of superficial cooling, whatsoever may be the cause, external cold, shivering, illness. "All passions are nothing more or less than states of heat or coldness of blood," says La Rochefoucauld.*

Hutinel† cites a fact from Burdach in which, following a great fright, the temperature fell to 33 deg. C. On the other hand, Chas. Martin‡ has observed the temperature rise in a fit of anger.

The idea of variation of temperature and that of emotional state are suchwise associated under daily observation that one says, in familiar language, of a person heated with wine that he is "ému."

The influence of the emotion upon animal heat expresses itself further by variations of the resistance to cold.

We have seen that Descartes did not ignore the influence of agreeable emotions upon digestion. There is no room for wonder that emotions which follow the satisfaction of appetite should be peculiarly efficacious,§ "a desired aliment is in part digested," says a popular proverb. The emotions act, in fact, upon the secretion of gastric juice: when they are too strong in place of favouring the action of the stomach they arrest it. Beaumont observed in his Canadian that anger provoked a redness, a dryness, and a morbid irritability of the gastric mucous membrane simultaneously with an indigestion. They are not only the passing emotions which influence the digestive functions: the sad passions end by the determining to the tongue lasting dyspepsias. Reciprocally organic lesions of the stomach come rapidly to realise the physiological conditions of the sad passions which, in point of fact, manifest themselves.

The gastric secretion is not the only one liable to be influenced by

* Maxims (13).

† *Des températures basses centrales*, th. 1880, p. 108.

‡ Rodard. *Traité de Thermométrie Medicale*, 1885. p. 102.

§ *De l'influence des aliments sur le moral et le physique de l'homme h*, 1819, no. 21—Blanc

the sthenic emotions: one will observe in joy, in anger, an increase of sweat and saliva. The sweat of the tonic emotions coincides, in general, with increased warmth of skin, which has itself for usual accompaniment a certain degree of exaltation of vascularisation expressed by redness. This redness does not exist exclusively on the face: it extends frequently to the upper part of the front region of the chest where it manifests frequently in the form of patches more or less extensive: this is the emotional roseola of Vulpian, which does not produce itself only in women, as this author says, but in all persons having a fine skin. It may extend itself to all the body, as I have already remarked. But the sweat does not always coincide with the vascularisation of the skin and the elevation of the temperature. The sweat can be the effect of the nervous excitation alone; observation shows it in epilepsy, for instance, as also experiment upon animals. Sweat thus can be induced, even though death has interrupted circulation; in several circumstances we have observed abundant sweats in man after death.*

The study of sweating in man has been the object of study in numerous works by Dr. Collongues.† In a recent work M. Peiper has further related that under the influence of mental excitements the perspiration of the skin augments.‡

In animals where the skin secretion can be easily verified, in the cat, for instance, one sees that the excitation of the sciatic can induce an abundant sudoral secretion on the free surface of the soles of the feet. We give the name of cold sweats to those which are unaccompanied by vascularisation and elevation of temperature, and which coincide even frequently with a very marked paleness of the skin: such are the sweats of agony, fright, terror, syncope. The cold sweats which some have wished to differentiate from ordinary sweats under the name of transudations, differ only in reality by their accompaniments: those glandular secretions which are produced under the influence of nervous action without increased blood flow, are distinguished, however, by their short duration. The skin secretion is affected under emotions, not only in its quantity, but also its quality. It is undoubted that the genital emotions

* Ledel. *De sudore P. M. (A. Cur. Nat.*, 1681, p. 120). J. A. Cones. *P. M. Sweating (Lancet*, 1889, t. i., p. 1027.)

† *Traité de dynamoscopie*, 8vo., 1862.

‡ *Untersuchungen uber die persp. insens.* Wiesbaden, 1889.

provoke in a certain number of people a secretion of special odour. In certain animals, such as the badger, for instance, the repugnant odour of the secretion which produces itself under the influence of fear becomes a protective agent.

In certain individuals the emotional sweat affects a special location, the forehead, the palms, the armpits.

In certain states of dryness of the skin there is induced, under the influence of peripherical excitations or emotions modifications of electric tension which deserve to detain us: they will be perhaps capable of giving the key to the phenomena of electricity of transfer of action to a distance which as yet one finds difficulty in explaining.

We know that certain animals whose skin offers a remarkable dryness, and especially cats, have the property of charging themselves with electricity in certain circumstances, and especially under the influence of rubbing, and to lose it in the form of sparks. Some individuals present the same phenomenon in a feeble degree in dry and cold seasons, and especially when it freezes and the ground is covered with snow: that is to say, when the atmosphere is almost completely deprived of moisture. One observes then especially from the hair, sparks or aigrettes disengage themselves with a dry noise, a characteristic crackling.

This phenomenon sometimes presents itself with a much more considerable intensity.

Cabanis recognised individual varieties of this phenomenon: he points out that exercise and artificial frictions augment greatly the quantity of electricity.*

Massey and Horsford report the fact of a woman, aged 30 years, of a nervous temperament, who, during an Aurora Borealis, was suddenly charged with electricity whose presence manifested itself by sparks when this woman chanced to pass a finger on her brother's body. This phenomenon persisted during about $2\frac{1}{2}$ months with a variable intensity: in the most favourable conditions she saw from the end of her finger pointing towards a ball of copper four sparks, or more truly aigrettes, $1\frac{1}{2}$ inches long, per minute.

In 1846 Arago introduced to the Academy of Sciences a young girl who had appeared to him to have the property of attracting

* *Rapports du physique et moral de l'homme*, 1802, t. i., p. 416.

certain light bodies and repelling others without touching them: but, in this case, no one noted the existence of sparks, and, moreover, none of the facts announced reproduced themselves before the commission of the institute. Another case of Floquin has no more importance.

M. Girard* relates the history of a female, aged 30, who for some time had become irritated, and whose hair afforded electric phenomena, crackling, and sparks, which augmented in intensity some days before the crises of neuralgia of the hairy scalp, and ceased sometimes completely after the paroxysm.

This woman, whatsoever the author of the observation says, was a neuropath: besides the neuralgia of the hairy scalp she had had a sciatica, and was subject to menstrual migraines.†

Any other cases which one can find in recent periodicals are still less characteristic: so I have thought it of interest to complete an observation, of which I have already indicated some important points several years ago.

OBSERVATION XI.

Hysteria—Electrical Phenomena.

"Mme. X., belonging to a neuropathic family, and, among other troubles, she has herself presented a nervous anorexia, which persisted, since infancy, with diverse degrees of intensity: she has besides that, at least momentarily, ovarian hyperæsthesia of the left side, and sensitive sensorial anæsthesia of the same side. Being a young girl towards the age of 14 or 15 years, she was already aware that at certain times her hair was the seat of a crepitation more or less intense, and that very visible sparks disengaged themselves in the dark. This phenomenon only increased slowly, but especially since 1882, she was then 17 years old, has its existence manifesting with greater intensity, and it has become almost permanent, except in moist times and southern winds.

"Mme. X. remarks that her fingers attract light objects, such as paper fragments, ribbon, etc. Her hair not only yields sparks on contact with the comb, but are most rebellious by reason of their tendency to set themselves up and separate the one from the others. When her clothing comes near the skin, upon whatsoever part it may be, there is produced a luminous crepitation, then the clothing adheres to the body sometimes with such intensity as to engender movements. I have been able to verify, by different attempts, the reality of these phenomena, which develop themselves in certain circumstances interesting to know. Luminous crepitation increases under the influence of rubbing by the repeated passage of the comb through the hair, by the

* I have been able to recognise that it is this case which has been described by M. E. de Goncourt under the name of Alexandrian Phenomenon in his romance of "The Lass Eliza."

† Girard. *Dégagement anormal d'électricité chez une malade atteinte de névralgia du cuir chevelu* (*Gaz. des Hôp.*, 1876, p. 483).

rubbing of two hands the one against the other, or of the hands against the clothes, etc., a morsel of stuff sufficiently apart one can draw sparks thereto.

"The electric tension and the intensity of the discharges increase further under the influence of the moral emotions. One of the first facts which have been remarked is that the crepitation becomes increased in the wake of audition of certain bits of music which induce a great general excitation. The cracklings manifest themselves over all the body spontaneously without the approach of any foreign body, and determine mainly in the limbs a very disagreeable sensation of prickling. Further, a large number of peripherical excitations provoke the same increase of tension, a noise, a smell, a change of light, etc. I have verified several times modifications of the lie of the hair under influences of this order.

"Dry seasons favour these electrical phenomena, which are especially marked during frosts: wet and foggy seasons produce opposite effects. The modifications of electric tension, which is nil in times of rain or south wind, precedes, sometimes several days in advance, a change of weather.

"In general, the electrical phenomena are more marked upon the left side, that is to say, upon the side where the sensorial troubles exist.

"To the exaggeration of tension corresponds a state of general excitation; a very exactly appreciable hyper-activity. When, on the contrary, under the influence of atmospheric humidity tension diminishes, there is produced a sensation of lassitude, powerlessness.

"When we have provoked diminution of tension by repeated discharges, there is a sensation of fatigue produced which seems entirely local. Simple rubbing of the hands one against the other induces an excitation adequate to the prolongation of sleep.

"When in 1884 I began to be witness of these phenomena, which were indicated to me for two years prior to my accepting them, Mme. X. presented an œdematous infiltration of the lower extremities, which appeared to me out of proportion to the anæmia from which she was suffering: I was struck moreover with the extreme dryness of her skin, a dryness such that under the influence of the least cold one saw cracks appearing, even on parts of the limbs not attacked by œdema. I thought then that there might be a certain relation betwixt the electrical phenomena and the vaso-motor phenomena. I tried to modify the loss of electricity by causing her to wear garments of silk, by making her powder her skin with lycopodium. Finally I subjected the patient to daily baths of static electricity. Under this influence the vaso-motor troubles disappeared, the dryness of the skin appeared to diminish, as also the loss of electricity. I remained convinced that the trouble of the electrical tension was in exclusive relation to the dryness of the skin.

"Since then the general health of Mme. X. ameliorated in spite of the persistence of a certain degree of anorexia, but the electrical phenomena persist with the dryness of the skin, and, during the past four years, I have been able frequently to control my first observations.

"One act which is further worthy of relation, and which I controlled in 1884 for the first time, with the help of a simple electrometer of elder pith ball, was that the charge exaggerated by rubbing was positive. We have determined since that it has remained the same.

"One special circumstance led me to recur to this question. Mme. X. has

a son, aged 11, who, in his first infancy presented no other troubles than fits of nocturnal coughing: but who, since the age of 3 years, has a nervous anorexia and recrudescing hysterical phenomena, left testicular sensibility, left hemianæsthesia and hemiamyoæsthesia, painful hypo-gastric spinal points, hyperæsthesia of the hairy scalp, plantar dysæsthesia, etc. But, besides, for several months he presents also electrical phenomena, the same luminous crepitation, and in the same circumstances. This crepitation being the only phenomenon which I have been able to observe directly in him I desired greatly more rigorous control experiments. M. D'Arsonval has much wished me to avail myself of his course, and here it was that we have established in his laboratory of the College of France these facts.

"An hygrometer (which will be the object of a presentation later), showed at once in the mother and in the son, that there exists an abnormal dryness of the skin, much more marked in the mother, and predominating in both on the left side. It falls to be noted that the observation was made last Tuesday, that is to say, at 4 o'clock, on a very wet day.

"The electrometer shows that without any rubbing Mme. X. produces a faint deviation to the right, a deviation greater when it is the left hand which is in contact with the apparatus (75 to 100 volts). The young X. produces no change. After some rubbings of his hand on his clothing there is produced a very considerable deviation always to the right in the two subjects, a deviation stronger in the mother (650 volts) than in the son (500 volts). In the two the deviation produced with the left hand appears also more considerable.

"When the subject, isolated on a stool, is in contact with the electrometer, a simple repeated rubbing of the hair, after having caused a discharge, produces a deviation so considerable, that the index passed the limits of the scale. It appeared that with Mme. X. the different contacts in the circumstances determined deviations very different in extent; a single deviation was made to the left, and was much less considerable than the deviations to the right. We have, moreover, verified on one of us that the same deviation can produce itself, though much less marked, apart from morbid condition.

"Under the influence of excitations of the periphery there is produced with Mme. X. a deviation to the right (125 volts), when one has made her look through a blue glass, and much more considerable when one has brought a bottle of ether near her."

We were not under conditions which allowed us to fatigue these patients by more frequent experiments. But these few facts, rigorously verified, sufficed to establish the truth of most of the previous observations. The charge of positive electricity is modified, not only under the influence of rubbing, but also under the influence of various sensorial excitations. If these phenomena have for their physical condition a certain dryness of the skin which opposes itself to the constant loss of electricity as it is produced, this condition is not perhaps the sole cause. The modifications which exhibit themselves under the influence of peripherical

excitations or emotions in the absence of all rubbing permit one to suppose that the organism produces electricity.

The existence of these electrical phenomena which find themselves exaggerated in certain subjects, but which appear to exist in a feebler degree in the normal condition, it was important to verify: it can perhaps afford a key to the phenomena of transfer, of polarisation, of elective sensibility, of certain distant actions.

I would compare the observations which precede, relative to the dynamic modifications which accompany spontaneous change of electric tension, with the physiological modifications which accompany the changes of tension provoked in other subjects. We know for a long time that under the influence of static electricity, we see sensibility restored in hysterical persons; we have noted also in a general way a sensation of well being in a great number of individuals subjected to this treatment. On the other hand, I have observed that when certain hysterios were placed on the stool of the static machine, the hand in the reservoir of the plethismograph, the apparatus being discharged, there was instantly produced a considerable diminution of the volume of the member as we can see by the tracing which I have already published elsewhere.* This observation, compared with those in which we have verified modifications of sensibility, of muscular force, of volume of members, in consequence of sensorial excitations or emotional states, serves as some kind of counter proof of the spontaneous modifications presented by patients whose history I have summarily related.

The demonstration of modifications of the circulation under the influence of sensorial excitations and emotional states permits us to understand those anomalous modifications of electrical tension of which the physical condition appears to be dryness of the skin, which, itself, depends upon a special neuropathic condition. These modifications of electric tension constitute, therefore, in these two particular cases, an episode in the grand neurosis, and not alone a particular state.

M. Dubois (of Berne)† admits that the electric phenomena upon which I have insisted can present themselves apart from hysteria,

* *Dégénérescence et Criminalité*, p. 127.

† *L'électrothérapie*, 1888, p. 141.

and that even they are frequent. Their knowledge is only the more important from the point of view occupying us.

It appears that the direct influence of the nervous system upon the glands may be slower in exhibiting itself, than the action on the vessels, that it demands a greater intensity of excitation: it survives when the other is already exhausted.

The sthenic emotions augment the salivary secretions. Anger is frequently accompanied by expectoration. The simple representation of the pleasures of taste causes a flow of water in the mouth: the genetic excitation is often accompanied by movements of deglutition which have no other cause. This action of the agreeable excitations is observed also in animals, in the dog, for instance, caresses not only provoke salivation, but also an abundant secretion on the free surface of the nostrils, which cause the dog apparently to lick the air. Darwin, neglecting these secretary phenomena, observed that his dog executed this movement when his back was rubbed, and concluded therefrom that he licked the air as he would have licked the hands, and he cites the fact in support of his hypothesis of association of useful habits.* In reality it is purely and simply a reflex phenomenon.

The emotions act upon the mammary secretion. The most active are those which have a bearing upon the function of this organ, such as the satisfaction which the mother finds in seeing her infant, or another even. The effect of the emotion does not, however, cease completely with the flow of milk: Parry has related the case of a woman who after having ceased lactation secreted milk upon hearing an infant cry. Emotions altogether strange to the function can influence also the secretion of milk, and when they are too intense suppress it totally and definitely. This suppression is not rare under the influence of fear or anger, which act just as a fit of epilepsy would.† Astley Cooper relates two cases of instantaneous suppression of the lacteal secretion caused by terror. Von Ammon, Kellog, Wardrop,‡ have reported cases in which suckling, after a fit of anger, determined the death of the infant, or convul-

* *Expression of the Emotions*, 2nd ed., 1877, p. 47.

† Ch. Féré. *Cas de la suppression de la sécrétion lactée à la suite d'une accès d' épilepsie* (*C. R. Soc. de Biologie*, 1897, p. 345).

‡ Carpenter. Principles of Mental Physiology, 6th ed., p. 679.

sions. Prolonged depressing emotions can also induce agalactia:* Verrier has studied the loss of the nutritive elements, which can manifest themselves in the lacteal secretion as a result of depressing emotions.†

Authors have cited a number of more or less well verified facts of lactation by virgins, by old women, and even by men,‡ in whom suction might have played the most important *rôle* as a provocative agent of the secretion. One might ask oneself what *rôle* emotion plays in this secretion. In this order of ideas the fact reported by D'Aubigné§ is not without interest, "The pastor of St. Leonard conducting him (D'Aubigné) to Conforgien, took him a detour in order to let him see in a village the miracle of a woman of 70 years of age, whose daughter, dying in childbed, she pressed the infant to her breast, exclaiming, 'O my God, who will nourish thee?' At these words the infant fingered one of the breasts of its grandmother, and the two nipples became instantly full of milk, from which she nourished it for 18 months, perfectly well. This history having been printed has been verified by the public act of the church." M. Demange has reported the case of a lacteal secretion during an imaginary pregnancy in which the local irritation was evidently not for nothing.‖

The excretions are also subject to changes under the influence of the emotions.

They act upon the excretion of urine to which they give very various modifications.

Emotional polyuria is a very common phenomenon among hysterios: but it is not peculiar to them. Acting at once upon the heart and arterial tension they can hardly fail to influence in the kidney the conditions favourable to the exaggeration of transudation. Majendie has observed that experimental pain brings an exaggeration of excretion of urine. As for the involuntary expulsion of urine it can be produced by two different mechanisms, by the energetic and spasmodic contraction of the abdominal muscles,

* Besson. *Pathologie de lactation*, th. 1873, p. 40.—Esperon Lacaze de Sardac. *De l'allaitemente vicieux dans ses rapports avec les maladies et la mortalité des enfants*, th. 1856, p. 31.

† Verrier. *Des altérations de la sécrétion lactée par causes morales* (*Gaz. Obst.*, 1876, pp. 118, 129, 148.)

‡ Longet. *Traité de physiol.*, 2nd ed., 1867, t. i. p. 909.

§ Agrippa D'Aubigné. *Memoires publiés par Lalane*, ed. Jouast, 1889, p. 138.

‖ *Arch. de tocologie*, t. xvi., p. 246.

as in laughing, or by the relaxation of the sphincter, as in fear. It is in many countries a popular belief that expulsion of urine as a sequel to a shock, and especially fear, is capable of avoiding other accidents of a graver kind: one often observes the common people placing their infant under fright in the most favourable attitude for micturition. Wilks is feign to admit the legitimacy of this opinion.*

Like intellectual labour the tonic emotions increase the urinary excretion at the same time that they act upon the tonicity of the expulsive muscles.

The extremely intense and painful emotions bring about, on the contrary, the suppression of some secretions, notably the saliva; whilst moderate agreeable emotions are accompanied by an increase of the salivary secretion, water flowing into the mouth; the painful emotions are accompanied by dryness of the mouth: we know well the Indian custom, of making eat, as a test, rice by persons accused, in order to make sure of their genuine terror. These different effects of the moderate or excessive emotions upon salivation concord with the important facts furnished by experimentation and clinical evidence. The experiments of Bochefontain and Albertoni have shown that under the influence of moderate excitations of the brain cortex a salivary excretion takes place in excess. François Franck, on the other hand, has observed that under the influence of strong excitations, epilepsies and repeats, salivation no longer takes place: this is what we also note as sequel to a series of epileptic fits, where the salivary secretion is no longer produced.

The increased secretion of tears which is allied to the sad emotions can be attributed to a direct action of the nerves upon the gland, but also to the sanguineous congestion determined by the troubles of respiration. Darwin allowed a considerable *rôle* to the pressure of the periorbital muscles upon the secretion of the lachrymal gland: and it is supported principally upon the analogy which there exists betwixt tears, and the moistening which is produced during the diverse acts where the orbicularis of the eyelids comes into play as in laughing, yawning, etc. This moistening is not due, like tears, to an augmentation of secretion, but to a simple retention of the normal secretion, a retention which is

* Lects. on Dis. of Nervous System, 2nd ed., 1883, p. 492.

effected by a mechanism of which Darwin took no account. The flow of tears by the lachrymal ducts into the nasal fossæ is favoured by the nasal draught in inspiration and expiration. Rava observed that the tamponing of the posterior orifice of the nasal fossæ impedes the passage into the nose of collyria of citric acid or sulphate of soda.* This *rôle* of the nasal draught can be demonstrated more simply in the following manner: the subject being in a place moderately lighted and heedless we measure the interval betwixt the winks which are provoked by the gathering of tears: then we begin the experiment whilst the subject has closed nostrils; we find then that the intervals betwixt two winks is five or six times less. The suppression of the nasal draught is then an obstacle to the flow of tears into the nasal fossæ: but this suppression finds itself exactly effected in yawning, laughing, vomiting, etc.: great muscular efforts which are accompanied by shutting of the mouth do not provoke moistening, precisely because the nasal draught is increased.

In the very lasting depressing emotions, and in the wake of very intense nervous shocks, the normal secretion of tears appears diminished, the eye becomes dull and dry.

The transudation of liquids into the intestine under the influence of fear appears due to a vaso-paralytic action consecutive to a very intense excitation. The diarrhœa which produces itself under the influence of physical pain shows itself also well under the influence of strong emotions.† The effects of nervous shocks are comparable to those of section of the nerves of the intestine: A. Moreau has observed that when one cuts all the nerves which go to an intestinal tract necessarily previously tied at both its extremities, an exudation of fluid takes place into its interior analogous to that of serous diarrhœas, and the weight of which can be raised to 100, 200, or even 300 grammes.

We know, moreover, that the painful shock, like the brain commotion, determines an enormous dilatation of the abdominal vessels with lowering of temperature, and diminution of the energy of the heart. The vaso-paralytic phenomena which produce congestion of the abdominal organs sequent to shock, play a very im-

* Panas. *Léçons sur les affections de l'appareil lacrymal*, 1877, p. 72.

† *Marcel de Tastes. De la diarrhée*, th. 1876.

portant *rôle* in the pathogeny of all the other troubles which shock produces. They provoke, in fact, a derivation, whence results an anemia relative to the other organs; the habitually worst nourished parts are those which suffer most the effects of this trouble of circulation.

On the side of these exterior phenomena we must cite other of them which, though more difficult of verification, are not the less worthy of interest.

In a note upon the comparative spectroscopic examination of the unequal surface of the two thumbs by his method M. Hénocque* has pointed out differences in the duration of time of reduction of hemoglobine betwixt one side and the other: but the conditions of these remained undetermined.† I have repeated this comparative examination upon hysterios and epileptics. In five hysterios I have verified that the duration of the reduction was longer upon the anæsthetic side; in epileptics that I have examined, and who, moreover, only presented but slightly marked troubles of sensibility, I have not found the same relation which is found in two hemiplegics.

	Side of Predominant Anaesthesia.	Quantity per 100 Oxyhemoglobin.	Right Thumb. Duration of Reduction. Seconds.	Right Thumb. Activity.	Left Thumb. Duration of Reduction. Seconds.	Left Thumb. Activity.
B.	R.	8.5	72	0.58	60	0.74
M.	L.	8.	58	0.69	65	0.61
T.	L.	9.5	72	0.72	78	0.60
V	L.	7.5	55	0.68	64	0.58
R.	L.	8.	63	0.63	70	0.57

The duration of the disappearance of the principal band of hemoglobin presents in hysterios numerous variations, and of which one can determine some conditions. In provoked sleep it is increased; but this increase has appeared to me especially manifest in lethargy; thus in T. it is 88 sec. in place of 72 sec., and in R. 82 sec. in place of 63 sec. In somnambulic states the diverse variations of the reduction of oxyhemoglobin are parallel to those of the psychic state.

In these same subjects one can cause variation of the duration of reduction, it may be by provocation of diverse emotional states, it may be simply by practising excitations of the sense organs. M.

* *C. R. Soc. de Biol.*, 1884, p. 762.

† *Vautrin*, Th., 1888, p. 51.

Hénocque has already recognised besides, moreover, that in normal subjects muscular exercise, massage, increase the activity of reduction: M. Lejard has seen analogous effects under the influence of bathing.* The passing effects of muscular exercise, massage, hydrotherapie, static electricity operate the reduction in a wholly remarkable manner in epileptics (hysterios): under these different influences, one may observe differences of 20 seconds, that is to say, of 1-3rd of the normal duration.

The influence of the skin excitations or special senses manifests itself with the same intensity. Colour excitations, for instance, provoke an increase in the rapidity of reduction which appears to vary as the effects of the same excitations revealed by the plethismograph.†

These variations of the duration of the reduction, under the influence of luminous or coloured excitations, are only confirmatory of Moleschott's experiments, who has observed that the quantity of carbonic acid exhaled in darkness, compared with that exhaled in light is as three to five, and that the elimination of carbonic acid is in relation to the intensity of light.

One can, moreover, by the same method, vary the experiment of Bidder and Schmidt, who have observed that the loss of weight due to the exhalation of carbonic acid and transpiration in animals in a state of inanition tends towards equalisation when they are blind. A short time after the simple occlusion of the eyes without sleep one can obtain, in a subject in this category, a lengthening of the time of reduction exceeding 20 seconds.

The influence of sleep or darkness alone upon the functions of nutrition and relation which shows itself with remarkable intensity in neurasthenics, and especially in hysterios, appears to me to throw a certain light upon the pathogeny of night paralyses, and those of the awakening which have been studied above.

Under the influence of suggestions of emotions (emotions suggested) to persons in somnambulism, and persisting in the waking state, we observe analogous variations. To the sthenic emotions correspond a diminution of the duration of reduction: to the asthenic emotions, an augmentation.

* *Des Anemics Br.*, 1888.

† Ch. Féré. *Sensation et mouvement in Bib. de Phil. Contemp.*, 1887, p. 108.

We know that if the nutrition of hysterios presents some differences of activity from normal nutrition, it obeys none the less the same general laws thereof: one is, therefore, right in admitting that the same phenomena, to a certain degree, accompany emotions in the healthy individuals. These observations are, moreover, conformable to what we have already learnt from the mechanical and chemical study of the respiration and the secretions in mental maladies.

The phenomena of nutrition relative to normal psychic states have been rarely studied: nevertheless Apjohn observed upon himself a considerable diminution of expired carbonic acid under the influence of a temporary mental depression.

Under the influence of suggested depressing emotions I have observed an increase in the duration of reduction of 10, 15, 20 in subjects whose activity of reduction is already slow in the normal state. The lowering of nutrition is not alone in relation with the depressing emotions: we have observed it besides, as M. Hénocque noted, under physical or mental fatigue, and also consecutively to increased activity exhibited in consequence of very strong excitations of mind or periphery. Nevertheless in these last conditions, one can only observe an increase of the duration of the reduction at the thumb, a fact which tallies, as one can see very well every hour, to that diminution of hemoglobine consecutive to strong nervous discharges.

The accidental lowering of nutrition which produces itself concurrently to mental depression, and consecutively to strong excitations, can explain how certain nervous discharges, be they from physical or mental fatigue, traumatic or moral shocks, are capable of lessening further the feeble activity of nutrition of certain subjects, and, consequently, to provoke manifestations of maladies denominated by M. Bouchard "maladies of low nutrition;" preferably evoked upon a certain side, if there exists primitively upon that side a relative depression. The same influence of these depressing conditions upon nutrition can explain, moreover, how they diminish resistance to intoxications and infectious maladies. The knowledge of the modifications of the activity of the exchanges

* Experiment relative to the carbonic acid of expired air in health and disease (Dublin Hospital Reports, 1830, t. 5, p. 532).

under the influence of the peripherical excitations or their mental representations, or of the moral emotions, clears up, in a general fashion, the relations of the physical and the moral.

These variations of the duration of the reduction of oxyhemoglobine will present, moreover, a new interest, if one wishes well to compare facts which I have pointed out previously, and relative to the duration of the time of reaction in hysterios; one can verify that the two phenomena are subject to parallel variations under the same circumstances (influences). We cannot pretend to establish a definite proportion, for the procedure of measurement of the time of reduction is not so precisely absolute as that for measurement of the time of reaction: it appears, however, that one may rightly conclude that the duration of the time of reaction varies as the reduction duration of the oxyhemoglobin: or that the intellectual activity is in relation with the activity of nutrition. Mental pathology can furnish other illustrations in order to show that intelligence is a function of nutrition.

My hematospectroscopic observations upon hysterios and epileptics have occasioned M. Malassez to recall facts of great interest. He observed that in vessels which have been subjected to a dilatation in consequence of diverse experimental manœuvres the proportion of the red globules diminishes in the blood which they contain: when, on the contrary, the vessels are contracted the proportion of the globules augments. These facts discovered later by Cohnstein and Zuntz merit comparison with the spectroscopic phenomena of the physiological variations.

The relative diminution of the number of the globules in the dilated vessels apparently must coincide with a relative diminution of the quantity of oxyhemoglobin, in the conditions where I have observed a diminution of the duration of time necessary to its disappearance at the angle of the main band of the thumb.

The numberings of red globules which I have been able to make yield figures sufficiently significant to enable one to affirm that in the subjects upon whom I have made observations, the number of the red globules is subject to variations in a sense inverse to the modifications of volume registered by the plethismograph, and in the same sense as the duration of the spectroscopic phenomenon of the thumb. The remark of Malassez enabled prevision that in

the conditions where the volume of the limbs augments or diminishes, there are produced variations of the quantity of oxyhemoglobin in the blood withdrawn from the vessels. These variations exist, and they exist in a foreseen direction. In four hysterios, for instance, and in nine hemiplegics, we find on the side of the predominant anæsthesia, or of the paralysis where it produces itself, a delay of the disappearance of the band, a greater quantity of oxyhemoglobin in the blood taken from the pulp of the finger. These lateral differences vary from 0.5 to 1 per 100, taking the scale of M. Hénocque. We find analogous differences enumerated in my preceding notes. One can, therefore, say that, equally well in pathological as in experimental conditions, there exist differences in the constitution of the blood, according to the state of dilatation or contraction of the vessels. It is a fact having its own clinical importance; for the spectroscopic examination, together, or as well as, the numeration of red blood globules, can reveal an objective character of the vascular troubles which constitute, in general, one of the physiological conditions of the paralyses or anæsthesias due to nervous lesions or dynamic troubles.

One fact worthy of remark is that the differences in the quantity of oxyhemoglobin, according to the circumstances under which the blood is withdrawn from the vessels, is relatively inconsiderable: it is thus that, in hysterios or hemiplegics the lateral differences vary in general from 0.5 to 1 per 100, the total quantity being, in the same subjects, from 8 to 9 per 100. The difference is, therefore, from one to two-eighths, whilst the differences in the duration of reduction are as much as 10, 20, or 30 seconds on a total duration of 60 to 80: that is to say, that in this last case the difference varies from a quarter to an eighth of the normal period.

The modifications of the duration of the spectroscopic phenomenon of the thumb do not, therefore, appear due exclusively to the modification of the number of globules and the quantity of oxyhemoglobine. These facts are comparable to the remark of Malassez apropos of the vessels of glands in activity, indicating that the relative diminution of the number of the red globules is not proportional to the increase of the loss.

In another work,* I have related the alterations of the

* *Les épilepsies et les épileptiques*, 1809, p. 219

blood which follow epileptic discharges, alterations which are characterised solely by a diminution of the proportion of oxyhemoglobine, but also by a special alterability of the blood globules. These alterations of the blood which produce themselves truly in the wake of every nervous discharge, and which persist a certain time, can explain some sudden anemias which we observe sometimes in consequence of violent emotions.*

It must be remarked that if moral shocks are capable of producing modifications of the constitution of the blood, when they are the consequences of physical conditions they entail a mental depression: the melancholic tendencies are almost constant in the anemics and chlorotics.

The influence of the emotions upon the genital functions is also very marked. It is not necessary to go at length into the exciting action of a great number of physical agents, light, odorants, temperature, and diffusible agents upon this function. The tonic emotions act similarly. Nevertheless the limit of efficacious excitation is rapidly reached; and, beyond this limit, there is produced frequently an invincible powerlessness, which is not explicable by a local discharge, but by conditions of general exhaustion.

It is not only under the influence of a sthenic emotion foreign to the genital function, like anger, for instance, that powerlessness can manifest itself; it produces itself very frequently under the influence of a very intense, very imperative love passion. A certain number of individuals who are subjects of this form of intentional impotence experience physical phenomena which cannot leave any doubt as to the nature of the phenomenon: they are seized suddenly at the acme of the emotion with a profuse sweat which coincides with the no less sudden collapse of the organs in action. This form of emotional impotence frequently assumes a morbid character. So far as it is allied to the asthenic depressing emotions its physiological conditions naturally flow from the notions acquired upon the state of the general circulation. We have seen young married people, in spite of the most lively flame, overcome with such a fear of not being able to come with honour from the first attempt, remain absolutely powerless for a variable period of days, weeks, or

* Duckworth. "Acute anemia due to fright." *B. M. J.*, 1873, vii., p. 226.

months.* Onimus and Legros instance a young man who remained powerless during several years as a result of having been surprised in the very act by a husband.† Roubaud has instanced impotences supervening as a sequence to railway accidents; chagrins sequent to the loss of beloved persons, to losses of money. It is not unusual to see a husband rendered entirely powerless by a jealous and crabbed woman, of whom one might say without metaphor that she is a remedy for love. It is by terror that the sorcerers produced impotence and "knotted the pintles."

Under the influence of the emotions sensibility and motility undergo parallel variations: to an increase of receptive capacity corresponds an increase of executive capacity.‡ The study of the energy of movements and of time of reaction can give to this aspect precious reinforcements which confirm the theory.

I have remarked already that under the influence of light the anæsthesia of hysterios modifies itself considerably, and we know that a large number of excitants of the periphery, æsthesiogens as they have been called, play the same *rôle*. One can say that excitants of all the senses can play the *rôle* of æsthesiogen. The emotions act as physical excitants according to their degree. With hysterios an agreeable emotion can dilate the visual field as well as a sinapism. I have observed often that the emotions provoked in this manner are accompanied by an augmentation of sensibility in all its forms, and one of the best means of objectifying the fact is to study the time lost of the sensation.

Lange§ has shown that the time of reaction to sensorial impressions varies considerably according as the subject of experiment concentrates his attention upon the excitation or upon the movement intended. The difference is about 10-100ths of a second at least for the second manner of doing. The time of motor reaction, viz., the time of simple reaction being 0.125, the time of sensorial reaction is about 0.225. In a good number of hysterios one verifies easily that the privation of normal excitants, and of light especially, lengthens the time of sensorial reaction; the sad emotions act simi-

* Onimus and Legros. *Traité d'électricité médicale*, p. 215.—Sirédey. *Art. Impuissance Dict. de méd. et chir. prat.*, 1874, t. xviii., p. 454.

† Roubaud. *L'impuissance et la stérilité*, p. 186.

‡ Romanes. Mental Evolution in Animals, p. 44.

§ *Neue Experimente ueber den Vorgang der einfachen Reaction auf Sinnesindrücke*, (Phil. Stud., 1886 t iv., p. 492)

larly. In several it appeared to me that the time of sensorial reaction lengthens the more proportionally than the time of motor reaction.

Under the influence of sensorial excitations, æsthesiogens, the time of sensorial reaction diminishes just as under the influence of the sthenic emotions, and this diminution is in general less considerable than the time of simple reaction. The emotions have a considerable influence upon the energy of the voluntary movements, which become exasperated in the case of the sthenic emotions, and subject, on the contrary, to considerable depression in the case of asthenic emotions. But it is not alone the energy of the voluntary movements which is modified by the emotions.

I set myself to show in several circumstances* that the variations of energy of the movements coincide with the parallel, if not proportional variations of their rapidity. In hyper-excitable subjects one can observe easily these parallel variations of the dynamometric force, and the time of reaction under the influence of sensorial excitations.

The same variations of the time of reaction produce themselves under the influence of the emotions. It is probable that all the agreeable or sthenic emotions which we have seen accompany themselves with augmentation of the muscular force and sensibility and correlative modifications of the circulation accompany themselves also with a diminution of the time of reaction; and that the disagreeable or asthenic emotions have always an inverse effect; but frequently the orientation, more or less fixed, determined by an emotion, like anger, hatred, desire, for instance, spoils the experiment, or makes it impossible. The effect shows itself in all its purity in moderate emotional states without impulsions, as those which accompany the state of general satisfaction, ideas of grandeur, richness, etc., which entail good will; or the depressing emotions which do not entail hate or the repulsion of the observer, and which permit consequently the repetition of the experiments.

The following figures give an exact idea of the facts which I have just given summarily. It represents at once the times of reaction to skin excitation in cases of incomplete anæsthesia. In

* *Note sur le temps de réaction chez les hystériques* (p. 492), *et chez les épileptiques (C. R. de Soc. de Biol* 1889.)

all the cases reported here, the exploration has been made with carefully closed eyes, the time of reaction is, therefore, somewhat lengthened.

1st. State of waking and repose. Reaction of left hand.

Point Touched:—	Palm.		Back of Hand.	
	R. Sec.	L. Sec.	R. Sec.	L. Sec.
B.	0.30	0.16	0.38	0.24
M.	0.44	0.76	0.57	0.78
T.	0.58	0.70	0.57	0.71
V.	0.33	0.42	0.43	0.54
R.	0.20	0.34	0.23	0.40

2nd. State of waking and repose. Reaction of right hand.

Point Touched:—	Palm.		Back of Hand.	
	R. Sec.	L. Sec.	R. Sec.	L. Sec.
B.	0.34	0.22	0.43	0.31
M.	0.42	0.68	0.44	0.72
T.	0.48	0.66	0.55	0.70
V.	0.32	0.42	0.39	0.52
R.	0.18	0.30	0.22	0.38

3rd. Somnambulism. Reaction of right hand.

Point Touched:—	Palm.		Back of Hand.	
	R. Sec.	L. Sec.	R. Sec.	L. Sec.
B.	0.18	0.17	0.25	0.19
M.	0.17	0.23	0.18	0.20
T.	0.54	0.70	0.60	0.71
V.	0.58	0.60	0.62	0.64
R.	0.28	0.37	0.31	0.42

4th. Under the influence of a suggested asthenic emotion persisting into the waking state. Reaction of right hand.

Point touched:—	Palm.		Back of Hand.	
	R. Sec.	L. Sec.	R. Sec.	L. Sec.
B.	0.42	0.36	0.50	0.48
M.	0.55	0.72	0.60	0.75
T.	0.52	0.68	0.58	0.69
V.	0.50	0.50	0.52	0.54
R.	0.44	0.44	0.46	0.44

5th. Under the influence of a sthenic emotion persisting into the waking state. Reaction of right hand.

Point Touched:—	Palm.		Back of Hand.	
	R. Sec.	L. Sec.	R. Sec.	L. Sec.
B.	0.14	0.13	0.15	0.13
M.	0.15	0.15	0.17	0.17
T.	0.20	0.21	0.21	0.23
V.	0.25	0.27	0.26	0.33
R.	0.13	0.15	0.15	0.15

The following series is produced from the reactions to the excitations of hearing (uniform shock) in two hysterios hemianæsthetic on both sides, but worse on left.

6th. Waking state. Reaction of hand.

Point Touched:—	R. Sec.	L. Sec.
C.	0.33	0.36
L.	0.36	0.37

7th. Somnambulism. Reaction of hand.

Point Touched:—	R. Sec.	L. Sec.
C.	0.37	0.35
L.	0.38	0.40

8th. Waking state—odour of musk. Reaction of hand.

Point Touched:—	R. Sec.	L. Sec.
C.	0.18	0.16
L.	0.15	0.17

9th. Under the influence of an asthenic emotion suggested and persisting into the waking state. Reaction of hand.

Point Touched:—	R. Sec.	L. Sec.
C.	0.42	0.48
L.	0.51	0.43

10th. Under the influence of a sthenic emotion suggested and persisting into the waking state. Reaction of hand.

Point Touched:—	R. Sec.	L. Sec.
C.	0.15	0.18
L.	0.16	0.17

The same influences do not act with the same intensity upon all subjects; they can even be indifferent to a good number; but these few examples suffice in order to show to what divergences explorations of sensibility in hysterios can give rise.

But it is not only upon voluntary motility that the influence of the emotions manifests itself; they are associated like the peripherical excitations, with involuntary movements, reflex movements, which appear to manifest themselves by modifications of the tension of all the muscles of the organism.* The muscles stretch themselves under the influence of the sthenic, and relax under the asthenic, emotions.

The motor effects of emotions are so much the more marked as

* *Sensation et Mouvement*, p. 78.—*Dégénérescence et criminalité*, p. 24.

they are intense and sudden.* The word expression implies by itself a relation betwixt the mind and the body; what is expressed is a condition of mind, what expresses it is a condition of body.

"In every act," says Lamarck, "the fluid of the nerves which provokes it undergoes a movement of displacement which originates it. But when this action has been several times repeated, it is not doubtful but that the fluid which has executed it must have made a path which becomes increasingly easy to traverse, so much so that it has itself a greater aptitude to follow this route, well worn as it is in proportion as it has been the more frequently traversed, than that which is less known."† This theory of habitude can easily be put in accord with the actual state of our consciousnesses: it is in accord with the facts. All things being equal it must be admitted that the general excitations express themselves at first and in a predominant fashion by movements of the organs whose innervation is most frequently in play, and especially the circulatory: in an enfeebled animal pinching of the external branch of the spinal was unfelt, nevertheless this insensible excitation caused the cardiometer to rise.‡ But other conditions can favour the swiftness and intensity of nervous action: the length of the nerves, the vascularisation of the parts which they traverse, and especially the volume of the nerve in relation to that of the muscle to which it goes: all conditions which favour the intensity and swiftness of the motor influx into the face and into the upper limbs compared with the lower. They are, therefore, the parts most favoured by these conditions of innervation which react in a predominant manner, be it in the case of peripherical excitation, or emotion. The nerves which serve as centrifugal ways to the reflexes produced by luminous excitations which are the least frequent, are at the same time more voluminous in relation to the muscles which they go to animate, and those which are most frequently brought into play: there is no room for astonishment then that it should be in their domain that with most frequency and most intensity objective and representative excitations of whatever sort occur.§

* *Piderit. la mimique et la physiognomie*, 1888, p. 40.

† *Lamarck. Philos. zool.*, t. ii., p. 318.

‡ Cl. Bernard. *Leçons sur des liquides de l'organisme*, t. i., p. 188

§ *Neque enim ulla vehementior intra cogitatio est, quæ nihil moveat in vultu.* (*Seneca, De Irâ, Lib.* i. 1.)

The exciting emotions are associated with a general tension of the muscles. The muscles allied to each sensorial organ extend themselves as they would under the influence of a local excitation. Under the influence of joy, for instance, the eyebrows become arched, the forehead transversely furrowed. If the excitation becomes more intense and painful the muscles of the median region of the brow continue to contract, the eyebrow assumes an oblique direction, the top of the eyebrow raises itself in an exaggerated fashion, and there results therefrom the formation of a quadrangular furrow from the inferior sinus to the middle of the brow; which assumes the aspect which one observes under the influence of a painful excitation of sight. The dilatation of the nostrils, the elevation of the angles of the mouth is effected in the same manner. The tongue itself does not remain outside the stimulation; in some sthenic emotions, it presents obvious movements analogous to those of articulation. "In love," says Cureau de la Chambre, "there is produced a movement of the tongue which trembles frequently between the lips, and which seems to fondle them."*

In attention, fright, anger, the look is fixed, and in every circumstance its fixity is in relation to the energy of the subject; it indicates a perfect equilibrium of energy of the different motor muscles of the eye.

Mobility of the look, on the contrary, indicates defective energy, and when it is combined to a defect of conveyance and to lowering of the eyelid, it gives to the countenance a meaningless expression, without intelligence.

The mobility of the periorbital muscles is less easily brought into play than that of the muscles of the eyeball and the palpebral portion of the orbicularis. The periorbital region can present the characteristic aspect of attention, although the frequency of winking and ocular movements indicates uncertainty or mental disquietude, timidity.

In mystic enthusiasm, ravishment, love, the largely open eyes bear themselves upwardly and convergently, and the exaggeration of this movement entails the raising of the face.

Contempt expresses itself by the opening of the eyes which attracts attention by the direction of the look, which indicates the

* Cureau. *Les caractères des passions*, in 4to, 1860, p. 97.

object, and by the bending of the head, which characterises dissimulation.

In attention the brow is furrowed vertically by the contraction of the superciliary muscle: the frowning of the eyebrow is especially pronounced in painful reflexion. At the same time as the brow vertically folds itself, the labial aperture tightens, the free borders of the lips come close together by the contraction of the internal fibres of the orbicularis oris. In bad humour the contraction of the peripherical fibres of the orbicularis determines a lengthening of the lips, a mouth entirely characteristic. The expression of defiance is realised by the raising of the lip on one side only, a movement which uncovers the canine tooth and gives to the physiognomy an expression of fierceness and disdain. In anger, whilst the brow is vertically folded, the lips set themselves, the nostrils dilate, the teeth meet and grind.

The expression of contempt is characterised by movements of the nostrils which correspond to those which are provoked by a painful excitation of odour: moreover, the metaphor exists as well in language as in mimicry, we say of a contemptible individual that he is a "stinker." The expression of distaste is the same as that of the painful emotions of the sense of taste, retropulsion of the head, movement of expulsion from the mouth, sometimes even expectoration realises itself : one spits in disgust.

When the infant at the breast is satisfied, if one continues to offer the breast to him, he manifests his distaste by a peculiar mouth, and by very characteristic movements of the head: it is carried backwards and from side to side in order to avoid the introduction of the nipple.

These movements of repulsion remarked by Charma and Darwin* perpetuate themselves in the expression of negation and disgust. It is possible that the nodding which expresses contentment and negation takes origin, as Darwin wills it, from the repetition of the movement of appetition which manifests itself in the infant actuated by the desire of its natural food.

Certain muscles which do not act under the influence of the will submit to the same tension and give place to special sensations: it is thus that, under the influence of a violent excitation, which comes

* The Expression of the Emotions, p. 296.

at the end of pain, the constrictors of the pharynx contract themselves so as to give the sensation of the "globus hystericus," which is only, in fact, a pharyngeal tenesmus: so long as it lasts deglutition is completely impossible.

The deception "break arms and limbs," "the arms fall," the muscles of the neck maintain the head badly, one has the "low head," frequently with a lateral predominance, "one hangs the ear;" the beaten dog lets its ears fall and its tail without dreaming of rhetoric, without making antithesis, whatever Darwin may say, but simply because its energy is in default, and its muscles cannot any more fulfil their task. This relaxation of the muscles determines in the face an alteration significative of the facts: the eyelids become lowered, the cheeks flatten, the lower jaw falls with its weight, the figure lengthens. The commissures of the lips become lowered. Whilst in the sthenic emotions, all the openings of the face which put the nervous system in communication with the outer world through the intermediary of the special senses, tend to open themselves widely: it is the contrary which is induced under the depressing emotions, the eyelids, the nostrils, the angles of the mouth become depressed, in order to put the nervous system abreast of the exterior excitations.*

The buccal orifice presents a strong lower concavity, which is not due only to the effacement of the soft parts of the face, but also to this circumstance that, as Duchenne (de Boulogne) remarked, the triangular muscle of the lips is one of the muscles of the face the least subject to the action of the will, it becomes exhausted less quickly than the others, and its contraction concurs to exaggerate the lowering of the commissures. One can perhaps explain in the same manner the intervention of the platysma (peaucier) which in fright and horror concurs in the opening of the mouth whose orbicularis nevertheless is contracted: at the same time as the frontal, in the same circumstances, raises the eyebrows and tends to keep the eye open in spite of the contraction of the orbiculares.

Impotence and resignation express themselves by a complex movement of the shoulders, which raise themselves towards the ears and the upper limbs; the tail approaches the trunk, and the forearms extend themselves horizontally in supination, the palm of

* *Evolution, Expression and Sensation.* Glasgow, 1881, p. 58. By Professor Cleland.

the hands widely open turns itself upwards. The same position of the shoulders and elbows is found again under influence of cold.

The relaxation manifests itself more rapidly in the lower than in the upper limbs.* According to their intensity, which is much more in relation with the constitution of the subject than with the quantity and quality of the excitant, the emotions can determine these inverse effects. "Sometimes," says Montaigne, "fear puts wings to our heels, sometimes it clogs our feet and fixes them." Pushed to an extreme, fear engenders a veritable paralysis in the lower limbs, "one is tied to earth," as a metaphorical expression justly verifies it. M. Batty Tuke instances a soldier who fell with flaccid limbs upon hearing a sentence of death.†

The emotions do not act only on the muscles of the life of relation. Under the influence of fear, for instance, the relaxation of the muscles of the lower limbs, which expresses itself by trembling and paresia, is accompanied by inertia of the sphincters.

Nevertheless Fubini indicated in fear an acceleration of the movements of the intestine measurable by the double swiftness with which a weight runs through the intestine.‡

The trembling which manifests itself apropos of the emotions is not always a paralytic phenomenon; general or limited it can present characters of spasm and be kin to the sthenic emotions as joy and anger.

The emotions act also upon the uterine muscle. One has related that pregnant women who assist at an accouchement are sometimes seized with pains and uterine contractions. But during normal labour it is not rare to see expulsive contractions cease briskly and sometimes definitely under the influence of a strong emotion, and in particular painful emotions.§

Anger and joy accompany themselves with a contraction of the pupil, fear and pain, contrarily, produce an enormous pupillary dilatation. Under the influence of violent excitements the pupil dilates sometimes even when the subject does not perceive them as pain. This is what happens, at least with most hysterios.

The modifications of pupil diameter, dilatation in the asthenic

* *Dégénérescence et Criminalité, p. 28.*

† J. B. Tuke. The Morisonian Lectures (E. M. J., Jan. 1875, p. 600.)

‡ *Influenza della paura sal movimento intestinale (Am. Univers. di Med et Chir, 1886, t 277, p. 288.)*

§ Teillet. Reflexions, &c. Th. *1814*, p. *21*.

emotions, contraction in the sthenic, are not the only motor-phenomena which we observe in the eye under the influence of the emotions. Under the same conditions the ciliary muscle presents modifications analogous to those of the iris. The verification of the fact is rendered easy by the study of the images of Purkinje which I have made on two categories of subjects; in hysterios under the influence of suggested emotions or peripherical excitations, and in epileptics under the influence of pain provoked by the application of the actual cautery to the hairy scalp. When one places oneself obliquely before the subject under examination, and when one causes the light of a candle to be reflected also from the opposite side, upon the reflecting surface of the eye, we see upon the cornea an erect image very luminous: upon the front face of the lens another image also erect, very pale, and finally upon the posterior face of the lens an inverted image, smaller but also more defined than the preceding. If we observe with care the two erect images, we see that the distance which separates them and their comparative surface presents variations of notable extent. Under the influence of sthenic emotions, or sensorial excitations, auditory, gustatory, etc., which determine an augmentation of the muscular force, the image formed upon the front face of the lens approaches the corneal image and becomes smaller and clearer. Under the influence of pain, contrarily, the same image lengthens its distance from the corneal, and becomes larger and paler than in the normal condition. These changes are very significant: we know, in fact, that the corneal convexity does not change, and that therefore these relative changes of the two erect images only bear upon the anterior lens image, and they cannot be produced except by changes of the form of the lens, which under the influence of the contractions of the ciliary muscle become more convex, mainly at the expense of its anterior surface, or which, under the influence of the relaxation of the same muscle, flattens at the same time as its margin enlarges. In fact, experience shows that under the influence of the sthenic emotions the lens becomes plump, and the image borne upon its front face is borne forwards, diminishes in extent, and becomes more distinct: whilst, under the influence of pain, the lens flattens, and the same image dims, whilst retiring from the corneal image, and becomes less distinct; the ciliary

muscle is therefore affected after the same fashion as the iris. It is remarkable that under these circumstances, as in others which we have already related, sthenic emotion acts like section of the sympathetic, whilst asthenic emotion acts like the excitation of the same nerve.

The muscles of the skin contract under the influence of terror, the phenomenon of the "goose skin" produces itself by the erection of the hair, horripilation. When one observes in some measure that horripilation is a phenomenon independent of the will in man, one is astonished to see it accorded an intentional character instead of purely reflex in animals; "When an animal proceeds to attack another, or has fear of another," says Darwin, "he gives himself frequently a terrible air by erecting his hair which makes him appear bigger." The phenomena of the goose skin and horripilation which produce themselves in man under the influence of the emotions do not differ from those which produce themselves under the influence of cold; when the hair of the horse erects under the influence of cold one cannot invoke a useful habit, as then the phenomenon has precisely for effect to uncover the skin and favour cooling. *In all the cases it is a reflex phenomenon, mechanical, in which the will plays no part.**

At the time of copulation male birds, exuberant with vitality under the sexual excitation influence, execute rapid flights, movements often ridiculous, which some have attributed to a desire to charm the females. These grotesque manifestations are observed also well in birds the most devoid of beauty, like geese and vultures. These movements are only involuntary discharges of the nervous system arrived at an extreme degree of tension.

This display of plumage which has been interpreted after the same fashion as horripilation, is also a reflex action which manifests itself with a marked predominance in the cutaneous muscles of a region where the nutrition has become sufficiently intense to determine with many birds the formation of supplementary plumes, and a very unique colouration. *These local phenomena evoke in the females special sentiments,* which can evoke the erection of new species, but which have nothing to do with æsthetic sentiments.

Amongst the involuntary muscles whose activity is brought into play by the emotions, it is necessary to cite the cremaster which,

* It appears to the Translator quite possible that these reflex phenomena might be mentally operated.

under the influence of the least mental excitement, lifts the testicles and leaves the lower part of the scrotum empty. An individual suspected of crime, pretended to a profound melancholy with absence of reaction to all external excitations, and became impassive to the most unpleasant threats: he exhibited no outward sign of emotion; was doubtless only feebly affected otherwise; then the circulation and respiration entailed no trouble: the cremaster only failed to remain indifferent: each time that the thermocautery was directed towards him, though not brought within a metre of distance of him, his testicles were raised.

An excitation of any sort whatever provokes an agreeable or disagreeable sensation, which determines reflex movements, expressing, it may be, satisfaction or desire, pain or repulsion. Gradually these expressive movements, at first only provoked by material, physical, excitements, produce themselves apropos of the perception by one of the senses of signs recalling the object which determined the reflex for the first time. Such is the origin of mimicry, expressive movements of the face and limbs, the eloquence of the body, which produces an effect so much the more striking as it the more perfectly recalls its animal essence, and as it approaches the more the reflexes.

In proportion as the animal which is subjected to the excitation is in a measure prepared to respond by an efficacious movement of defence or flight we assist by a mute effort. If, on the contrary, it is incapable of this useful effort, let it be because the excitation is too sudden and surprises it, or because it is out of proportion to its power of reaction, the animal stiffens, its glottis remains half open, and the contraction of its thoracic muscles in place of furnishing a support to the useful contraction of the limb muscles only furnishes a cry, involuntary proof of powerless effort. Under the influence of pain the cry escapes even from animals whose voice does not usually serve them, such, for instance, as the hare and the rabbit. At first accidental, the cry becomes voluntary, manifests itself apropos of sensations which recall only from afar the excitations which primitively provoked it in a reflex manner: from a reflex sign it becomes a sign of will. At first constituted by simple musical sounds, gradually it reproduces the sounds and murmurs of nature, becomes articulate language, and constitutes a sonorous mimicry, which sur-

passes greatly in richness of expression the silent mimicry constituted by the expressive movements of the face and the members.

It is unquestionably to the modifications of the tonicity of the muscles of the larynx that one must attribute the modifications of the voice which are produced under the influence of the emotions: the timbre, the height, the fulness of the human voice vary considerably in these conditions: we see them attain an extremely acute tone in anger, and especially in pain. The highest and most sonorous tones are produced by a more energetic contraction of the thorax and a more marked tension of the vocal cords. In anger the voice comes to produce very high tones, and to assume a metallic ring. The same modifications of the voice exist in animals; the difference of sounds emitted by the pig, for instance, recording as it grunts normally, or squeals under the influence of terror or pain, is considerable. The most sensitive individuals have multiplied these varieties of sounds, and music has become the ideal language of the passions. The rapidity of the articulatory movements also varies considerably according to the nature of the emotion: at the same time that the voice becomes higher the speech becomes shorter and more rapid: when, on the contrary, the voice lowers itself, speech becomes slow and drawling. In excessive anger, in rage, as in fear, when the tension of the muscles arrives at its limit, the voice becomes tremulous, corresponding with a defect of stability of the phonating muscles, and analogous to what we observe in the limbs which tremble also in the same circumstances. The tremolo expresses an acute emotion.*

Joy expresses itself by saltatory movements, running, gesticulations, and spasmodic expiratory movements, which constitute laughter, by cries. It is in infants especially that the expression of joy is striking and emotional: but not exclusively in them: Archimedes ran through the streets of Syracuse crying "Euréka!" Davy danced in his laboratory when he discovered potassium.

In anger there is produced also a great number of useless movements of stamping, grinding of teeth, etc., which have no other utility than serving to discharge nervous energy.

Whilst fear associates itself to general movements of retropul-

* Spencer. *Origin and Function of Music.* (Essay on Progress.)

sion or flight, anger associates itself to a general movement of propulsion. This different direction of the movements does not, in reality, constitute a physical contradiction: in the two cases the end which imposes itself determines the direction of attention.

The direction of attention can play an important *rôle* in the impossibility of executing certain acts under the influence of an emotion: but general exhaustion of the nervous system takes, in general, the greatest part in these impotences, genetic impotence, for instance.

We have frequently remarked that when the expression of pain is withheld by the will or otherwise, the consecutive exhaustion effects were more considerable. Before the use of anæsthetics we observed that the patients operated upon who suppressed their cries and their movements, experienced with greater intensity the effects of shock. It is only in reality the voluntary obstacle brought to the expression of the pain by tears, cries, plaints, defence movements, which necessitates a considerable expenditure of energy which adds itself to the loss caused by pain. The heroes of the Iliad wept and wailed without reserve, and were not on that account the less capable of acts of courage.

The involuntary movements which accompany the emotions constitute the expression of the emotions. These movements, these expressions, these attitudes, recall frequently, in a striking manner, the effects of sensorial excitations; they are so kin to the emotion that when one communicates them artificially to certain subjects, these experience really the corresponding emotion (Braid).

As Mosso correctly observed the fact,* "it is especially the quantity and not the quality of the excitation which weighs on the balance of the emotions." "I have set myself to discover," says he, "on a dog rendered insensible by chloral, the facial nerve at its exit from the skull, and I have sent a current through it in such manner as to excite its totality. By using at first a very feeble current I have ascertained that one could determine the contraction of the muscles of the forehead and the ears, whilst the muzzle remained immobile, as one sees it when the animal is attentive. With a more energetic current the muscles of the nose, the eyelids and the face, take on movement: with a still more energetic current

* *Mosso. La Peur* pp. 118, 119.

the muscles of the lower lip, in their turn, are brought into play, and the mouth opens itself: finally, if the current was most energetic, I obtained the ferocious expression of an aggressive dog."

Piderit* remarking that the muscular movements of expression occasioned by agreeable or disagreeable representations, are the same as those which are related to agreeable or disagreeable sensorial impressions, concludes therefrom that the emotional expressions are determined by impressions of imaginary sensorial kind. But the existence of these imaginary sensorial impressions is altogether hypothetical: whilst we know perfectly that very diverse peripherical irritations bearing on the different senses are capable of provoking, mechanically, identical effects, one same increase of arterial pressure, for instance, one same increase of energy of effort, etc. If an emotional state determines the same movements as an excitation of the periphery, there is room to admit that the one and the other are associated with identical or equivalent modifications of the nervous system, without the intervention of a sensorial representation which has never been established.

The state of tension or relaxation of the muscles characterises, in a general way, the sthenic and asthenic emotions: but it is not without interest to consider particularly each of the groups of muscles which play an important *rôle* in the expression, and to recall the special significance of their tension or relaxation.

Moreover, a rapid review will permit us to show that according to the intensity of the emotion, the contraction of the muscles of the face changes the expression thereof, in proportion as the muscular action is more intense and more generalised.

Let us consider first the eye and the periorbital region. In the most feeble sthenic emotion, surprise, the eye opens itself out largely. If the emotion increases as in ravishment, the eye tends at the same time to carry itself higher, and convergence becomes exaggerated: the eye becomes more fixed and brilliant in joy. In anger, which entails an almost painful excitation, the eye, more brilliant and congested, becomes, at the same time, more fixed and convergent: the forehead folds itself at first transversely as in astonishment, then the eyebrows approach one another, there is produced a vertical and median fold of the forehead, as in intense

* *La Mimique et la Physionomie*, p. 40.

attention and in effort. These movements which recall those which are provoked by a painful visual expression, characterise a painful emotion with tendency to reaction. If the emotion augments in intensity, the movement of elevation of the eyebrows accentuates itself at the outward part, the transverse fold of the brow becomes more marked at the same time that the top of the eyebrow approaches the median line. There results from that the formation, upon the median line, of a rectangular line which gives to the upper part of the face the expression of fright or dazzling.

It must be remarked that in the expression of fright several paralytic symptoms appear, the dilatation of the pupil and diminution of convergence. The diminution of convergence, which finds itself again in all the depressing emotions, gives to the look an unintelligent expression which does not fail to accentuate the lowering of the upper eyelid. When the individual tries to struggle against fatigue he lifts the eyelids by folding the forehead skin transversely, but he does not succeed in lifting the eyelid thus, and this discordant expression does not conceal the painful and inefficient effort.

The preceding facts show, in short, that the muscles innervated by the upper branches of the facial nerve enter successively into contraction according to the intensity of the excitation; a fact which concords formally with the result of the experiments of Mosso. The phenomena of exhaustion appear successively in the muscles which have taken the first part in the excitation.

The emotional movements, like all the other physical conditions of the emotions, vary according to the individuals, according to an indeterminate personal susceptibility. Always the phenomena which transpire in the organs of voluntary motility produce themselves in a less imperious fashion than the others: the will cannot arrest them, but transforms them.

It is thus that such a person cannot arrive at not being able to frown the eyebrows in anger: except to dissemble the expression of this emotion in part by strongly elevating the eyebrows, and folding the brow: but the deceit is incomplete, the firming of the lips, for instance, effects itself in a reflex manner. When the repression of the movements appears more complete, it is true that the discharge produces itself in

another form: it is, in fact, a vulgar notion that when the expression of an emotion has been repressed the effects of consecutive exhaustion are more intense. It would be difficult to establish the real value of the facts relative to the pathological consequences of anger suppressed, but one cannot any the more on that account dispute the universal consensus.

The rapidity of the emotional discharge influences its form greatly. When anger expresses itself by a rapid discharge the diffusion of the excitation generalises itself rapidly, and this diffusion expresses itself by the incoördinate movements of the members: in this form of anger the subject stamps, strikes his foot, tears his hair, grinds his teeth, emits cries, makes useless movements, loses energy. When the same energy escapes slowly, as in hate, it no longer translates itself into incoördinate and useless movements, but into acts adapted to the circumstances, and proper for the accomplishment of vengeance.

The excess of muscular tension in anger provokes some secondary phenomena which merit being pointed out. This tension concurs, with rapid respiration, to provoke the venous stasis which expresses itself outwardly by the swelling of the veins of the face and forehead. The closure of the jaws and compression of the lips entail an enormous dilatation of the nostrils which must give passage to the inspired air. When the contraction of the elevator of the nostril and the upper lip become prominent the inspired air penetrates hissing between the teeth. This same muscular action, pushed to its extreme limit, uncovers the canine teeth, which gives to the physiognomy an expression of menacing ferocity. "One shows his teeth," says Spencer, "even when pride suppresses cries and wails (a suppression itself the result also of a muscular contraction); the closing of the fists, the frowning of the eyebrows, the grinding of the teeth are there to attest that the bodily acts which develop themselves are also great if they are less striking in their results. If, in place of sensations, we take the emotions, we find that the correlation and equivalence are entirely manifest." In the false brave, who would dissemble the effects of their emotions, the effects of consecutive exhaustion are often more marked than in others.

The necessity of the physical accompaniments of the emotions is

demonstrated by the fact that the primitive production of these physical conditions entails concording emotional states. Broussais had remarked that if fear and surprise produce palpitations of the heart, reciprocally palpitations produce fear, or at least a sentiment of surprise. What has been said of the heart can be repeated of the stomach. A bad condition of stomach can be the cause, equally as the consequence, of a bad condition of mind.

The intensity of the emotions and their outer manifestations are so much the greater as the subject is impressed by the representation which provokes it, in a state of complete repose of mind and senses, as we observe it in the monideal states of hypnotism, and even in natural sleep. Also the emotions of dreams themselves play a very important *rôle* at the inception of a great number of mental maladies.

The physical conditions of the emotions and of the representations rule the physiology of sympathy. As one can demonstrate it experimentally, the idea of a movement is the idea which commences it, the idea of a sensation is the sensation in a feeble degree, and consequently a certain change of form. We can neither see, nor hear, nor feel, in a general fashion, an individual in a certain affected state, without our organs participating, in a certain degree and proportionally to our sensibility, our excitability, in the modifications which his own proper organs experience. If these organic modifications of the witness acquire a certain intensity they accompany themselves to a state of consciousness which constitutes sympathetic emotion.

The demonstration of this fact that the representations are inseparable from certain somatic manifestations gives us the key of the emotions in contagion, and the ideas of thought reading, a contagion which is in reality the consequence of physical phenomena: the sight of the outward signs of an emotion provokes the reproduction of these signs and consequently the reproduction of the emotion. The more numerous and more energetic the signs are, the more intense is the emotion communicated. The emotions propagate themselves in crowds, frequently without awakening the individual consciousness by a simple reflex imitation of movements (psychomotor induction), and they give place to

irresistible collective impulsions of which the authors recognise only too late the monstrosity.

Campanella imitates the mimesis of people whose sentiments he wishes to divine. Dugald Stewart has cited other analogous facts.* "In view of an excellent pantomime the body of the spectator makes the same movements mechanically; our figure moulds itself without our being aware of it upon that of the persons whom we see strongly affected."† This reciprocal influence of physiognomies the one upon the other (Lavater), this imitative sympathy (Mantegazza), is not only involuntary, but it can exceed by a long way our consent. A mimic, Gallius Vibius, instanced by Seneca, became mad through imitating the movements of the mad. "However insufferable, however insupportable, may be the defects of those with whom we have to live," says Chamfort, "we do not fail to take a part therefrom: to be the victim of these strange defects of our character is not even a preservative against them." The power of this psychomotor induction is such that it can bring at length a true resemblance betwixt individuals who have shared for a long time the same emotions. The utility of this physiological fact did not escape Frederick the Great, who had always in his bureau a bust of Julius Cæsar, who, said he, inspired him with great things. If most frequently the contagion of the unconscious movements is unconscious it is not always thus with them. "Whensoever my brother-in-law smoked," said a patient of Legrand du Saulle,‡ "the movements of his mouth made mine go: I felt that it tired, I was frightened, and I saved myself; I fly when I see him: it is good, but he rules me."

It is apparent that the knowledge of the causes of the emotion of which one is witness augments the intensity of the contagion, and specifies it. The imitation of the physical phenomena only gives the tone of the emotion. Adam Smith§ remarks that "the furious gestures of a man in anger prejudice us rather against him than against his adversary. Not knowing the provocation he received, we can neither put ourselves in his place, nor experience any

* Stewart. *Elements of Phil. of Human Mind.* Vol. iii., p. 141.

† *Marat. Mon âme:* or, the principles and laws of the influence of the soul upon the body and the body upon the soul. Amst. in 12, 1773, vol. i., p. 109.

‡ *Le délire des persécutions,* 1871, p. 54.

§ *Theory of the moral sentiments,* 1860, p. 4. Edit. Baudrillard.

similar sentiment to that which agitates him." We sympathise more readily in the pains which we have experienced.

When an emotion and a desire have provoked a movement this movement does not necessarily arrest itself by the destruction of the reflex brain centres. Kaw Bœrhaave having made a cock hungry, presented grain to him at a certain distance: as soon as the famished animal perceived them it ran towards them with avidity: but, in the middle of the space which separated it from them, the experimentalist be-headed it: the animal still ran twenty-three feet.

The physical signs of the emotions can exceptionally specialise themselves, by localising themselves in an organ or in a group of organs without troubling profoundly the psychical functions: on the side of the cases of this kind which we have already cited in passing one can recall that of Turenne, who before the battle said to himself, "Thou tremblest carcass; thou would'st tremble still more if thou knewest where I am about to take you."

The physical accompaniments of pleasure and pain discover themselves in the general qualities common to all the processes which lie at the basis of conscious life.*

* H. R. Marshall. The Physical Basis of Pleasure and Pain (Mind, 1894, p. 354).

CHAPTER VI.

Pathological Effects of the Emotions.

Summary—Emotional Ebriety—Death by Moral Emotions—Pathological Effects of the Emotions upon the Circulation—Œdemas—Troubles of the Secretions and Excretions—Troubles of Nutrition—Infections—Skin.

The intellectual operations can barely be isolated from every passion. They are, at their beginning or at their end, a desire or a repulsion, a satisfaction or a pain. Madden, in his "Infirmities of Genius," remarks that the greatest longevity exhibits itself among the savants, who occupy themselves with natural philosophy; while the poets succumb quicker. One could be led to conclude from this observation that works of imagination mostly entail organic troubles. But the works of imagination necessitate a necessarily previous condition, a special nervous excitability which frequently is confined to malady: and it is this nervous excitability evoking necessarily the idea of an organic feebleness which is in reality the cause of all the evils which attack men whose imagination is most quick. This irritable feebleness which is the condition of the lively representations is at the base of all the morbid manifestations of the emotions.

It is impossible to trace a limit betwixt the physiology and the pathology of the emotions. Always an emotion can be reckoned morbid; 1st. when its physiological accompaniments present themselves with an extraordinary intensity; 2nd. when it produces itself without sufficing determining cause; 3rd. when its effects prolong themselves beyond measure. These three conditions coincide usually, and they are in relation with the special individual organic conditions.

The pathological conditions of the emotions are sometimes general, sometimes only local. Although the proposition may not be one of absolute exactitude, one can say that in general the local effects of an emotion are always the same in an identical person, and manifest themselves towards the organ which offers normally a

congenital or acquired defect. Certain momentary dispositions can influence the localisation of the troubles.

"Even a simple emotion, anger or fear, does not attain its full force at the moment when its cause acts: when the cause has disappeared, it takes some time to die."* The long relative duration of the emotional phenomena can explain how the effects of the consecutive exhaustion, which expresses itself by the same troubles as those of the exhaustion produced by the sensations, are usually much more intense.

All the peripherical irritations determine phenomena of excitation, followed by phenomena of depression or exhaustion, which are both so much the more marked as the subject is more feeble and irritable. These alternative phenomena of excitation and depression can be objectified in certain subjects by a study of the muscular force, of the general and special sensibility, of the circulation, of the respiration, of the electric tension, etc. In certain conditions the phenomena of excitation alone strike the observer: in others, the phenomena of exhaustion appear so rapidly, and hold so predominant a place that they appear alone and independent. These apparently opposable facts have been prompted mainly since the works of M. Brown-Séquard under the name of dynamogeny and inhibition. Always when one can examine closely the phenomena consecutive to peripherical irritations, whatsoever they may be, one sees that they do not escape the general laws of mechanics: irritation creates nothing, it could never be known to merit the qualification of dynamogenic in the proper sense of the word, it puts in action forces accumulated in the organism by the fact of nutritive changes: and to the discharge which effects itself more or less rapidly under the form of movement, of secretion, of heat loss, etc., succeeds fatigue, exhaustion. In proportion as all the functions of the organism have not been explored minutely one cannot affirm that an irritation has determined a phenomenon of arrest, under the pretext that such function has been suspended more or less suddenly.† It remains to be ascertained whether the force put into action has not found another way of escape. The expression "inhibition" only serves to con-

* H. Spencer. *Principes de Psychologie*, t. i., pp. 120, 121.

† "Inhibition," says Loye, "acts like the click which falls on a wheel and suspends its movement." This has the merit of being naive and applies well to a theory which is one none the more.

ceal very imperfectly our ignorance of the transformations of forces which operate in the organism.

The phenomena determined by peripherical irritations reproduce themselves apropos of the visceral irritations, and they present themselves with evident objective characters in consequence of the absorption of certain substances. A good number of hypnotic medicaments determine at first a manifest excitation, an excitation which can proceed even so far as inebriety, such as ether, chloroform, etc.: opium and its derivatives produce frequently very marked phenomena of excitation, and appreciable on an entirely superficial examination.* Other reputed substances of exciting character determine, on the contrary, consecutively phenomena of exhaustion, very evident in the alcoholic inebriety.

The subjective irritations, irritations by mental representation, determine phenomena of excitation and depression entirely analogous to those which result from peripherical or internal irritations. The emotional states which are in connection with mental representations, and hold voluntary phenomena dependent upon them, are never fixed. They show us oscillations more or less extensive according to their intensity; to the great excitements succeed more profound depressions. To these emotional alternatives, especially marked in feeble subjects, in the degenerate, and especially in hysterios, correspond objectivable somatic phenomena by the study of the muscular force, the sensibility, the respiration, etc.: to the sthenic emotions correspond an exaggeration of the physiological functions, to the asthenic a depression of the same emotions. All the subjective irritations, like all the peripherical, determine at first phenomena of excitement: if it is in circumstances in which the phenomena of depression appear to supervene at first and exist only, it is because the observation is defective. In emotional impotence, for instance, where it would appear there is a sudden cessation of sexual power, an arrest pure and simple, if we inquire carefully, we come generally to recognise that the suspension has been preceded by a spasm, a trembling, a sweat, a sudden desire to micturate, etc., all phenomena adequate to show that there had not been inhibition but derivation of the nervous force set in action by the subjective irritation. Following

* *Lépine. Deux phases, &c.* (La. Sem. Méd. 1889, p. 437.)

certain emotional shocks, as in the wake of certain physical shocks, we observe sometimes paralyses; it may be, a dulling of the psychical functions, and especially of memory. Pinel has observed a sort of idiocy (stupeur) produced by lively and unexpected affections, such as excessive joy, or mortal terror. These facts, in the absence of all physiological observation, have been interpreted by inhibition.*

When depression appears to be the first fact, as in certain nocturnal troubles, upon which we shall have to return, the phenomena of exhaustion must not be attributed to an inhibitory excitation, but to the absence of physiological excitation.

The physiology of the emotional shock can be cleared up by the study of some clinical facts.†

OBSERVATION XII.

Neuropathic Heredity—Neurasthenia—Moral Shock—Emotional Drunkenness.

"N. P. J., designer, æt. 32 years, his father is 68; a merchant, he has never had grave illness and is in good health. He gave himself up to hazardous speculations and lost a large part of his fortune, but presents no nervous or mental trouble, of which, moreover, one can find no trace in his family. A paternal uncle is gouty. His mother is 51 years old. She has been hysterical all her life and presents besides permanent stigmata, she has had grand attacks for ten years. A maternal aunt has had also grand attacks of hysteria. N. P. J. had two brothers and a sister born after him, all of whom succumbed to convulsions in their first year.

"In his infancy one finds no characteristic neuropathic trouble. At the age of 15, being at college, he took to the habit of masturbation, and from the beginning of this time he began to suffer violent headaches. It was a headache with sensations of compression, manifesting itself mainly when he applied himself at any time to work, ceasing in the intervals, frequently he had abundant epistaxis and grew thin. He had to renounce his classical studies, he followed a course of industrial designing, suffered less in his head but was not completely well when he had to leave to put in a year of military service. On his return he was completely recovered, had taken on flesh. He resumed successfully his studies in design. He was then 22 years of age. Since this time he had always good health, working much only to obtain always a very modest position. In May, 1887, he had a fall when going on board a boat, and although the shock had been slight and had left no local trace, there remained to him, in his own words, "a general stunning," a lassitude, with weighted movements and slowness of ideas. He was seized again at the end of some days with compressive headaches, then

* *Pinel. Tr. méd. ph. sur l'aliénation mentale*, 2nd ed., 1809, p. 184.

† Féré. *L'ivresse Emotionelle* (*Rev. de Méd.*, 1888, p. 937).

lumbosacral hyperesthesia. This relapse of neurasthenia determined by this slight shock yielded to a hydrotherapic cure.*

"For six months he was entirely recovered, when upon the 2nd March, 1888, being in bed at an early hour and feeling perfectly well, he received, whilst dressing, a letter announcing to him that he had obtained an honourable situation, and also remunerative, for which he had ceased to hope.

"Hardly had he finished reading the letter when he ran to his parents' room enumerating with an extraordinary volubility all the advantages present and to come of this situation. Gradually this exaltation increased, his face became red, animated, his eyes brilliant, he gesticulated, opened the windows, hailing the passers-by to relate the subject of his joy in very exaggerated terms with shouts of laughter. He set himself to embrace with effusion his father and mother, the first comer who entered, speaking, laughing, demonstrating unceasingly. His language and his gestures became entirely incoherent. He precipitated himself into the street, clad only in his trousers and night shirt, dancing, gesticulating, laughing, singing, directing himself, so far as his people were able to judge, towards the house of one of his friends, a shopkeeper in a neighbouring street. His people made up upon him, however, and induced him to return home after some trouble. This state of excitement had lasted for two hours when he was induced to return to his bed-room. He began to laugh and talk less excitedly, his gestures were less energetic. All of a sudden he began trembling all over, his back was pressed against the wall, his limbs bent, he could only murmur unintelligible words; he entirely collapsed. When one raised him he collapsed, looking with an air of languor, and not replying to any question. When he was put back to bed he was entirely inert, the congestion of his face was gone, he appeared sound asleep. When one wished to raise his head he vomited the chocolate which he had just taken at the time when he received his letter. When I saw him at midday he had slept for two hours. It was with great trouble he was awakened, he appeared to understand nothing of what had passed. At last he began to reply stammeringly, but had only a vague memory of what had transpired even of the letter. He moved perfectly his head and upper limbs, but when he attempted to stand his legs seemed unable to sustain him, he let himself fall. He was moved by this event, he began to ask and render a better account of what had transpired: in short, he had not lost completely the memory of any circumstance and appreciated perfectly the absurdity of his conduct. It appeared to him that he had been drunk and there remained with him a painful heaviness of the head. The inert lower limbs were completely flaccid and the feet were numbed, but sensibility was not abolished in any of its forms, the cutaneous and tendinous reflexes were normal. The hands folded without energy, but were capable of every movement. The special senses were not grossly affected, the pupils presented nothing of special note. There was not developed any special hysterical sign.

"The patient, fatigued by this short examination, slept profoundly. The sleep lasted from half past noon till seven o'clock the following morning. His head was then entirely free, he did not feel any defect in his upper limbs;

* The relations of shock to development of neurasthenia are perhaps more frequent than appear Weir Mitchell has pointed out exactly this etiology. I have observed a patient in whom accidents had appeared after a shaking, without direct contusion, which resulted from a railway accident.

but when he wished to rise, his limbs bent again and it was with great difficulty he could get to his couch. This feebleness of the limbs only diminished slowly, he did not walk easily until the fifth day. Since then he has not developed any new neuraesthenic trouble or other.

"It falls to be noted that N. P. J. has been always absolutely sober."

This observation presents us with a curious example of representative irritation determining phenomena of excitement, soon followed by phenomena of depression going even as far as paralysis. This group of symptoms presents the greatest analogy to those of intoxication. This succession of phenomena is so much the more instructive as the case is not absolutely unique. Dr. Crichton Browne has published under the title of "Psychic Intoxication," a designation admitted by Handfield Jones* and by Darwin,† an observation which presents the greatest analogy to the foregoing.

OBSERVATION XIII.

(Crichton Browne).—Psychic Intoxication.

"A.B. is a frail young man of a very nervous temperament and hereditarily predisposed to mental troubles. After a long series of misfortunes and reverses he was suddenly informed by telegraph that an unexpected accession of fortune had happened to him. He was indescribably surprised and his intelligence was affected thereby. One of his friends who was with him at this time was so shocked by his pallor when he had read the message, that he concluded therefrom that he was agitated afresh by some new misfortune. A.B., however, soon regained his spirits and manifested then the joy which the circumstances plainly justified, expressing his satisfaction with the intense exaltation of an impressionable temperament. Within the space of an hour he began to get excited, to exalt himself to such an extent that he could not remain seated nor restrain laughter, nor from walking and demonstrating in his chamber. Still he attributed that to the natural reaction of his mind delivered from heavy cares. He concluded that a walk in the open air would rapidly calm and tranquillise him. But he discovered, on the contrary, that his excitement only increased; that he began to be confused and to lose command of his ideas. He became alarmed then at the situation, for he preserved sufficient sense to recognise that the extraordinary hilarity to which he yielded himself and which escaped from his control must be the result of some derangement. Assisted by his friend he went back to his house, but during the time they took to get there he sang aloud in the street and conducted himself with inconvenient grotesqueness. They then obtained the assistance of a medical man. He was found stretched upon a sofa loquaciously discussing upon the most varied subjects, demonstrating furiously, breaking out every moment in loud and inexplicable fits of laughter and exhibiting an extreme irritability when one ventured to contradict him or interrupt him. The observations took a trenchant tone and his friend remarked that his

* Studies in Functional Nervous Disorders, London, 1870, p. 259.

† The Expression of the Emotions, p. 80.

mind had taken a particular and new turn, more alive with sarcasm and repartee. He had perfect consciousness that he was not himself and even shed tears like a drunken man when he is sentimental, drying them up quickly in order to launch into fresh absurdities. His face was congested, his head hot, his manner animated, his eyes injected. His pulse beat 100, full and bounding to an extraordinary degree for one of so feeble a complexion. One was compelled to believe, in a word, that he was under the influence of wine, but this circumstance was positively denied at the time by him and his friend: the latter affirmed that he was habitually temperate and that he had taken nothing stronger than tea for twenty-four hours. A cold affusion of the head was advised, but he would not submit to that. Finally the excitation became more intense and passed gradually to a sort of delirium. His ideas became confused and he expressed broken projects, absurd and incongruous for the future. He insisted upon writing letters to all his relatives and could only cover a sheet of paper with unintelligible characters; his remarks became incoherent and incomprehensible, then his voice became muffled, his articulation slow and difficult, his expressions loud and vague, all his movements tremulous. He fell from a chair on which he was sitting and slipped when crossing the apartment. Then seven hours after the inception of the attack, he vomited largely, then he became calmer and more restrained, but he had singing in the ears and a sore frontal headache. The vomited matters, half digested, had no odour of any stimulant. He left himself to make a cold affusion, for the head was still hot and the pulse full. This was immediately followed by a sound sleep which lasted seven hours, and after which A. B. went out the next day tranquil and reasonable, but suffering from nausea, headache, and experiencing great prostration. The vomiting reproduced itself in the morning, and towards midday he had a slight return of loquacious excitement. Hydrocyanic acid allayed the irritability and depression. He had no relapse, and two days later the patient had recovered his usual health."

In this second fact, the phenomena of exhaustion are much less intense than in the first, but they are of the same order. It appears that there is in these two examples an evident relation betwixt the phenomena of excitement and exhaustion consecutively: they find themselves conform to what we know of physiology and fatigue. We find again, in fact, the same succession of phenomena as after peripherical or internal irritations. When the phenomena of exhaustion manifest themselves by characters so gross that they appear to exist alone one has no right to conclude that there has been no excitation so long as one cannot make a complete study of the primitive troubles. But this study has never been made conveniently up to the present in the cases where the symptoms of depression have appeared to be the first. As much from the physiological as from the psychological point of view, the hypothesis of inhibition would serve especially to produce an arrest in the study

of the physical conditions of the phenomena: one is stupefied to see that the philosophers whose first duty appears to be to preoccupy themselves with scientific criticism have so easily accepted it.

M. Lanigan* has pointed out in persons who do not drink, but find themselves at banquets where others drink, a sort of emotional drunkenness followed by torpor which might very well merit the name of "drunkenness by induction."

Emotional drunkenness can be met with again in a crowd of circumstances, as common phraseology would indicate: drunk with blood, with carnage, with pride, joy, love, pain, rage, pleasure, tenderness, horror.

And in all circumstances drunkenness, according to its intensity, can present itself under the gay, sad, or furious forms.

The movement itself, like the intellectual exaltation we have already related, is capable of provoking a state of drunkenness: it is not then surprising that emotions which accompany themselves with intense motor manifestations show themselves more apt to produce it. This state manifested itself several times apropos of a rapid race in a very excitable man, who is not, however, the subject of any other characteristic nervous trouble. This fact merits being compared with those in which, in the same circumstances, an excitation of the genital organs is produced going the length even of emission: this excitement manifests itself in a young medical man, it may be, under the influence of a mental tension in view of examination; it may be when he has to run to catch a train.† Crothers has related the existence of an alcoholic heredity in individuals who present an abnormal emotional susceptibility, and he cites the case of an officer who during the War of Secession fled from the field of battle with all the signs of violent drunkenness. Certain maniacs have perfect consciousness that their agitation increases under the influence of too violent physical exercises.‡

We find again in the sufficiently dramatic history of transitory mania cases which belong manifestly to emotional intoxication, and which establish a gradation betwixt emotional discharges and epileptic discharges. In a sufficiently large number of cases the

* *Union Medicale*, 1889, p. 619

† Alienist and Neurologist, 1886, p. 566.

‡ Guislain. *Leçons orales sur les phrénopathies*, 2nd ed., 1880, v. ii.

phenomena of depression manifest themselves without having ever been preceded by the period of agreeable exaltation. In nervous subjects, in women, and infants, anger, an explosion of vexation, is frequently followed by a period of stupor characterised by a more or less durable comatose sleep. The stuporous angers figure frequently in the infancy of the subjects who progress later into the hierarchy of neuropaths.*

The pathological effects of the emotions are due in part to the mechanical conditions which constitute their physiological bases, and in part to the individual effects, congenital or acquired, which constitute the morbid predispositions: the emotions provoke morbid accidents, they determine morbid aptitudes, and they evoke morbid predispositions: we proceed to follow them successively through these influences.

According to their intensity the peripherical excitations and the moral excitations accompany themselves with physiological effects which one can compare to the phenomena which result from section, or excitation of the sympathetic: the moderate physical or moral excitations provoke effects comparable to those of section of the sympathetic; the excessive excitations, of which the ultimate effects are analogous to those of the absence of physiological excitation, are comparable to those of galvanisation of the sympathetic; the characteristic effects do not appear at the outset: the temperature mounts at first slightly, then it lowers itself definitely.†

The disagreeable peripherical excitations or the absence of physiological excitation, accompany themselves to a depression of the heartbeats and the pulse.‡ In animals we have also seen that in general pain determines a diminution of the heart beat, and to this depression of the mechanical phenomena of the circulation corresponds lowering of temperature.

The fever appears to constitute an equivalent to the section of the sympathetic: it impedes the lowering of temperature allied to pain (Heidenhain).

We have seen that under the influence of the sthenic emotions there are produced important modifications of the circulation, and,

* Nerve troubles as foreshadowed in the child (*Brain*, t. viii., p. 230.)

† Cl. Bernard. *Léç. sur les liquides de l'organisme*, t. i., p. 155. *Léçons sur la chaleur animale*, p. 299.

‡ *Dégénération et Criminalité.*

in particular, a considerable increase of the arterial pressure. The increase of the mechanical work of the heart can entail failure of that organ and syncope, and even sudden death. This accident is not very rare in anger (Prelincourt, Tissot, Stahl, Hoffman, etc.);* and some observe it also apropos of less violent sthenic emotions: Plutarch tells us that Polycrates died of joy on receiving testimony of the reconnoitering of Naxiens: Diagoras and Sophocles succumbed to the same emotion: Leo X. died also of joy upon learning of the seizure of Milan, and the neice of Leibnitz when she heard of her inheritance.† The mortal effects of joy do not appear even to be restricted to man: Homer depicts for us the dog of Ulysses dying of joy upon seeing its master again. These unhappy effects of joy can hardly be understood except when there exists, necessarily previously, organic alterations, or particular mechanical conditions. It is thus that one has been able to point out the dangers of laughter during operations practised upon the head, the lungs, or the stomach.‡

Mantegazza§ says truly that when pleasure is the cause or effect of an illness, it is because we are in a pathological state (sexual aberration, perversion of appetite, alcoholism, etc.).

Fabrice and Hilden report that a man on whom one had opened the temporal artery was almost cured when he put himself on the fifteenth day into a violent anger: a hemorrhage ensued which failed to bring about death. Escoubas has cited a case of uterine hemorrhage provoked by anger.‖ Valentinian died of apoplexy, and Attila of a blood vomiting in fits of anger.

They are most frequently the sad emotions which have pathological effects. Isocrates died of pain (grief) on learning the loss of the battle of Chersonesus.

Fourcroy and Chaussier were, they say, struck with apoplexy in the wake of violent griefs.

Medical men of Copenhagen, wishing to experimentally try the effect of imagination upon one condemned to death, after having closed his eyes, pretended to bleed him to death: he died at once.

* Hoeppins. *De iræ energiâ ad morbos ducendum.* Haloemagd, 1720. *Estièvenart. De præcipuis, ab irâ, etc.* 8vo. Lovan, 1788.

† Hosteing, *Essai sur la Syncope.* Th., 1877.

‡ Gouillard. *De l'influence des affections morales, etc.* Th. in 8vo., 1813, no. 41, p. 12.

§ Mantegazza. *Phys. du plaisir,* p. 4.

‖ Esconbas, *De l'influence des affc. de l'âme, etc.* Th. Strasberg, an. x., p. 13.

It is related that a buffoon of the Duke of Ferrara died also suddenly; whilst, in the same condition, they passed a wet towel round his neck to simulate decapitation. Cases of sudden death during the preparations for an operation are cited.

Claud Bernard has remarked that the pinching of a very sensitive nerve is especially capable of bringing about syncope in animals enfeebled by inanition or otherwise. The emotions are also more active to produce the same effect in individuals depressed by a certain morbid cause, congenital or acquired. The analogy of the physiological effects, of the physical and moral excitations exist equally well in the morbid as in the normal state.

But they are the painful emotions, or the lasting ones, that bring about death by multiple and complex processes. The deaths caused by chagrin are numerous; Artemise cannot survive Mausolus.

Unhappy love has had also sad endings; amongst the historical examples we cite Lucretius, Pindar, Tasso.

The influence of sad emotions has especially a disastrous effect upon sick people: we have often pointed out the sad effect of religious cares in the article on death.

They are not the sudden emotions only which are capable of determining death: we have observed death by syncope frequently in individuals who lived in expectancy of an operation. Pouteau was in the habit of surprising his patients by not giving them time to think about the pains which they must endure; this practice it is good to follow amongst children, when one can decide the operation without their consent. Lussana has no doubt but that a severe moral pain can produce syncope as well as a physical pain.*

The death which supervenes by syncope apropos of moral emotions is produced by the same mechanism as that which comes by shock. If one strikes a sharp and sufficiently strong blow, with the finger, or with some soft instrument, upon the back and upper part of the head of a frog, so as not to bruise the parts, we see the animal, after a short convulsive period, fall into a state of complete resolution. There is a state of apparent death, and the heart becomes arrested even for some moments.† Goltz has also observed syncope produce itself under the influence of a similar shock, and he has

* *Ann. univers di Medicina*, 1865, p. 448.

† Vulpian. *Note sur les effets produits par la commotion des centres nerveux chez les grénouilles* (*C. R. Soc. de Biol.*, 1863, p. 123).

determined that there exists then an enormous dilatation of the abdominal vessels. This dilatation of the abdominal vessels indicates to us where the blood goes to when the members lessen in volume under the influence of painful emotion.

Syncope and sudden death by moral emotion are generally attributed to inhibition of which the hypothetical mechanism is well known especially so far as it concerns the heart. Most physiologists admit now that the pneumogastric has an action of arrest upon the heart: but the moderator effects of excitations of the pneumogastric upon the systolic movements of the heart cannot be a proof of an action of arrest, only a condition: it could prove that the diastolic movement of the heart is purely passive, that there exist no dilator fibres. This proof is not quite complete, and the hypothesis which we prefer, in which the pneumogastric animating the dilator fibres can produce an extreme and persisting diastole, when it is strongly excited, cannot be upset by known experimental facts. The very intense and painful emotions which give us a heavy heart, can end in syncope and death by a common process, an extreme tension of the muscular fibres animated by the pneumogastric: and it is not necessary to cause a process to intervene which has no analogy either in physics or mechanics.

The elevation of arterial pressure which characterises pain ends by giving place also to a definite lowering if the excitement lasts. Prolonged depressing emotional states coincide always with a lowering of arterial pressure. The frequency of the pulse, which is augmented at the same time as its force, gives place also to a permanent lowering. However, in certain conditions of irritability, the rapidity which has been provoked by a moral emotion persists, tachycardia establishes itself as a permanent condition: Squires* cites a young girl of 21 years, who, after a fright, still maintained, at the end of two years, a remarkable frequency of pulse, which beat at the rate of 135 per minute.

A moral emotion equally well as a traumatism can provoke the crisis in essential paroxysmal tachycardia.†

No one doubts that violent and repeated emotions can influence, in a prejudicial manner, organic diseases of the heart and large

* Effect of Fright. *M. R.*, v. 32, 1887, p. 190.

† H. Castaing. *De la tachycardia paroxystic essentielle.* Th., 1891, p. 20.

vessels. One can admit theoretically with Senac and Corvisart that provoking repeated palpitations can bring about hypertrophy of the heart and valvular lesions.* It is an opinion accepted now by several notable pathologists (Peter, Bernheim, Rey, Picot, etc.)† In a case of Beau's we find accidents occurring after a fright which recall those occurring in an overdriven animal (cœur forcé). "The emotions always only strike with this intensity hearts predisposed by a native feebleness or by a morbid previous state, and if they cause serious injuries to damaged hearts, they soften most frequently those which are young and without blemish" (Parrot). Leudet also admits reservedly the influence of the moral emotions upon heart troubles.‡

The emotions can provoke troubles of the peripherical circulation. The violent sthenic emotions can provoke by increase of vascular tension ruptures of altered vessels, various hemorrhages: the most frequent are epistaxes which manifest themselves frequently after anger.§ Hemoptysis has been observed under the same circumstances, Gorter observed a female to whom a lively joy occasioned a blood spitting which nothing could arrest: Highmore has seen an hemoptysis under the influence of anger. Borelli has observed this last emotion provoke tears of blood. Luc has observed an otorrhagia.

Fick‖ has cited a case of hemorrhoidal flux provoked by anger. We have indicated bleedings from the lips under similar conditions.¶ Hamaide only makes mention of subcutaneous bleedings under the influence of lively emotions; but we understand that a violent fit of anger can equally well provoke these as a fit of epilepsy.** Lancereaux has mentioned multiple bleedings as the result of fear. Purpura hemorrhagica has been several times observed after moral shocks. Neuropathic hematuria produces itself frequently after a violent emotion. We have mentioned the influence of the moral emotions in the production of hematemesis in

* J. Moreau. *Les fac. mor. consid. sous le point de vue Méd.*, 8vo., 1836, p. 123.

† Cureau. *Des in. Psych.*, etc. Th. Bord., 1889, p. 50.

‡ E. Leudet. *Déterminer l'influence réelle des causes morale dans la production des maladies organ. du cœur, etc.* (Th. Ag. 1853.) *Etudes de pathologie et de cliniques médicales*, 1891, t. ii. p. 5.

§ *Luc, Cont. à l'étude des Hémorrhagies néuropathiques de l'oreille.* (Arch. int. de Laryngol), 1891, p. 14.

‖ Guitard. *Des passions considerées dans leurs rapports avec la médicine*, 1808, p. 31.

¶ Hamaide. *Influence du moral dans les maladies* (Th. 1861, p. 28.)

** Lancereaux. *Traité d'Anat. Path.*, t. p. 562.

the round ulcer progress.* As in other circumstances the emotions are only efficient to provoke these accidents by reason of pre-existing anatomical conditions.

The depressing emotions bring with the gradual depression of the circulation and lowering of pressure, peripherical stases, passive congestions, œdemas, which manifest themselves so much the more easily as the heart and vessels offer anatomical alterations: but which can present themselves in neuropaths without necessarily previous gross lesions.† M. Pitres reports a case of hysterical œdema producing itself and renewing itself under the influence of painful emotions.

Observation XIV.

Neuropathic Heredity—Serial Migraines—Nocturnal Paralysis—Vasomotor Troubles—Recrudescences provoked by painful emotions.

"Mme. C., 32 years of age, lost her father at 58 years; he was in a state of senile dementia for three years; the grandfather had died in the same state at 60 years, and two uncles are also actually demented, one aged 63 and the other 61.‡ The mother is 54 and in good health. There is no neuropathic antecedent. Mme. C. has only had one sister, elder than she by three years, and who died at her first confinement after eclampsia with delirium. She herself has had no nervous antecedent. Married at 26 years she had a miscarriage at 28 years, and at 30 years she had an infant which she suckled and which died at 5 months from convulsions. During pregnancy and suckling she continued to follow her occupations which are very painful; she is the wife of a restaurateur: she cooked and worked about from 7 a.m. till 9 p.m., with short interruptions, taking little amusement and being rarely absent. She was greatly affected by the loss of her infant, she was already thin, but the wasting increased rapidly: she continued, however, to work without much rest.

"Three months later, Dec. 1889, she began to experience migraines, with eye troubles, producing themselves by lengthened attacks, then by serial attacks. These were characterised by a left suborbital pain, appearing suddenly, without apparent cause. The pain lasted about twenty minutes, then sight became totally obscured upon both sides, and in a minute or two the blindness was complete, the patient was obliged to seat herself, she could not distinguish even the light of day. At the end of 15 or 20 minutes, the darkness lifted and sight became perfect, in appearance at least, the patient being able to resume her occupations. These fits, which renewed themselves at first every 8 or 10 days are become at last every 2 or 3 days, then by series on the same day. It has happened to her to have 4 or 5, and the

* Mathieu. *Traité de Méd. de Charcot et Bouchard*, 1892, t. iii., pp. 252-3.

† Pitres. *Des troubles trophiques.* (*Prog. Med.*, 2nd ser., t. xiii., 1891, p. 145.)

‡ Neither of these four dements have had paralysis or apoplectic fits. It is an interesting fact from the point of view of heredity of senile dementia in support of which I might quote several other analogous observations.

successive fits of the same day became stronger and stronger. Several times the fits of the end of the day have lasted more than an hour and a half without presenting, moreover, any of the paralytic or anaesthetic accompaniments of ophthalmic migraine. These repeated fits left after them a state of general torpor. It has happened several times after the last fit, she fell into an invincible sleep enduring 12 or 14 hours.* These migraines, which recall the serial fits of epilepsy, have ceased gradually after two months' treatment by the bromide of potassium in doses of 7 grammes daily, and they are no more reproduced in spite of the cessation of the medicament: they had lasted about 5 months.

"Towards the month of June, 1890, Mme. C., who for several weeks experienced frequently lassitude and breathlessness and whose nights were frequently disturbed by nightmares, began to experience in the morning, upon awakening, numbing in the left hand which she could with difficulty lift. This paretic numbing disappeared at the end of an hour or two. Gradually it increased, accompanied itself with sensations of pricking at the end of the fingers, which appeared slightly swollen, then it extended itself to the left limb and the right hand, but predominating always in the left hand, which remained frequently feeble and unapt for 3 or 4 hours. The impotence of the hands, and principally of the left hand, manifests itself especially when an attempt is made to seize objects of small volume, pins, needles, buttons, etc.; but the difficulty of lifting weighty objects is also manifested in several circumstances. This morning impotence is associated with a state of general torpor, the patient cannot make up her mind to quit her bed: it seemed to her "that her eyelids were of lead and that she could not lift them," whilst the blinds were undrawn and the light had not penetrated largely into the room, the movements were almost nil; speech presented even a drawling character, which struck persons who came nigh. When after having stretched the limbs for a long time she came to rise, it happened frequently that the left limb bent and trailed; when the patient had made her toilet, movements began to become easier, and towards ten or eleven o'clock she could in general resume her occupations. The rest of the day transpired without notable troubles. Towards the evening, at the fall of night, the patient had frequently dark ideas and experienced coldness of the feet and hands, a coldness which frequently delayed sleep. In some circumstances only the paralytic numbness of the limbs and mainly of the right hand, had presented diurnal recrudescences: twice after a prolonged immersion in cold water, once after having remained two hours motionless at a ceremony, twice after a moral emotion at the sight of a horse killed by a man who fell off a ladder. In all these cases the recrudescence did not last more than an hour.

"These diverse accidents lasted for more than 4 months without the patient, (who, nevertheless, could only badly manage her affairs) being able to resort to the consultation of any medical man: the exhortations of her relatives could not overcome her irresolution. With this woman of ordinary energy, the modification of character was especially striking. On the 28th September,

* Moebius has applied the name Migrainous state, status hemicranicus, to a migraine persisting during several days but without a period of exhaustion. What I have described under title "State of the Migrainous Evils" comprises not only serial painful fits but a period of exhaustion and paralysis which merits comparison with that of the epileptic evil state.

after a discussion which was produced in her establishment, her husband was violently menaced by the customers. She was taken with a sudden sharp oppression, it seemed to her "that lead ran down her limbs," she suddenly bent and fell inert upon the ground, in complete resolution but without losing consciousness: she was extremely pale, her extremities cold. Put to bed, she slept till the next morning, without giving any sign of suffering. On awakening we found her in a more than usually deep state of torpor: she appeared not to be able to open her eyes, her speech was slower, and especially she wilfully left questions unanswered. The impotence dissipated itself more slowly than usual. One was, moreover, struck at once by an unusual fact: the ear was filled with a colourless fluid, and we found that an abundant serous flow was producing itself exclusively by the left nostril, the right remaining absolutely dry. When the patient raises herself we see that the two limbs are heavier than usual, especially the left, which is more swollen about the ankles to such an extent that the patient could with difficulty put on quite large shoes. As the ordinary accompaniments of awakening, nasal flow and swelling of the feet disappeared two or three hours after rising, Mme. C. could still put herself to sufficiently painful work, which she still continued to do when she got rid of her morning numbness. The same reproduced themselves upon succeeding days.

"Upon October 4th, at 4 p.m., although neither she nor her husband were in any way compromised, she experienced an extraordinary worry and trouble on the news that an inquest would have to be held in their establishment relative to recent events. She began to tremble in her limbs, which soon were unable to support the weight of her body; they had no time to get her into bed till the swelling of the limbs, which had disappeared since morning, became reproduced synchronously with the nocturnal paretic numbing. She fell into the same sleep as after the preceding emotion and only awoke in the morning at 8 o'clock. The restoration of the movement was effected more slowly than usual, she could not leave her bed till eleven o'clock; but the swelling of the limbs persisted and persists, from this moment, diminishing only a little towards evening.

"Actual state, Oct. 7, 3 p.m. Mme. C. presents herself in the conditions in which she is at the best. In spite of the persistent swelling of the limbs, she has been able to take an hour's journey by rail, a carriage journey, and a walk of nearly a kilometer to mount the steps. She does not complain either of fatigue or of actual pain, she feels herself quite as well as she has been able to be since she escaped her migraines, and regrets coming to see a doctor. This unconsciousness of her state is constant, when the motor troubles are least.

"The physiognomy is animated, the gestures lively and Mme. C. rises quickly, unhesitatingly. There exists no outward trouble of standing or walking, only (the eyes being open or closed) there are produced oscillations somewhat extensive, but the patient can guard the position. The hand movements are perfectly free, the patient can seize (the eyes better closed) objects of small volume, and the notion of position and direction is normal. The dynamometric force (flexors of fingers) is inconsiderable: on the right 24, on the left 14. The tactile sensibility grossly examined is less on the left than on the right. Cold is felt more painfully on the left, the application

of a bronze object upon the back of the forearm provokes reflex movements, not only in the upper limb but also in the lower. The same excitation of the right side provokes no movement. Special sensibility is also altered as one can determine easily by sight and hearing; the visual field is narrower upon the left, the visual acuity lessened, whilst she sees all colours upon the right; upon the left the violet is called grey. There exists, on the left, a painful latero-mammary point and a very acute ovarian sensibility upon the same side. The swelling of the feet is actually reduced to a minimum. On the right side the swelling is especially marked behind and below the malleoli, where there exists a prominent ridge upon each side of the tendon achilles, without alteration of the colour of the skin, very impressible, but not retaining any imprint. Around the crown of the foot there exists a slight puffiness, but little deformation. On the left side the lower part of the limb presents a swelling of diffuse kind beginning at the lower part of the calf, the malleoli do not stand out and the subcutaneous puffiness extends to all the back of the foot. Pressure leaves no imprint, produces no pain, there exists no change of colour of the skin.

"The patient consented to remain in Paris and to undergo a hydrotherapic treatment. Under the influence of repose, change of environment and alimentation, there has been effected a rapid change. The œdema has completely disappeared at the end of 15 days, the troubles of sleep are lessened, to cease entirely about 2 months later."

The stasis of blood which produces itself in painful emotions at once in consequence of the feebleness of the respiratory movements, and of relaxation of the circulation, is accompanied by cooling of the extremities.

The analogy of physical pain and moral pain from the point of view of their physiological conditions, is especially put in evidence by certain vascular phenomena.* M. Léloir has reported a case of *local syncope of the fingers* which could produce itself in a nervous woman under the influence of scarifications of the skin, and lasted about a quarter of an hour after the operation. The local asphyxia of the extremities is observed sometimes in melancholics: but the most instructive facts are furnished by the history of duplex forms of madness in which the periods of excitation alternate with periods of depression; and where these last are sometimes accompanied by local asphyxia of the extremities which ceases in the periods of excitation or remission.†

The pathological influence of the acute emotions upon the circulation manifests itself sometimes by sudden arrests of physiological hemorrhages. Amenorrhœa is frequently the consequence of pain-

* Levêque. *Contr. a l'étude des dermatoses d'origine nerv.* Th. de Lille, 1887, p. 27.

† A. Ritti. *De l'asphyxie locale.* (*Am. Méd. Psych.*, 1882, 6th ser., t. viii., p. 36).

ful emotions, and this retention can have as consequence the most serious pelvic troubles (Bernutz and Goupil). Very often the fear of a pregnancy produces a delay of the menstrual flux for several days, and even for several weeks. An acute desire to have children can produce the same effect (Raciborski).

The moral emotions frequently affect the respiration: anger can kill by suffocation. In grave affections of the respiratory passages the emotions can provoke accesses of dyspnœa the end of which is sometimes fatal.

We have seen that under the influence of agreeable excitements, expiration becomes tremulous, then interrupted by the shakes which characterise laughter. The expiratory shakes, on becoming convulsive, and very close, can arrive at that point where every efficacious inspiration is arrested, and bring about modifications which bring to the circulation, accidents, due to the increase of pressure or to powerlessness of the heart: laughter can bring about suffocation, syncope, or rupture of vessels, whose gravity varies according to their seat: the expression "to burst with laughter" is not exclusively metaphorical. Nevertheless the facts of death provoked by laughter are few, and their conditions badly determined; the history of Zeuxis dying of laughter when considering the painting of an old woman which he came to buy: of one named Margatus dying of laughter to see his monkey put on his boots, and that of this author succumbing in the same manner upon seeing an ass eat a dish of figs, are little explicit.

The influence of the violent emotions upon the constitution of the blood is still one of these facts which impose themselves upon popular belief: we have "blood turned" under the influence of fear.* M. Lancereaux has seen, after an emotion of this kind, develop itself, in absence of every predisposition, an aptitude for hemorrhages which induced rapid death, and it indicates a state of the red globules which were pale, voluminous, round, and became rapidly deformed. This alterability of the globules merits being compared with what I have observed following epileptic discharges.† In a neuropathic and arthritic patient under course of treatment for a paroxysmal hemoglobinuria provoked by cold, there was pro-

* Laucereaux. *Traité d'anat. path.* t. i. 1879, p. 562.

† *Les Epilepsies et les Epileptiques*, 1890, p. 223.

duced a relapse under the influence of a violent anger, although the patient had not left the chamber, and was not free for any fatiguing exercise. The absence of coagulation of the blood in animals dying from over fatigue or pain can find itself again in man under the influence of violent emotions. John Hunter determined the fact in an individual who died in a fit of anger.*

J. Weir appears to be the first who has reported scurvy arising under bad moral conditions. Affective, like physical, inactivity can favour this malady,† but they are especially the sad affections which play an important *rôle* in its causation; nostalgia; the discouragement of defeat. The sad emotions have amongst the causes of scurvy an importance almost as great as the influences of the physical order, cold, humidity, obscurity, alimentation, insufficient and of bad quality, etc.

We have previously cited some facts capable of rendering account of the influence of the physiological excitants upon the manifestations of maladies by depression and cold. The emotions can act similarly.‡ In gout, the fits of which are often induced by moral causes, the depressing emotions act by diminishing the elimination of organic wastes which produce accumulation of uric acid salts. The acute sthenic emotions can provoke the same result by producing, like excess of work, an increase of waste. The emotions have an evident influence upon gout and its manifestations, just like the rheumatismal affections.

The emotions act not less effectively upon diabetes. They provoke an exaggeration of glycosuria, and they are not without influence on a terrible accident of the complaint, diabetic coma. Bouchardat, Prout, Foster, Davy, and Schmitz have recognised the etiological value of the violent and repeated emotions. This action of the violent emotions on diabetes must not surprise so much as that of slight injuries, and especially injuries bearing upon regions distant from the nervous centres.§ Laycock‖ has already pointed out, under the influence of the emotions, the existence of temporary

* J. Hunter. *Complete Works*, t. i. 1839, p. 275.

† J. Mabe. *Art. Scorbut. Dict. Encyclo. de Med.*, 3rd Ser., t. xiii., p. 94, 1880.

‡ Garrod. *La goutte. Trad. Ollivier*, 1867, p. 304.

§ A. B. Kahan. *Cont. a l'étude du diabète traum*, th. 1861.

‖ Laycock. Treat. Nerv. Dis. of Women, 1848, p. 183.

diabetes, which one would call to-day non-diabetic glycosurias.* Reibel has pointed out the frequency of diabetes after the bombardment of Strasburg.†

In enfeebled individuals the emotions provoke sometimes sweats so profuse that they constitute a new cause of enfeeblement. Sometimes the sweat takes a colour more or less intense, yellow, green, blue, black. It is especially a propos of disagreeable emotions that coloured sweat, chromydrosis, the existence of which has been doubted by Le Roy de Mericourt,‡ is produced: a patient cited by Parrot went blue every time she uttered a disagreeable word principally at the menstrual periods: but it can show itself still, and even with men, a propos of physical causes, excessive fatigue, heat, and intense cold: we have seen it manifest itself after the extraction of a tooth.

These pathological forms of sweat which present themselves a propos of the emotions can produce themselves in the case of very intense intellectual excitations, in neuropaths. Very often the sweats provoked by intellectual exercise predominate in the parts which serve for expression: on the face, on the hands, and mainly on the palm. We find these same peculiarities a propos of material lesions of the brain: general paralytics present very often profuse sweats, and also coloured sweats. Paulini has observed a blood sweat, under the influence of fear, in a marine during a storm. The physiology of these sanguinolent sweats is the same as that which we have observed after a prolonged walking effort.

Ogier Ward has observed purpura after fear: in one of his cases emotion had immediately followed an epistaxis. Seymour has observed also a case of purpura provoked by fear in a pregnant woman.

The bloody surface exudations on the skin produce themselves also in consequence of acute emotions.§

Goullard reports an effect of fear which only merits acceptance under reserve: in an infant which one wished to lance for an

* Halstead Boyland. *Des glycosur. non diabétiques*, th. 1891.

† *Reibel. Des malad. internes produites—pendant le bombardement de Strasbourg* (*Gaz. Méd. de Strasb.*, 1878, t. xiv., p. 86).

‡ Parrot. *Art. Chromhydrose: dict. ency. des sc. méd.*, t. xvii., p. 123.—Foure. *De la chromhydrose*, th. 1891.

§ Parrot. *Etude de la sueur du sang et les hémorrhagies nevropathiques* (*Ges. Héb.*, 1859, p. 632).—Mangon. *De l'hématkydrose et de ses rapports avec la menstruation*, th. Bord., 1886.

abscess, the smallpox variole papules from which it suffered became effaced.

The painful moral affections have often provoked the apparition of skin troubles. Plenck, Willau, Bateman, Alibert, Schedel, Caezenave, Biett, Boyer, Gibert, Baumés, Dévergie, Bazin, Diday, Doyon, etc., have cited examples thereof.* Leloir indicates amongst the dermatoses by moral shock, local syncope, erythema, urticaria, purpura, eczema, psoriasis, herpes pemphigus.† Cannuet insists upon lichen and prurigo, which he regards as a neurosis.‡ Lorry had already remarked that they are the sad emotions which are most effective, and that joy is without effect. In the observations of Meyer which treat of the beginning of the affection, the psoriasis manifested itself long after the emotion.§

In the shipwreck of the frigate *Elisa* Follain the pilot reports, that, seeing the danger which he could not avoid, he entirely lost consciousness, and the surface of his body was covered with pustules in less than one hour.‖

The dermato-neuroses which most frequently produce themselves in neuropaths a propos of emotions can manifest themselves in very young infants: it is thus that Ollivier points out emotional urticaria, in infants hardly weaned, but of neuropathic stock.¶

On the side of urticaria we can cite the œdemas of the skin of vaso-motor origin, a case of Bauke particularly merits being cited: It happened to an hysterio in whom, under the influence of disagreeable moral impressions, such as menstruation, plaques of œdema were observed to appear upon the face, neck, and shoulder, in the lumbar region near the sacrum, and always on the right side. The splotches were as large as the hand, a little raised: their colour and temperature were those of the surrounding sound skin. Their consistence was hard enough. The œdema not only occupied the skin, but also the subcutaneous tissue. The gay moral impressions caused the rapid disappearance of these plaques.**

The modifications which are observed upon the side of the skin

* *Des dermatoses par choc morale* (*Ann. de Derm*, 1887, p. 367.)

† Bulkey. The Relation of Eczema to Disturbances of the Nervous System (*Med. News*, 1891, p. 128.)

‡ Cannuet. *De l'influence du système nerveux sur les maladies cutanées*, th. 1855.

§ Meyer. *De l'influence des émotions morales sur le développement des affections cutanées*, th. 1876.

‖ Follain. *Sur les effets de la peur*, th. 1815, no. 159, p. 13.

¶ *Léçons cliniques sur des maladies des enfants*, 1889, p. 191.

** *Berlin Klin. Wochenschrift*, 1892, Feb. 8th, p. 114.

are very important, are very interesting from the point of view of the impression of the pathological effects of the emotions, in particular amongst hysterios. Pain holds a great place in this pathological state: sometimes even it constitutes almost all the malady. One can distinguish a painful hysteria. But this pain frequently lacks objective characters. "Do not believe too much in pain," (nimium ne crede dolori), parodied the ancient practitioners; when listening to the plaints of hysterios it is easy to deny what one comprehends badly. Two circumstances, moreover, serve wonderfully the hypothesis of simulation:—*

1st. Hysterios, dowered often with a very acute imagination, come to accord the same belief to their mental representations as to the real facts; it follows that they deceive themselves frequently, and as, on the other hand, they have the most lively desire to appear and occupy their friends, they put out to profit their vivacity of representations in order to construct altogether a tale of lies: their reputation for artful liars is only too well justified.

2nd. In short their pains have often for character to appear suddenly under the influence of a circumstance apparently insignificant: the arrival of a stranger, for instance, suffices sometimes to give the sign for complaints upon a matter which, the instant before, was perfectly indifferent.

Most estimable authors have, notwithstanding, accredited the sincerity of these apparently insignificant causes. Thus Bernutz remarked that rachialgia is increased by moral pains: and Briquet himself admits that hysterical hyperæsthesia is very notably influenced by moral pains, and in particular by emotions of a depressing nature, which, according to him, moreover, play a very great *rôle* in the genesis of hysterical manifestations in general.

If one wished to render a clear account of the physiological effects of outward excitations on hysterios, one need not any more be astonished at the apparition of painful phenomena under the influence of apparently slight causes. I have shown, by a series of experiments, that, in certain hysterios, an excitation of one sense, even slight, is capable of determining very important modifications of the circulation, respiration, motility, and sensibility; modifications

* Ch. Féré. *Les douleurs hystériques et la simulation. (Revista de neorologia e psychiatria,* Lisbon, 1888, t. i. No. 2, p. 121.)

considerable enough to be easily appreciated, even with gross means of exploration. These physiological modifications are in connection with psychic modifications, also very important. On the other hand, the study of hypnotic hysterios has shown that the irritation of certain zones entails necessarily a modification of the emotional state: there is now, therefore, no room for astonishment that an emotional change entails also a change of certain local sensibilities.

Moreover, this relation betwixt emotion and peripherical irritation, whichsoever it may be, and the appearance of certain hysterical pains, can be sometimes verified by direct observation.

We know that the painful nipple or breast which coincides very often with other hysterical stigmata, presents itself generally under the form of an intermittent or paroxysmal pain, whose recrudescences are determined by peripherical excitations or emotions. But this paroxysmal pain accompanies itself in a great number of cases with swelling of the nipple, and sometimes even with redness of the skin. I have had occasion to observe a fact of this kind in a woman 45 years of age, who had seen hysterical spasms appear at the epoch of the climactery a propos of family annoyances. I examined her breasts during an interval of painlessness: they were perfectly symmetrical without any alteration of colour. The person who accompanied the patient made an observation altogether uncomplimentary to her: under influence of this, at the same time as the face reddened, the left breast, which was the seat of the trouble, marbled itself with small red spots, a sort of scarlatiniform rash, of which the spots became soon merged together to form an uniform redness, which passed over a little all sides of the nipple, without extending itself in the direction of the nerves. At the same time that this redness appeared the breast swelled en masse, and the nipple became erect. All the region had become the seat of a sensation of smarting with prickings of the skin, and lancinations into the mammary gland which became heavy. One minute barely was all that was required for all these phenomena to arrive at their apogee.

There are met with now clinical facts which concord with the experimental facts to show, by the objective phenomena, that in

hysterios an extremely slight influence can provoke important functional modifications.

This notion is not without interest in practice: it warns us, in fact, that it is not necessary to attribute the motor phenomena which appear suddenly in hysterios, to simulation, sensorial or psychic, without apparent adequate reason, as, for instance, by the sole fact of their finding themselves in public. In the matter of hysteria, more than in any other, if "one ought never to receive anything for true, without knowing it palpably to be so," according to the principle of Descartes, one must not any the more receive it as false without having acquired the same evident knowledge.

The vaso-paralytic troubles of the skin manifest themselves mainly in subjects of a feeble constitution, or who have been enfeebled by accidental causes. Vulpian observed that in weakened animals there was a great tendency to reflex vascular dilatations.*

On the side of the dermatoses properly so-called which are produced a propos of moral emotions, it is needful to indicate the trophic troubles of the skin and its adnexa. We have cited vitiligo amongst the consequences of the painful emotions.†

OBSERVATION XV.

Troubles of dermal sensibility after an Emotion—Vitiligo.

"Mme. B., 42 years old, has had crises of hysteria in her youth; one of her sisters had them also. She has lost 4 children in convulsions and the last is epileptic and interned in our service at Bicêtre. On the 5th February, 1888, her son went out by permission and having taken too much alcohol, he had a violent anger before her, during which he smashed chairs and vessels and menaced herself. She was not too frightened at the time but in the evening she experienced a general trembling with a sensation of cold of very painful sort. The next day she began to experience unbearable itchings at the neck, on the back, and on the upper part of the upper limbs. This sensation of itching coincided with a feeling of cold in these regions. She did not offer, moreover, any general trouble. These itchings persisted with the same character on the 21st February, when she came to consult at the dispensary. We began to see on the neck small points where the skin offered a manifest discolouration: these points were surrounded by a ring more pigmented than the neighbouring region; there did not exist any appreciable modification of the skin sensibility. When she returned 15 days later the itchings had considerably diminished, but there were formed very characteristic plaques of vitiligo, of which several had the extent of a 15 centime piece. These plaques occupied the upper dorsal region and the neck just to the root of the hair

* Vulpian *Leçons sur les nerfs vasomoteurs*, t. i., p. 66.

† Gailleton. *Traité des maladies de la peau*, p. 44.

which is whitened on the spots. The periphery of the plaques of vitiligo has taken a very marked tint, altogether brown, and this aspect of the skin extends itself all around the neck, which is encompassed by a sort of brown cravat quite close in front, about 4 centimetres in width, and of which the uniform tint is unbroken in the front and side regions by any discoloured point.

"On the 6th March there had no longer been any itchings for about 8 days, the vitiligo has extended to the neck, the plaques are confused: there is one spot of discoloured hair, of the size of a 5 franc piece, but the brown cravat remains intact in front and on the sides of the neck. I have known since that these lesions remained almost stationary."

Pruritus without outward lesions accompanies sometimes the development of vitiligo:* Leloir cites notably an example thereof in an individual who had received on the neck a splash of cold water. But I have not found another fact in relation with a moral emotion.†

By the side of vitiligo one can place canities, the rapid and premature discoloration of the hair. This accident has been studied in very ancient times.‡ Pechlin and Stahl§ have cited instances thereof. Cassan has reported the case of a woman Leclere, who was cited before the Chamber of Peers to witness in the Louvel case, who became white in one night under the influence of moral preoccupation. M. Perry has cited the case of a revolted Sepoy, who became white during the interrogatory to which he was subjected, and which was necessarily the prelude to a condemnation to death. A Dutch physician, Junius, speaks of a Spanish noble who blanched also in one night after having been surprised in a convent and condemned to have his head taken off. The same accident happened to Ludovic Sforza when he fell into the hands of Louis XII., to Lord St. Vallier, father of Diana of Poictiers. Guarini, professor of Greek at Verona, became white all at once upon learning of the loss at sea of a case of M.SS. which he was having brought from Constantinople: if he was an old man or decadent he had not arrived at the stage of infecundity, for he had had, they say, 23 sons.‖ Thompson cites the case of a workman of York, who having fallen from the top of a battlement which he was repairing, saved

* Leloir. *Réch. clin. et anat. path. sur les affections Cutanées d'origine nerveuses.* Th. 1881.

† Boursiac. *Des démangéaisons.* Th. Bord, 1889.

‡ Schmidt. *De Canitie prematurâ. Diss. phys. méd. Madgb,* 1729, p. 11.

§ Zimmerman. *Traité de l'expérience,* 1822, t. iii. p. 44.

‖ G. Pouchet. *Le coloris dans la substance vivante,* v. 171, p. 75, 1872. Rév des Deux Mondes.

himself by keeping hold of the rhone with his hand: after a time he was rescued, but his hair had gone white.

The cases in which the discoloration is not sudden, but very rapid, appear more frequent. Bichat has cited several of them. Moleschott accepts those which were communicated to him by Richter.* He cites cases in which the production of emotional canities is favoured by pressure when the subject has rested the head for a certain time; the head being supported upon the hand, or on an arm, the compressed part is the only one attacked, or at least is attacked in a predominant fashion.†

Alongside the colouration of the skin and hair, it is necessary to indicate pigmentation, which can produce itself under the influence of the emotions. Long Fox cites a fact in which under the influence of anxiety, there is produced a pigmentation almost as great as that of Addison's disease.‡

The fall of the hair is also common after prolonged anxiety: sometimes it takes place very rapidly, in some hours after the acute emotions. The fall of the hair and the canities may be combined: after a rapid fall the hair grows again white. This last effect of the violent and painful emotions is not peculiar to man: Thompson cites, from Young,§ the case of a blackbird (merle), which had been surprised in its cage by a cat, and which when someone arrived to rescue it, was found upon its back covered with sweat; its feathers fell out and grew again perfectly white. A gray linnet having been seized in its cage by a tipsy person who plucked its feathers from it, the bird survived, but its feathers grew again white.

We have seen that, in the normal state, the sthenic emotions entail an increase of the saliva. This increase can constitute a true siallorrhœa: an epileptic of Bicêtre, who put himself into a violent and prolonged anger every time his family went to see him, and refused to take him away, salivated in an extraordinary manner during the several hours during which his irritation lasted. He spat out constantly, and in spite of expectoration a large quantity of saliva ran down his garments. This patient afforded an ex-

* *Influence of Sympathetic on Disease.* London, 1885, p. 497.

† *The Passions of Animals*, 1851, p. 123.

‡ *Infl. of Sympathetic*, 1885, p. 497.

§ *The Passions of Animals*, 1851, p. 123.

tremely abundant salivation in his convulsive fits. Redi admitted that the bite of a viper is only venomous when it is angered. We know even, says Le Cat, that the bite of the least venomous animal becomes venomous almost equally with that of the viper, if we put it into a degree of passion: and the same author believed that an individual carried away by a violent anger could, by biting himself, communicate hydrophobia to himself.

The painful emotions which, as we know, frequently determine the momentary suspension of the saliva, can determine a permanent dryness of the mouth, observed perhaps for the first time by Laycock,* and described since by Weir Mitchell, Hutchinson, Butlin, Morgan, Hadden,† with more precision. This accident presents itself especially in women at the menopause. Sometimes, along with the salivary secretion, the secretions of the nasal and lachrymal glands are also dried (Hadden).

The emotions have a great influence upon the digestive functions. If the tonic emotions facilitate digestion, as Descartes has already remarked, the painful emotions act in an inverse sense. If, someone, says Bacon, feels himself agitated by some passion of a violent kind at the moment of sitting down to dinner, or going into bed, he ought to defer taking the repast or going into bed. In rabbits, after subjection to operations upon the nerves, Cl. Bernard‡ observed that the gastric juice became bloody. The painful emotions are capable of drying the secretion of gastric and intestinal juices: disappointments, preoccupations provoke a constipation which can proceed even to occlusion of the intestine (Cherchewsky). The energetic excitations of the peripherical nerves can determine arrest of the rhythmical movements of the stomach as well as those of the intestine. The same arrest, and perhaps the permanent dilatation of the stomach, can result from painful emotions.

The pathological influence of the emotions upon the biliary function has been remarked from of old: no one has the smallest dubiety about emotional jaundice.§‖ After an acute moral emotion, in general fright or anger, there is produced an icterus which appears,

* Laycock. *A treatise on nerve dis. of Women*, 1840, p. 267.

† *Xerostomia (Brain*, 1889, v. xi., p. 484).

‡ *Leçons sur les liquides de l'organisme*, v. ii., p. 405.

§ and ‖ *Quercitanus (Diaeteticon polyhistoricon. Genova*, 1528, p. 51). Ch., "*De irâ aut biliosâ affectione.*"

it may be some hours after the blow, it may be only after an interval of days. Diderot having been one day witness of an execution returned with a very pronounced jaundice.* This icterus is more or less intense and durable, but it is cured as a rule. It is only among neuropaths, among "bilious" folk, as it is vulgarly put, that we see it appear. Its pathogeny is still very obscure: doubtless the mechanical retention of the bile is capable of provoking icterus, undoubtedly the biliary passages are in a certain degree contractile, but no one has provoked in the biliary passages any but barely apparent contractions, and in every case incapable of provoking an obstruction of the calibre of the excretory canals. There is no experience which proves, whatever some may say,† that the biliary passages can contract themselves under the influence of a cerebral excitation. The most plausible is that which has been put forward by M. Potain: under the influence of moral shock, there is produced a dilatation of vessels in the abdomen: the pressure diminishing in these vessels whilst the internal pressure of the biliary vessels remains unmodified, the passage of bile elements by osmosis, or otherwise, from the biliary canals into the blood vessels becomes easy.

Emotional icterus coincides sometimes with skin eruptions.‡ It appears to assume a special gravity in pregnant women.§ We have cited cases in which icterus reproduces itself to every emotion of a similar kind:‖ Royer cites the case of a young man, who every time he became angry, took on an icteric tint requiring two days for its disappearance.

The sad emotions, especially when they are prolonged, can favour the formation of biliary calculi, it may be primarily, by the delayed nutrition which they provoke: it may be secondarily by determining an exaltation of brain activity which associates itself to an excess of production of cholesterine.

The acute emotions provoke very often hepatic colics, it may be by increasing the quantity of bile flowing into the biliary passages, it may be by the spasmodic contraction of their walls.

* *Essai sur la pathogénie de l'ictère émotif.* Th. 1890. Dafraignez.

† Moreau. *Les Fac. Mor. Consid. sous le point de vue Med,* 1886, p. 140.

‡ Negel. *Nu cas d'ictère emotif (Ps. Med.,* 1886, v. iv., no. 34, p. 689.)

§ Bernheim. *Ictère. (Dict. Encyc.,* 4th ser., v. xv., p. 429).

‖ Roger. *De l'influence,* etc. Th. 1803, p. 41

A moral emotion can suspend the secretion of milk during twelve or twenty-four hours, the nipples subside, and remain empty,* and the milk can subsequently lose a portion of its qualities. Albinus attributes to the same qualities of the milk the death of a child who was attacked by hemophillia after having drawn suck from its mother after the latter recovered from a syncope induced by a terrible emotion. Desormeux, Dugès, Stork, Brachet, Underwood, etc., have admitted after observations that convulsions of infancy can have their cause in an anger or a violent chagrin of the nurse.† We have instanced irascible nurses who seemed to kill the infants whom they nursed: several times the death has been produced suddenly. A much more common accident, but which might have equally grave results, is diarrhœa (Bouchut, Rayer, etc.).

We have seen that the emotions can provoke in the physiological state, modifications in the urinary secretion and excretion. In general polyuria is induced. In certain conditions this polyuria can last several hours or several days. But it is not only in its quantity that the urinary secretion can be modified. J. Teissier (de Lyon)‡ has observed a transitory albuminuria after acute emotions: I have seen it also twice in epileptics. Richardson has observed polyuria and glycosuria associated with moral shock. The development of glycosuric diabetes is influenced by depressing emotions: and the diabetic accidents, notably coma, can be provoked by a moral shock. Azoturic diabetes can also develop itself under the same influence (Rendu), which acts very efficiently upon the quantity excreted.

Most of the painful emotions entail only depressing phenomena after a transient excess of excitation, which has determined a general exhaustion of the organism. They are accompanied frequently by spasms which do not spare the muscles of organic life: A. Petit reports that, during the siege of Lyons, and in the most frightful time of the terror, there were many laborious accouchements due to vice of position, and that "turning" had to be resorted to in a great number of cases. One might attribute displacements of this kind to the provoked movements of the fœtus, movements

* *Jacquemier, art Allaitement D. En. &c.*

† Sous. *De l'infl. im. des em. morales de la neurrice sur la santé des enfants à la mamelle.* Th. 1859.

‡ Michel. *Cont. à l'étude.* Th. Lyon, 1885, p. 30.

which we have seen produce themselves under the influence of outward excitations or emotions.* But the observation of Lallemand is not susceptible of the same interpretation. This author instances a woman, who, surprised immediately after connection by the entrance of a person who opened the door suddenly, remained speechless, agitated: she became enceinte, and when she died at the sixth month, at the autopsy, an extra-uterine pregnancy was found.

The influence of the violent emotions upon the contraction of the uterine muscle, and upon the premature expulsion of the fœtus, has been long known.† Garman has reported an observation having for its title "de tonitru obstetricante." One can only accept the evidence of this author with reserve, for he shows himself extraordinarily credulous: he proves it in the history of a man who vomited white cats, but he is not the only one to believe in the influence of fear upon abortion.

Van Swieten has attributed abortion to fear. Baudelocque recalls, in his lessons, that during the first eight days which followed the powder explosion on the plain of Grevelle, he was called to 62 women in peril of, or actually, aborting. Several fœtuses died at the mother's breast. Schmidt and Menard charged in 1793 with the service of the military hospital of Landau at the time of the explosion of the arsenal of the place, communicated to Percy a report in which it is noted that of 82 infants born in the months which followed, there were sixteen of them who perished at birth, being premature, there were eight of them who fell into a sort of cretinism, and who died before the age of five years, 33 lived languishing till eight or ten years old, and 22 came into the world with fractures of the long bones.‡ One can entertain some dubiety as to the multiplicity of the fractures, but it is certain that most of the other accidents have also been observed at the siege of Landrecy, and even more recently after the siege of Paris.§

We know that maternal emotions have an action on the fœtus which reacts by so-called spontaneous movements. It is possible that in the violent emotions these movements become convulsive.

* Ch. Féré. *La Psychologie du foetus* (Rev. Ph. 1886). *Sensation et Mouvement*, p. 90.

† *De l'influence des maladies de la femme*, etc. *(Extr. des Mem de l'Acad de Med.*, 1861, p. 117.

‡ *Les Enfants du Siège (Pr. Med.* 1884, 29 Mch., p. 246).

§ Hennart. *Sur les reflexes d'arrêt de l'estomac*, th. *Lille*, 1892.

Gintrac* reports the fact of a sensitive woman, vaporous, having an extreme fear of storm, which fatigued her excessively: "She is in the family way, and each time that her son has attacks of epilepsy she feels in her belly violent blows which she attributes to analogous blows from the infant she is carrying."† Smellie has reported an analogous case. A great number of maladies, and in particular epilepsy, have been attributed to maternal emotions occurring during pregnancy: this influence does not seem disputable, and it is perhaps still more evident for idiocy (A. Mitchell, Langdon Down).

The mother of Hobbes‡ brought him into the world under the influence of the terror produced on the English coasts by the invincible armada of Philip the II. in 1588. Hobbes, although puny from his birth, lived 92 years: at 83 he published a translation of Homer, and at 88 his Cyclometry: his materialism has practically given two generations of prosperity to England: but he was not the less subject, all his life, to morbid fears.

A great number of developmental troubles of monstrosities have been attributed to violent emotions supervening during pregnancy. This influence does not seem disputable. According to the epoch of the embryonic or fœtal period to which the product of conception was subject to this influence, one may observe disproportions of the cranium or brain, of the spine or cord, of the face or members. Hemophilia shows itself in infants whose mothers had suffered a violent emotion during pregnancy.§

This influence of the violent emotions upon pregnant women and upon the fruit of conception was well known to the ancients. Solon forgave a murderer who found asylum with a pregnant woman; Galen forbade coitus with pregnant women.

If moral emotions can provoke involuntary emissions of urine in other circumstances psychic excitation is capable of determining spasms constituting true strictures of the urethra.‖

The acute emotions accompany themselves sometimes, in predis-

* Gintrac. *Mém. sur l'influence de l'hérédité mém. dr. l'Acad. de Méd.* 1895, t. xi. p. 321.

† Courby. *Des effets généraux des passions dans l'économie animale et de leur influence chez les femmes grosses.* Th. 1807, No. 9.

‡ Lange. *Histoire du Matérialisme*, t. i. p. 243.

§ Rochard. *Hémoph. Dict. Encyc.*, v. 13, 2nd ser., 1888, p. 294.

‖ Laycock. *Nervous Diseases of Women*, 1840, p. 173. Lucas. *Influences of Common Senses on Organic Functions (Lancet*, 1881, vii., p. 205.

posed individuals, with involuntary seminal emissions. In the following case these emotional seminal losses have preceded the evolution of a general paralysis.*

OBSERVATION XVI.

Morbid Rages—Seminal and Emotional Losses—Progressive General Paralysis.

"M. G., æt. 39 years, professor in a provincial school. His father died of general paralysis at the age of 41 years. An aged sister has, from the age of 17 years, hysterical accidents, and has lost by convulsions six infants which she has had. Himself has been always well till 1887. So far as nervous accidents he has only presented singular excitements and depressions alternately. For several months he was extremely salacious; and, after, he remained several other months without any desire; besides, it happened to him several times, and this act goes back to his college life, to have seminal losses under a strong intellectual contention; these losses produced themselves when he applied himself strongly to a composition for examination, or, later, to a lesson which he had taken to heart.

"In 1887, towards the month of June he began to experience, after domestic annoyances, a sensation of coldness of the extremities producing itself under the form of paroxysms, and predominating, at first, in the upper limb. These sensations of coldness were accompanied to curvatures appearing often suddenly and disappearing similarly after having lasted some hours or one or two days. At the end of some months his character was altered; he has for the slightest occasion unwonted and extremely violent angers; these were accompanied by ejaculation which brought a sudden end to the emotion. Since the month of February, 1888, he has lightning pains in the lower limbs and in the flanks, and from time to time troubles of walking; he trails the right limb, the foot seems to him on cotton. To these symptoms are added transitorily, in the course of 1888, troubles of the motility of the eyes; a falling of the eyelid on the right, paralysis of the left outer rectus, pupillary troubles.

"Up till the month of March, 1889, he had been able to fulfil his functions, but his limbs becoming gradually enfeebled, it happened to him from time to time to fall, which constrained him to take repose. A short time after, moreover, having tumbled down a stair, and being much bruised in the forehead, he began to experience headpains; and loss of memory, which had perhaps passed unperceived till then, became very manifest. At the same time his speech was occasionally embarrassed. The right hand began to tremble, he had also fibrillary tremblings in the face mainly on the right side. The mind gradually became enfeebled, the rages gave place to fits of weeping, the patient wept for the most futile reasons for hours, then, all at once his face illumined.

"On the 10th December, 1889, he had a first epileptic attack limited to the right side of the face and the arm. This attack had been preceded for some minutes by an extremely abundant salivation. The patient did not seem to

* Ch. Féré. *Note sur un cas de sialorrhée paroxystique dans la paralysie générale* (*C. R. Soc. de Biol.*, 1891, p. 321.)

be embarrassed by the expectoration of the saliva which found issue by the corners of the mouth.

"Since this period M. G. has had twelve epileptiform attacks, mostly limited to the parts of the right side first attacked, at others more extended, and three of them generalised by loss of consciousness. All these attacks have been preceded by the same phenomena of salivation which were never presented alone, and have been considered by the relatives of the patient as a necessary prelude.

"Actually (on the 3rd February, 1891) the symptoms of general paralysis are too numerous to leave any doubt: slight ptosis upon both sides: unequal pupils; Argyll Robertson symptom: right hemiparesis, especially marked on the face and upper limb, feebleness of the limbs: spinal epilepsy: vesical troubles: anæsthetic and hyperæsthetic spots. Stuttering: amnesia, ideas of satisfaction: absurd projects: voracity, complete anaphrodisia. After the three last attacks the patient has been completely hemiplegic for several days."

M. Malecot* has cited analogous cases of spermatorrhœa producing themselves apropos of intense mental disturbances or muscular efforts. Liard pointed out sperm flux in terror.†

Some have attributed to the emotions immediate and profound troubles of nutrition. It is thus that Dela Brousse cites a case of gangrene in disseminated spots producing itself in an infant three years old five hours after a fright. But the case is highly disputable for several reasons.‡

Van Swieten admitted the influence of fear on the development of tumours, and especially of tumours of the breast: and Hoffmann believed that this influence made itself felt especially during the puerperium. Chomel reckoned the moral emotions amongst the causes of cancer:§ and Laennec that they had a certain influence upon its course: many authors have recognised their importance in the evolution of the cancer of the stomach.

Lebert‖ disputes the opinion generally admitted relative to the influence of the emotions upon the development of cancer. The fact is that the observations are rarely of satisfactory clearness, when especially it concerns tumours developed at the expense of organs whose destruction or partial compression entails no very characteristic troubles: but when it concerns the brain and spinal

* *De la spermatorrhée*, th. 1884, p. 65.

† Liard *Sur les phen. phys. et path. des passions et des affections de l'âme et sur le parti qu'on en peut tirer dans la thérapeutique* (th. 1885, no. 47, p. 27).

‡ De la Brousse. *Sur un sphacèle produit par une frayeur* (*J. de Med. et Ch.*, 1764, t. xx., p. 57).

§ Chomel. *Eléments de pathologie générale*, 3rd ed., 1849, p. 99.

‖ Lebert. *Traité pratique des mal. cancéreuses*, 1851, p. 132.

cord it is not very rare to see the explosion of pathognomonic symptoms provoked by a moral emotion. One can only say that, when the emotion does not act upon the specific elements of the tumour but on the vascular elements which modify its volume. This remark applies to tumours of every description.

Let us note, however, as Reibel noted, amongst the effects of the bombardment of Strasburg, a rapid evolution of cancer.

A certain number of trophic troubles develop themselves after disappointments or depressing emotions.* Rossbach has indicated a symmetrical atrophy of the bones of the cranium which he could attribute to this cause.

Pel† has published an observation of acromegaly developed under the influence of fright in a young girl, 25 years of age, without either personal or hereditary antecedents, who, during the menstrual period, falling down a dark stair, was caught by a man passing by; she took him for an aggressor and fled under the impression of terror. From this day she experienced pains in her limbs, in her head, asthenopia, considerable depression, profuse sweats, amenorrhœa, and an increase in the volume of the extremities.

The sad emotions can, in fact, provoke general troubles of nutrition such as obesity.

OBSERVATION XVII.

Disappointments and Prolonged Preoccupations—Obesity Rapidly Developed after their Cessation.

"M. P., 44 years old, is of tuberculous origin. His father was, his only brother is, phthisical. His mother is dead of cancer of the breast. In 1883 he lost his wife from phthisis: he has only one daughter, subject to Pott's disease, and living in a gouttière already for two years. M. P., who was devoted to this infant, lived in continual disquietude. At the end of some months, his misfortunes were increased by the death of his partner. He had never been stout, but now he became excessively thin. He coughed a little: had sweats upon the slightest exercise, and spontaneously at night, so much so that among his relatives some were uneasy about his health: so much the more as the little girl had developed lung disease, and M. P. lived almost continually in her chamber. On the 23rd of June, 1885, the girl died of hemoptysis.

"The father was violently chagrined and demonstrative for several weeks, then he calmed himself, and slept, and took suitable food. Dating from this

* *Neurotische symetrische Atrophie des Shocdeldacher.*(*Deutsch Arch fur Klin. Med.*, 46, p. 161).

† *Pel. Ein Fall von Acromegalie in Folge von Schreck* (*Berlin Klin. Woch.*, 1891, p. 503).

time he began to get stout, which disquieted him, not being able to understand that he could grow fat living so sadly and simply. Previous to all these vexations M. P. had never weighed more than 60 kilos; he is 1 m. 64 high. On October 30th, 1885, he weighed 82 kilos: on January 16th, 1886, 90 k. 500. He tried violent exercises, but without any result. The fatness did not actually proceed to deformity. M. P. did not have recourse to any medical treatment. On May 12th he weighed 102 kilos, on July 15th 106 kilos. Since that time the weight of M. P. has oscillated from 106 to 112 kilos."

This fact merits comparison with those in which obesity develops after acute ailments which modify nutrition profoundly.

The relation existing betwixt the activity of the nervous system and resistance to the causes of destruction can be put in evidence by facts of different kinds. We have often remarked, what the registers of the academies confirm, that one meets old men among savants and men of letters frequently. Whether this resistance can be attributed to the habitual exercise of the intellectual functions,* or to the fact that the vital resistance and the intellectual power are conjointly attributable to a good original organisation, the relation thereof is not the less certain. The same relation is found again subject to the same interpretations amongst uncultured people whose existence has been, so to speak, entirely organic, and who are more exposed to intempestive weather, and all chances of mortality. Cabanis† attributes to Baillou the remark that porters and labourers resist bleedings and purgatives badly. Nothing is more remarkable than the facility with which the feeble succumb to acute ailments of every description.‡

Several virulent maladies remain, moreover, as having been produced entirely under the influence of moral emotions.§ Sennert believed that fear was capable of provoking erysipelas: Hoffmann also made fear play, together with the resulting adynamia, a leading *rôle* among the predisposing causes of contagious diseases. Hack Tuke‖ especially admits the influence of fear upon hydrophobia: several times we have traced an explosion of hydrophobia after a psychic emotion. Bouley instances the case of a dog become rabid

* Alibert. *Physiologie des Passions*, 3rd ed., 1837. v. i., p. 18.

† Cabanis. *Rapports du physique et du morale de l'homme*, 1802, t. i., p. 466.

‡ Langdon Down. *Loc. cit.*, p. 114.

§ Mondville. *De la rage spontanée produite par des affections morales*, th., 1821.

‖ H. Tuke. Illustrations of the Influence of the Mind upon the Body, 1872, p. 204.

after immersion in water. Gamaleia* cites an analogous fact in man: and another in a woman frightened by a drunken man: this last case, where cold was not the cause thereof, is more interesting. It was to get rid of the influence of fear that Desgenettes concealed the name and nature of the plague: it is remarked also that the Turks die thereof less frequently than the Christians.

Cullen† admitted that the sad emotions favour the contagious diseases, and particularly the plague. This aptitude for contagion after violent emotions which determine secretory discharges can explain itself, in part, by this circumstance that all the conditions which diminish the proportions of the liquids of the blood favour absorption. But it appears at least probable that the nervous discharge accompanies itself also with changes in the blood, modifications of interior environment, which justify the popular expressions: "make bad blood," "turn the blood."‡

We admit that a violent emotion is capable of curing intermittent fever and of causing the same.§

OBSERVATION XVIII.

Paludism Revived by an Emotion.

"At the end of June, 1889, Dr. Jullien, surgeon to St. Lazare, called me into consultation concerning Count X., an hypochondriacal neurasthenic, who believed himself the subject of ataxia. He was a vigorous man, without marks of degenerescence, but very emotional. He had had some fits of ague in Poland a dozen years previously: he had suffered nothing of it since. Finding himself at St. Petersburg, near the place where the Emperor Alexander II. perished tragically, he suffered a violent emotion, after which he had for three days well marked fits of fever. A fresh fit was induced at Paris, some months before our visit, apropos of an emotion he experienced, on finding dead, at the Beaujohn Hospital, an equestrienne whom he knew."

Ancient authors make the emotions figure largely in most of the eruptive fevers. We find them again in the etiology of cholera.

Pneumonia can break out on the occasion of an acute emotion. Rostan‖ has reported the history of a woman who was struck suddenly with a very grave pneumonia upon the news of her son's death.¶ Grisolle has observed it in a woman who, apprehending

* *Etude sur la rage paralitique chez l'homme* (*Annales de l'institut Pasteur*), 1887, t. i., pp. 66 and 82.

† Cullen. *Eléments de médicine pratique; trad. Bosquillon*, 1785, t. i., p. 427.

‡ Brifseaud. *Loc. cit.* p. 95.

§ Bouygues. *Ann. méd. psych.*, 1857, 2nd ser., t. iii. p. 660.

‖ Brochin. *Art, passions. Dict. encyclo. des sc. méd.*, 2nd sér., t. 21, p. 519.

¶ Grisolle. *Traité de la pneumonie*, 2nd en., 1864, p. 155.

that she had been robbed, experienced instantly a violent shaking which was followed by a shivering, a side pain, and red spots.

The depressing emotions appear to have frequently an action upon the development of tuberculosis.

Laennec admitted that disappointments and torments are largely responsible for the frequency of consumption in large towns.

Puerperal infection appears also to be favoured by depressing emotions. "I have seen many times amongst my patients," says M. Hervieux,* "young accouchées in the way of restoration take a chill and become mortally ill after a visit or intemperate reproaches made by their mother or a relative; or after an agitation or perplexity which determined them to abandon their infant, girl mothers, up till then very well, falling ill the day succeeding the execution of this project, and succumbing a short time after." Rivière, Willis, Denman, Delaroche, Paul Dubois, Alexis Moreau, Tonnelé, etc., have attributed an important *rôle* to the emotions in the causation of the diseases of lying-in women. And their opinion has found support in more recent observations.†

The emotions play also a *rôle* in the evolution of surgical maladies, and especially in their infectious complications.‡

The theories put forth recently in order to explain the contagion of, and immunity from, infectious diseases can be brought into accord with what we know of the facts relative to the influence of the emotions. Amongst these theories there is one of them to which the facts bring a serious support. In this theory they are the phagocytes, and especially the white globules, which are charged with the protection of the organism against the invasion of the microbes. We know that the leucocytes have the property of moving and putting forth prolongations in a manner so that they surround the strange bodies, and compel them to come within the protoplasm of their own bodies. They behave towards microbes similarly, which, once surrounded, will be destroyed by a true intracellular digestion; it is to the totality of these

* Hervieux. *Traité clin. et prat. des mal. puerp.*, 1870, p. 46.

† A. H. Wright. *The emotional element in the puerperal period* (The journal of nervous and mental diseases, March, 1891.)

‡ Baumés. *Observation sur une mort causée par un accès de colère à la fin de la résolution heureuse d'une abscès laiteux* (Jl. de Med. et Ch. 1870, t. liii, p. 513.)

Bonnefoy. *Quelle peut être l'influence des passions dans les maladies chirurgicâles et quels sont les moyens d'en corriger les mauvais effets?* (Mem. de l'Acad. de Ch. 1783, t. v. 2nd part, p. 865.)

operations that has been given the name of phagocytism. It is admitted that dilatation of the small vessels favours the issue of the phagocytes, and consequently phagocytism.* But the dilatation of the peripherical vessels finds itself realised in the sthenic emotions where it is expressed by redness, increase of volume, functional exaltation.† In the asthenic emotions, upon the contrary, the inverse phenomena entail a diminution of circulation. In the asthenic emotions, on the contrary, the inverse phenomena bring about a diminution of the calibre of the vessels, and diminished circulation, and consequently a condition unfavourable to the issue of the white globules, and to phagocytism. The asthenic emotions realise, from this point of view, the same conditions as the traumatisms, fatigue, cold, inanition, blood losses, nerve sections.

The conditions of the vessels are not the only ones to change: the phagocytes and the white globules especially are modified in their vitality, their chimiotaxie, their property of being attracted or repelled by microbes; or their products of secretion vary under the same circumstances; under the influence of cold the white globules tend to become paralysed.‡

MM. Massart and Bordet,§ whose experiments appear to demonstrate an absence of relation betwixt the chimiotactic action of the leucocytes and the state of the vessels, admit that in the defective conditions of nutrition, the entire organism becomes the more easily infected by a poison which provokes at all points the chimiotactic activity of leucocytes, which have no special reason to direct themselves to one particular point. The modifications of the composition of the blood which we have pointed out in the wake of nervous discharges and in the emotions can further adapt themselves to this theory.

The experimental facts show that in all the conditions where nutrition is in default, and a painful emotion is one of these, infection happens easily. And it is not only on animals that the fact is put in evidence: I have had occasion to observe on man several

* Metchnikoff. *Leçons*, 1892.

† Bouchard. *Essai d'une théorie de l'infection* (Cong. Int. de Berlin, 1890.)

‡ Herman. *De l'inft. de quelques variations du terrain organique sur l'action des microbes pyogènes* (Ann. de l'institut Pasteur, 1891, t. v. p. 253.)

§ Massart and Bordet. *Le chimiotaxisme des leucocytes et l'infection microbienne* (Ann. de l'institut Pasteur, 1891.)

facts which come to support the results obtained in the laboratory.

Having to re-vaccinate the patients in my wards I have inoculated symmetrically on the two arms one dozen hemiplegics, with a view to observing if the paralysed side would present a different resistance to the virus.* In none of these cases was the true vaccine pock produced, all having been vaccinated three or four years previously. Upon three only were there developed pocks of false vaccine exclusively upon the hemiplegic side in one and with a marked predominance from the point of view of volume and duration in the two others.

On a little girl of 18 months attacked with infantile† spinal paralysis of the lower left limb with considerable coldness, I have practised on the outer part of each arm four punctures with a lancet charged carefully from a tube containing vaccine; the innoculation only showed reaction upon the affected side. Some other more recent experiments indicate the same results.‡

On the other hand, certain medicines depressing to the nervous system, like opium, morphia, chloral, potassium bromide,§ appear also to favour infection.

Moreover, the influence of the emotions upon infection is susceptible of a direct experimental demonstration.

Having at my disposal a number of mentally feeble folk capable of taking interest in a monotonous exercise, I have profited thereby for the purpose of experimenting upon a large number of pigeons, rabbits, and white mice, with a view to finding out the effect of fear which one provokes by the help of a noise or menacing movement, during several successive hours.

The experiments can be divided into three groups: 1st. We have mixed the blood of frightened animals and animals witnessing them. Whilst the blood of the last showed itself sterile, that of the first showed itself once or twice full of more or less numerous colonies.

2nd. We innoculated with cultures of pathogenic microbes (anthrax, chicken cholera, swine fever, Fraenckel's pneumococcus) animals, of which one set was tranquil, and the others were tor-

* Féré. *Influence du système nerveux sur l'infection* (C. R. de Soc. de Biol, 1889, p. 532.)

† *C. R. de Soc. de Biol*, 1890, p. 512.

‡ *Ibid*, 1892, p. 103.

§ Ch. Féré. *Note sur l'influence de la bromuration sur la tuberculose expérimentale* (C. R. de Soc. de Biol, 1891, p. 668.)

mented. In all these experiments, without exception, the frightened animals died first, if they were subjected to virulent cultures; when to attenuated cultures they only died, or were only ill.

We have seen animals little susceptible to an infection succumb thereto under the influence of fright: tormented pigeons have succumbed to swine fever, whilst the witnesses thereof did not appear at all affected.*

3rd. Upon introducing under the skin of the ear,† or under the skin of the chest of rabbits, under the skin of the wing in pigeons, capillary tubes closed at their end, and filled with cultures of pathogenic microbes or saprophytes, we have determined considerable differences in the chimiotactic properties of the white globules according as they act upon animals in repose. In frightened animals we have discovered frequently the tubes filled with transparent liquid throughout the whole of their extent at the end of 24 hours, whilst in the witnesses the tubes enclosing in all their extent white streaks were obliterated at their free extremity by a compact plug of leucocytes, two or three mm. in length. In sound animals most of the microbes had disappeared, whilst there remained of them a very great quantity amongst the others where the microscope could only discover rare leucocytes.‡ We can, however, demonstrate experimentally, in frightened animals the absence of one of the conditions of resistance to infection. The study of these merits being pursued in detail.

We know what influence local traumatisms have on the localisation of the accidents of infections and maladies of nutrition. Moral shock constitutes in reality a brain commotion: and, without forcing analogies, one can understand that it provokes more readily cerebral lesions.

* The same fact has been observed on brominated pigeons and confined in darkness.

† Gabritchewsky. On the chimiotactic properties of Leucocytes *(Ann. de l'institut Pasteur)*, v. iv., 1890, p. 346.

‡ Massart and Bordet have seen chimiotaxy diminish in intensity under the influence of Chloral and also of chloroforms (*Ann de l'institut Pasteur*, 1890, t. iv, p. 346.)

CHAPTER VII.

Pathological Effects of the Emotions *(continued)*.

Summary—Influence upon Development and the Course of Nervous Maladies—Hysteria—Neurasthenia—Epilepsy, etc.—Influence upon Mental Maladies.

The ancients, and Tissot, in particular, had already noted that it is especially upon nervous maladies that the influence of the emotions is most marked.*

It is especially upon the neuroses that the emotions, and particularly the depressing emotions, like chagrin, fear,† have a very etiological influence, equally in provoking the initial appearance of the troubles as in exasperating them or multiplying their attacks. Georget had already pointed out the frequency of the moral emotions in causing hysteria. The statistics of M. Pitres‡ exhibit the influence of this cause in eight men of 34; and in 54 women of 69. The moral emotions act on the beginning of the neurosis which is a consequence of a general depression of the organism: and they have, besides, a most effective action upon the determination of polymorphic manifestations.§ Convulsive attacks, localised spasms, dysphagia, dyspnœa, paralysis of the limbs, mainly the lower, aphasias, affections of general and special sensibility, vaso-motor troubles, œdemas, congestions, hemorrhages, over-secretions, visceral troubles, mental troubles. Hysteria, of and by itself, can furnish a synthesis of emotional pathology. If the hysterical troubles of emotional origin are especially frequent in women they are not exceptional among men.‖

This is a fact well set in light by Calmeil and Briquet, but which has become evident in these last years. The relations of hysteria with the moral emotions have been well observed by Marshall

* Calabre. *Sur l'influence de l'éducation, des habitudes, et des passions dans les maladies nerveuses.* Th. An. xii., no. 257.

† Jacquard. *La Peur.* Th. 1871.

‡ Pitres. *Clinical Lessons on Hyst. and Hypnotism*, 1891, t. i., p. 36.

§ Lavirotte. *Obs. sur l'effets de la colère (Gaz. des Hôp*, 1848, p. 273). Lorain. *Des émotions soudaines chez les femmes (Arch Gen de Med*, 1875, t. i., p. 205.

‖ Ferrier. *Histories and Reflexions*, 1810, vol. i., p. 128.

Hall: "There is a near connection between emotion and hysteria, which is doubtless very much a disease of emotion: the same organs, the same functions, are affected."*

Handfield Jones has noted a case of cerebral neurasthenia with night sweats following fear.† Moreover, the sensory troubles which are not wanting in analogy to those of neurasthenia have been pointed out by other authors. Favre‡ has remarked that Daltonism can be produced equally well after moral emotions as after great fatigues.

OBSERVATION XIX.

Neuropathic Heredity, Prolonged Disappointments, Neurasthenia, Dyslexia, Dysgraphia.

"M. P., 39 years, commercial, did not know his father, who died of consumption, some days prior to his birth. A brother of his father has been 'odd' ever since his birth, and is the subject of dementia, now of senile kind. He is 68, and in an asylum. His mother is 60, she has been a sufferer from grand hysteria: actually she enjoys perfect health, and appears much less than her age. M. P. has only had one sister, born after him, and who died of meningitis at the age of three years.

"He himself always enjoys good health, had no convulsions in infancy, nor any neuropathic trouble: he had smallpox and scarlatina successively in his 16th year. He has been married since 1876: his wife has excellent health, is not at all nervous, and presents no hereditary neuropathic antecedents. He had a son in 1877 and a daughter in the following year. The son has excellent health, is well developed, and intelligent. The daughter began to walk and speak at the age of nine months, she 'came right' at an early time, but she has been attacked by a great number of acute maladies: she has had several pseudo-meningitic attacks; smallpox, scarlatina, varicella, quinseys; almost every winter she was attacked by false croup. Although this child, who had given so much trouble, had been well spoilt, she was very wise, sensible, sweet, and affectionate: but, from the age of five or six, people remarked that she lowered her eyes and blushed, whenever she saw or heard, whatsoever it might be, which had a significant bearing nearly or distantly to the sexual organs. These reactions produced themselves, most frequently, in cases where the persons present could have been in no way shocked. This peculiarity caused astonishment in the family, when one day the mother of the infant surprised it in the arms of an old man who had the *entrée* to the house, and who, as was discovered later, practised perineal coitus upon her. They hid this from the father: but no one could conceal from him at the same time that his child had inveterate habits of masturbation, which she admitted in the most open way in the world. The father was much occupied with this matter, consulted several doctors, tried every means to establish an effective oversight, prayed,

* M. H. *On the Dis. of the Nervous Sys.*, 1841, p. 257.

† *Loc. Cit.*, p. 161.

‡ Farre. *Reforme des Employès de chemin de fer. (Cong. de l'assoc. franç*, 1873, p. 854).

promised, menaced. His daughter had become his constant preoccupation. Nothing was of any use.

"When I saw her for the first time, on the 29th October, 1889, she was 10½ years old, her physiognomy struck one at once by the expression of the countenance, which was that of a much older person. When one hid the lower half of her visage one would say she was 16 years.* She did not offer, moreover, any neuropathic trouble, nor any permanent marks. She replied most intelligently, and promised all one wished. I threatened her with local cauterisations if she did not keep her promises, but I remained well satisfied that nothing would change her conduct. This is, in fact, what happened, and I made slight cauterisations with the thermocautery every eight days upon the labia majora. It was the father who brought her, and he was greatly moved about her, and I noted, and at each visit even, that the signs of emotion were more marked: one saw his visage pale and cover itself with a cold sweat: one day he had even a syncope. It was quite necessary to maintain this kind of intimidation, which, after a while, restored her somewhat. At the end of three months the first menstruation produced itself. Dating from this the character of the child modified itself in an extraordinary manner rapidly, at the same time that she developed physically. She grew two c.m. in a month. The cautery had been interrupted, the child appearing to have completely lost its habits. The cure must be attributed much more to the constitutional crisis than to the treatment: the father did not think thus, and showed himself well pleased. But he began himself to complain of troubles which were only slowly developed since he was under the sense of his permanent preoccupations.

"M. P. has become very emotional, the face and ears become congested under the influence of the slightest emotion: he is irritable, allows himself to be engaged otherwise than usual, and thereafter prostrate. He is undecided in a manner unknown to him before, he discusses long before deciding for himself a journey on foot, he puts off several days before replying to a letter. He believes always that he is deceiving himself or being deceived.

"But, outside these phenomena, which attracted the attention of his immediate friends, he complains of a general lassitude which attacks him especially in the morning: he finds himself more fatigued when he rises than when he lay down. His head is heavy, he is incapable of undertaking any labour. Gradually he recovers, but it is only towards night that he resumes a little activity. He complains of an almost constant pain in the nape of the neck, and frequently of intercostal pains. He has, from time to time, pains which dart into the limbs. We find, moreover, on his skin several hyperæsthetic spots, notably on the back and on the wrists. Special sensibility is not affected in a gross manner, but the patient is incapable of reading for long: when he has read for five or six minutes, he can no longer recognise the value of the letters; he sees them, but is incapable of forming them into words. Although the muscular feebleness may not be very apparent, M. P. has also a special impotence for writing: when he has written a page he becomes incapable of continuing. He makes to re-read what he has written: if he would write such or such a character, letter, or figure, he is still able:

* *Arch. de Neurologie*, 1887, t. xiii., p. 120.

but he is incapable of constituting a word. When he has rested for some minutes then he can resume the composition of his letter."

This neurasthenic state, which had taken four or five months to develop, has taken six months to rectify, although the moral conditions were completely changed. Chagrin had determined in this man *physical conditions* which could not instantly cease, but only after a long time, and under the influence of a physical treatment.

Among the painful troubles provoked by the emotions there must be mentioned the hysteralgias, migraine, and neuralgia of the trigeminus. Fear or fright can also determine perversions of the organs of special sensibility, losses of memory, tinnitus aurium,* or sensations of a subjective kind, such as violent sensation of epigastric shock.

The effects of exhaustion consecutive to the violent emotions manifest themselves also by troubles of sensibility. Under the influence of painful emotions especially we see frequently in hysterical persons painful points appear, spots of dysæsthesia, which, like those which we see appear in the same subjects at the fall of night, have an organic basis. They appear when nutrition undergoes a depression; pain, as Romberg says, is the prayer of nerves which demand a more generous blood supply.† We have cited cases of deafness and blindness caused by fear: Wilde says that fright has caused in young people the sudden loss of hearing, and that this deafness is generally incurable. Favre observed Daltonism in the wake of moral emotions, as after severe fatigue. Amblyopia has been observed very frequently: sometimes it coincides with a sudden amenorrhœa.‡

The asthenic emotions determine very various motor troubles. Falconer attributes stuttering to anger. Troubles of articulation can be annexed to emotions at two different periods. In the period of exaltation they are due to spasmodic contractions; in the period of depression to exhaustion: they are veritable paralyses. The post-emotional stuttering can be compared to the post-epileptic. Sometimes we see it appear in an acute manner following fright as

* Ridard. *Essai sur la frayeur et la terreur* (Ann. Med. Psych., 1844, t. iii. p. 317.)

† Ch. Féré. *Les doul. hyst. (Revist. de nevcol et de psych).* Lisboa, 1888.

‡ Lerat, etc. *Essai.* Th. 1878. *Et Oursel, Gendron, Pargoire.*

well as after an injury.* These troubles of co-ordinate movements are in some manner the first degree of the paralyses which can be produced under the same circumstances (emotional dysphasia of Zeni). Hysterical aphasia, frequently emotional in origin, is sometimes cured after passing through a period of stuttering.

Functional impotence of emotional origin is not special to the tongue. We find it again in the lower limbs under the form of locomotor ataxia, which itself also is frequently one of the consequences of emotional shocks, and at the origin of which we find again, almost always, an evident cause of general exhaustion. This morbid state characterised by the impossibility of vertical upstanding and progression, has appeared to coincide with the integrity of the muscular force. M. Blocq,† in an important memoir upon this subject, says expressly that the dynamometric power of the muscle persists: but there is no question of the dynamometer, nor of dynamometrical exploration, in any of the observation which he reports, nor in those which have been published since.‡

This form of impotence, which can not only be provoked by an emotional shock, but whose manifestations can be also exaggerated by an habitual state of morbid emotivity, is not simply always, as we have repeated, a trouble of the memory of associated movements of walking and standing.§

Emotions can also leave in their wake other permanent troubles of motility. It is thus that some have noted after disappointments enfeeblement of the voice,‖ which cannot explain itself by enfeeblement of tonicity and motility of the thoracic and laryngeal muscles. The acute emotions can also affect the larynx otherwise: in certain neuropaths there is produced a very true spasm of the glottis which renews itself upon every attempt. In patients already attacked by symptomatic spasm of the glottis there are produced fits also, equally apropos of emotions as of impressions on the periphery, and especially cold.

* Treitel. *Ueber acutes Stottern* (Berlin, Kl. Woch. 1890, p. 1027.)

† *Sur une affection (Arch. de Neurologie*, 1888, t. xv., p. 187).

‡ Cahen. *Contrib. a l'étude de l'astasie-abasie.* Th., 1890. Séglas. *De l'ab. et l'ast. emot. (La Méd. Mod.*, 1891, no. ii., p. 24.)

§ Maigre. *Some Thoughts on Tabes.* Th., 1891.

‖ Cornette. *Une des nombreures actions du moral sur le physique (Aum Med. Psych*, 1873, 5 ser., t ix., p. 177).

Aretaeus knew paralyses by emotion. Todd describes them carefully. They are the most frequent hemiplegias accompanied by loss of speech: and as he has remarked justly these develop themselves most frequently in women, and in men whom we then call hypochondriacs. These paralyses are relatively frequent, but some have often attributed them to other causes.* Sometimes the emotional paralyses show themselves under the form of paraplegia. Peter cites an hysterical who, finding a man concealed in her bedroom, was suddenly seized with headache and epistaxis, then pains in the brachial plexus and spine, and lastly paraplegia.† But just as in the wake of a traumatic shock the paralytic phenomena show themselves frequently after the lapse of a long time so, after moral shocks, it is exceptional for troubles to appear suddenly. As for the localisation of these troubles one might say that it is dominated by a congenital local feebleness. In hysterios it is usually the more anæsthetic side in the normal condition which becomes the seat of these troubles. I have already cited the case of a patient whom I have observed in the clientèle of Vulpian, who, in his infancy, was subject to fits of anger in which his limbs bent under the weight of his body, and who later becoming an alcoholic had a paralysis limited to the lower limbs.‡ It is a general rule.

OBSERVATION XX.

Nocturnal Paralysis Reproducing Itself a propos of Moral Emotions.

"Mme.T., 34 years of age, presents herself for consultation at Bicêtre on April 8th, 1892. She knows of no hereditary neuropathic antecedents; her father is 72 years of age, is subject to violent angers, but has never had characteristic troubles; her mother is 60 years of age and is in good health. She has two older sisters in good health, and one younger than she who is palsied and violent. She herself has never had nervous troubles up till the time of her marriage. Her parents so opposed her marriage with her lover that she fled to Brésil. There she had two infants, of whom one has had convulsions several times, and the other nocturnal incontinence of urine. Following her last accouchement she had intermittent fevers which enfeebled her very much. She returned to Gentilly, but was not completely restored; she was transformed from the point of view of irritability: she was subject to nervous attacks with globus hystericus, and she gave way to extremely violent fits of anger, in which she struck herself or injured others. In one of these fits her husband, whose business affairs are indifferently prosperous, had recourse to her in order to procure relief from his creditors; she was obliged to make

* Bourbon. *De l'influence du coït et de l'onanisme dans la station sur la production des paralysies* Th., 1859.

† Peter. "*Du rôle de l'émotion morale, etc.*" (*Un. Med.*, 1891, t. i., p. 121).

‡ Ch. Féré. *Note sur les alcoolisables* (*C. R. Med. des Hôp*, 1885, p. 293).

long journeys, and make a labour of writings relatively great. For two months since she has completely lost appetite, only eating against desire: she has not lost flesh notably, although she may be affected with a serious diarrhœa, which is painless, and reproduces itself every morning under the form of two or three liquid stools. Since the same time, she suffers paralytic numbings with bluish swellings of the hands and feet. These phenomena are not presented from the beginning with very exact limits. In the upper limbs it is like a pair of gloves which cover up to the middle of the forearm: in the lower limbs to a pair of socks ending below the knee. The extent of the troubles observed do not vary; but their intensity is considerably increased. At first the patient only feels a slight swelling without change of colour, with numbings and prickings at the ends of the fingers: these troubles only manifest themselves during the second part of the night, or in the morning upon awakening; they disappeared rapidly when the patient was slightly agitated, and had made some frictions on the limbs. She remarked from the beginning that the troubles had a marked beginning and predominance on the right side: but, this predominance was in their intensity and not in their extent. Three weeks ago her husband accused her suddenly of having communicated syphilis to him. He appeared, in fact, convinced that he was attacked by it: but she affirmed that she had never had such a thing, and that she had not exposed herself to having such a thing: the fact is that she presents no trace of actual or ancient lesion. Since this time quarrels have become frequent in the household, and the nervous troubles have much increased; and in place of presenting themselves only in the morning they appear sometimes sharply during the day apropos of an emotion, apropos of a cold, of a long walk; and whatsoever the cause the four limbs are attacked simultaneously. Always these accidental causes only provoke short fits, whilst those of the morning prolong themselves far into the day, and last sometimes till midday. Whilst the fit lasts she experiences unusual indecision, and she is incapable of understanding anything. She has been several days before having the power of executing her intention of coming to consult me. These paralytic paroxysms are accompanied sometimes with serous diarrhœas analogous to those which produce themselves in the morning.

"When she presents herself, one only makes out a slight bluish puffiness round the malleoli, a puffiness which does not retain the imprint of the finger, and presents the characters of the blue œdema of hysterios. The fingers are swollen and violet. The numbed regions are the seat of a very marked analgesia and anæsthesia, especially on the right side. There exists no other gross trouble of general or special sensibility: the visual fields have been examined with care: there is no achromatopsia. There exist no hysterical stigmata, no painful points: inappetence, anemia, loss of flesh: 52 kilo.

"Prescribed: Hydrotherapy, iron. nux v. as.

"On the 12th Mme. T. returned complaining of a trouble which had only affected her twice, and that when she was much frightened: she awoke on both occasions betwixt two and three o'clock in the morning with a sensation of choking, and she found that her tongue protruded from her mouth, and was swollen and blue: she could hardly make any movements, and was incapable of uttering a word. Nevertheless she had been able to sleep; in the morning, her tongue was still large and articulation difficult, but when she

arrived at the hospital one could trace neither increase of volume nor change of colour. The other accidents reproduced themselves with the same characters and the local state remained the same: nevertheless the patient eats better and has taken on some flesh. The patient decided to go and follow out treatment at home, in the country, where she hopes to recover her nerve. The douches will be replaced by the wet pack."

The swelling of the tongue which figures in this observation appears to have been related to the neuropathic œdemas (angio-neurotic œdema of Strübing), which have been observed already in the absence of every other sign of hysteria.* Nevertheless swelling of the tongue is complained of over and over again by hysterios, the subject of nocturnal paralyses. This angioneurotic œdema assumes a special value in view of its association with swelling of the extremities and morning diarrhœa,† whose pathogeny appears to me also cleared up by this fact.

The œdemas which we have indicated in the preceding chapter merit, under the same title as those under consideration now, to figure among the paralytic troubles of emotional origin, at the same time as a good number of secretory troubles which we have also pointed out.

Paralysis agitans is frequently consecutive to fright or disappointment.‡ M. Charcot has put in the light the importance of depressing causes anteriorly to the shock which provokes the invasion of nervous troubles. I will report further on an interesting observation in this regard.

Marshall Hall remarked that if the incoördination of paralysis agitans and chorea ceases during tranquil sleep it may be observed to recur when the sleep is agitated by dreams: he concludes therefrom that they are the emotions which act on it, and that it is their absence which induces their cessation.

Most frequently tremulousness manifests itself after a certain time in the wake of a moral shock: but it is not always thus. The beginning can be absolutely sudden as in the following case:—

OBSERVATION XXI.

Paralysis Agitans of Apoplectiform Origin caused by an Emotion.

"Jean Louis P., aged 69 years, formerly hospital superintendent, affords no antecedent hereditary or personal trouble, history either neuropathic or

* Ruault. *Traité de Méd de Charcot et de Bouchard*, t. iii., 1892, p. 8.

† Chauvet. *De la diarrhée matinale.* Th., 1888.

‡ Lhiroudel. *Antécédents et causes dans la maladie de Parkinson.* Th., 1883.

arthritic. He was always in good health, when, three years ago, his daughter, aged 39 years, came to pass some days with him, and suddenly disappeared, not only taking with her all the savings of P., but also those of his second wife, who had, moreover, with great care, reared this daughter. P., not believing in a theft, went to his daughter's residence, where he learnt that she had just fled with her husband. P. fell unconscious upon the ground, and they were nearly an hour in bringing him back to consciousness. When he came to he had neither paralysis nor trouble of speech, but a very severe trembling of the right side, which a witness characterised at once by saying 'he rolled the cigarette.' This man had to frequent an office, and it is perfectly certain that this trembling did not exist previous to the emotion. Moreover it became very quickly intensified, and extended to the left side. Then came propulsion, the sensation of nocturnal heat, fixity of head. Actually, on May 8th, 1891, to the walking attitude peculiar to paralysis agitans: the head is completely fixed."

Amongst the nervous affections which are most frequently provoked by emotions chorea must be cited.* Fear plays the greatest part (Todd, Romberg, Frousseau, Ogle, West, Handfield Jones): then come prolonged disappointments: Peacock† confirming the preceding statistics of Hughes and Burton Brown‡ upon 110 cases of it, has seen 25 provoked by fear and eight consecutive to divers emotions and disappointments. The same causes have been operative 68 times out of 235 in the statistics of M. Bonnaud.§ Frequently the invasion of the nervous troubles is preceded by insomnias. Emotions do not act only on the development of choreas: when they occur during its course they frequently aggravate it.

OBSERVATION XXII.

Paralytic Chorea having Emotional Origin.

"A. D., aged 10 years, brought by his mother on the 27th December, 1884, was attacked by a generalised chorea predominant on the right side. His father is rheumatic, and his paternal uncle had been paralysed in the two lower limbs for some time, at the age of 14 or 15 years. The mother is very excitable, but has never had characteristic nerve troubles, and does not know of such in her family.

"An elder sister of A. D. has had since her early infancy night terrors, and is still subject to them. In the month of March, 1881, he fell one night into a cave, whence he was rescued pale and trembling. On the following morning on awakening his left hand and his body on the same side especially presented movements which the mother recognised as those which her daughter had had.

* Herringham. "Eighty Cases of Chorea" (*Med. Ch. trans.*, 1889, v. lxxii., p. 117).

† Statistical Report (*St. Thos. Hosp. Repts.*, 1878, v. viii., p. 1).

‡ Digest of One Hundred Cases (*Guy's Hosp. Repts.*, 1846, 2nd ed., v. iv., p. 360). A Digest of Two Hundred Additional (*Ibid*, 3rd. series, v. i., 1855, p. 217).

§ Bonnaud. *Cont. à l'étude de la chorée infantile.* Th., Lyon, 1890. Colat. *Cont. à l'étude de la chorée de Sydenham.* Th. de Toulouse, 1892, p. 54.

The movements and grimaces generalised themselves quickly, all the time remaining predominant on the left side, which, at the end of a few days, became entirely flaccid. At the same time the infant had nocturnal and diurnal incontinence of urine and fœcal incontinence also. The left hemiplegia lasted about three weeks, the chorea persisting on the right side: then the movements, after being settled generally for some days, have gradually subsided.

"In the month of May, 1882, having gone to the country with his father he was frightened by a bull which had escaped into the field: he was seized with such an intense trembling of the limbs that his father had to carry him to the railway and thence home. When he arrived he already had choreic movements in the left side. The chorea evolved more rapidly than the first time, but he had also during some days an almost complete left hemiplegia with diurnal incontinence of urine and fœces. The same predominance upon the left side.

"On the 4th June, 1883, a neighbour having entered drunk into the apartment where A. D. was alone, he was seized with a great fright, fled away crying, and fell helpless to the foot of the stair. He appears to have lost consciousness. He was put to bed and he slept. On awakening the following day chorea was manifest upon both sides, but especially marked upon the left, as in the two preceding attacks, but the movements remained less intense. The infant continues to walk to school, where he is, however, very inattentive, till the vacation. He underwent some betterment then, but the movements did not completely disappear. On the 24th November, after an escapade, he was well whipped by his father who sent him to bed without supper. On the following morning the movements were already accentuated, and three or four days later they became extremely violent and generalised. They persisted without modification till the 28th December. The child nourished itself badly, and was like to die for about a week. In the afternoon, and without any fresh provocation, the left arm, then the leg, became gradually enfeebled, at the same time that the abnormal movements disappeared from this side, but persisted upon the other with the same intensity. When on the 29th he was brought for consultation to the Salpetrière the two limbs of the left side were completely flaccid, the face was turned to the opposite side. There exist no gross troubles of general or special sensibility. The tendinous reflexes are only slightly exaggerated upon the left. There is daily incontinence of urine and fœces. On the right side, the choreic movements persist, and are intense enough. The child appears little affected by the situation, he laughs continually with a naive manner, his memory is enfeebled, he only replies to questions of a very simple kind, and which he could have easily done before the vacation. Left inguinal hernia.

"In spite of hydrotherapy, tonics, iron, the paralysis was only slowly improved. That of the sphincters yielded first towards the end of January, 1885,* walking was only possible on February 15th, and the choreic movements which returned after the cure of the paralysis, and persisted on the opposite side, lasted till the end of March, only finally leaving the left side."

* Incont. Ur. and Fac. is one of the most rare features of chorea. There exists only one instance among the cases of M. Ollivier. (Perisson. *Cont. a l'étude des paralyses et des Amyotrophies dans la chorée de Sydenham.* Th. Bord, 1891).

One can discover the same influence of the lively emotions, and especially fright, equally well in the chorea of lying-in women as in ordinary chorea.* (M. Riche).

The emotions frequently exaggerate the spasmodic phenomena: this is what is observed in most contractures, but the contractures without permanent lesion and the contractures secondary to the degenerations of the pyramidal cord. In the wake of emotions hemiplegic contractures augment: there is also rigidity in spasmodic hemiplegia. I have observed an interesting case thereof with Dr. Reliquet, in a confrère attacked by a syphilitic affection of the cord with spasmodic paraplegia: when one brought the inner surface of the wrist near a cold vase he did not make any movement: if the nurse was present the same contact provoked an epileptiform trepidation difficult to arrest.

Epilepsy appears very frequently provoked by terror, anxiety (Maissonneuve, Leuret, Reynolds, Rousseau, etc.)† Anger can produce the same effect. It falls to remark that the increase of arterial tension which accompanies the tonic period of the emotions is one of the physiological conditions of epileptic fits, whilst the general depression consecutive to the emotion exaggerates the reflex excitability: the emotions can then provoke epilepsy by two different mechanisms. They can play a provocative *rôle* as well in partial epilepsy as in general epilepsy at the outset.‡§ When one confuses grand hysteria with epilepsy this last neurosis would appear much more often still influenced by moral emotions. Hysteria, in fact, is the nervous trouble most frequently influenced by moral causes: the emotions can provoke the attacks be they convulsive, or contractures, or paralyses, or disorders of sensibility. Briquet has already noted that hysterical anæsthesia can supervene on the occasion of moral shock.

Emotion plays a considerable *rôle* in the propagation of epidemics of convulsions. A large number of localised spasms are influenced by emotions. Hysterical deliriums frequently break out apropos of emotions.‖

Pulmonary angina is provoked by fear.

* *La chorée gravidique.*

† Dubrisay. *Ann. Méd. Psych*, 1858, 3rd. ser., t. iv., p. 428.

‡ and § Ch. Féré. *Les Epilepsies*, pp. 279, 7, 8, 10, 250.

J. Moreau. *Les facultés morales considérées sous le point de vue médical*, 1836, p. 117.

Asthma is provoked by acute emotions. Fear has been able to provoke thymic asthma: it can act similarly on laryngismus stridulus. (Robert Whytt, Salter, Watson, Ferrus, Lavirotte, Rousseau).

Handfield Jones observed the influence of moral sufferings and despair on the development of insomnia.*

Paramyoclonus multiplex, which can be provoked or exasperated by all the causes of depression of the nervous system, such as cold, a violent effort, shock, diverse emotions, is mainly influenced by fear.

We have cited several cases where congenital myotony (Thomson's disease) has been provoked or exasperated by fright.†

Fear, and especially disappointments, play an important *rôle* in the development of exophthalmic goitre (Geigel, Baümler, Stokes, Fletcher, Parry, Rousseau, Meynert, Baedeker). The moral emotions and the shocks act also in this malady upon the recrudescences of the paroxysmal symptoms, like diarrhœa, and permanent symptoms like trembling. They are also peculiarly efficacious in provoking mental troubles which are so frequent in the course of Basedow's disease.‡

The explosion of symptoms of certain organic affections of the nervous system produces itself often apropos of an emotion. It can be thus in spotted sclerosis.§ Prolonged disappointments figure frequently among the etiological factors of this malady (Charcot).

M. Lancereaux gives the observation of a vanman of 26 years who, after a fright caused by a thunderclap, had a peripherical neuritis as determined by M. Pierret.

Locomotor ataxia itself may manifest itself on occasion of an emotion.

Observation XXIII.

Progressive Locomotor Ataxia, the first symptoms of which appeared after violent emotions—Hemoptysis after terrifying pains in the Thorax.‖

R. E., aged 27 years, presents himself at the consulting room of Dr. Ch. Féré, May 15th, 1888, with troubles of motility already marked. He was ill for 2½ years.

* *Loc. cit.*, p. 404.

† Déleage. *Etude clinique sur la maladie de Thomsen*, 1890, p. 23.

‡ Jacquin. *Etude critique des rapports du goitre exophth. avec l'aliénation mentale*, th., Mont., 1891.

§ Buzzard. *Brain*, 1890, p. 38.

‖ Ch. Féré. *Faits pour servir*, etc. (*N. J. de Salp.*, 1889, p. 153.

Whilst a child he lost his father after an accident. He did not know if he had even been ill. The mother died in January, 1886, aged 58. She was afflicted with a tremor which, from his description, appears to have been paralysis agitans: but she succumbed to pneumonia.

R. E. has a brother older than he by two years, who behaved badly, and who has gone to America since 12 years without sending any word. A sister younger than he by a year is hysterical and has lost the three infants which she has had from convulsions. Her husband, who is a gardener, was a man of regular habits, non-alcoholic, and of good health.

R. E. who, from the age of 16, works at the tailoring, has bought a shop for himself, where he has resided, thanks to his economy and incessant labour. He was sober, has never had syphilis and was always in good health up till 1886.

He was married in 1884 to a hard-working woman like himself, he had two children perfectly formed, all seemed to flourish with him up till the time when his mother died. He was very much affected by this loss.

His wife, who still suckled her last infant, was fatigued by the prolonged vigils and it became necessary to wean it. Some days after, it was the 2nd February, the child took diphtheria, it died on the 16th day. The other infant was always ill with it and succumbed very quickly. Three days later the mother was seized in her turn and succumbed upon the 18th day.

R. E. was terrified by these repeated occurrences. So long as his wife remained he tried to bear up: but as soon as she was dead, he allowed himself to sink under his pain and remained sleepless, and almost without eating for four days.

He says that it was some hours after the death of his wife that he began to experience in his limbs pains which he was never aware of before. These pains have increased since, but they have not changed in character: they are lightning and terrifying pains which seat themselves across the two sciatic nerves and especially in the neighbourhood of the knees and crowns of the feet. Since the beginning these pains repeat themselves, almost every day more or less intense. Nevertheless, the general health of R. E. does not appear to have suffered much, he has gone back to his work. In the month of August, 1886, he was obliged to give up because he had diplopia and ptosis on the left side. These troubles only lasted 15 days and ceased spontaneously.

Since the beginning of the year 1887 the lightning pains generalised themselves. They seated themselves in the upper limbs, in the thorax. He had urethral and rectal crises. It is only since this epoch that they have acquired, moreover, a very great intensity that the lightning pains accompanied ecchymoses of the limbs.

These ecchymoses have probably for a long time escaped unobserved, R. E. being subject to strike his lower limbs frequently in his workshop, but he was struck by those which produced themselves upon the calf of the leg and the inner surface of his limbs, and he remarked then that, in reality, they could not be explained by injuries.

In the month of November, 1887, R. E. has had without appreciable cause a painless swelling of the left knee supervening in the wake of a crisis

of peculiarly intense pains. This swelling, without any general or local reaction, disappeared spontaneously in some days.

"When he presented himself for a consultation on the 15th May, 1888, R. E. had no apparent trouble in walking. Always the sign of Romberg is well remarked: the patellar reflex is completely absent upon both sides; the Argyll Robertson sign is equally exact on both sides. There exists no gross trouble of sensibility. The general health is good, no digestive troubles. The lightning pains appear to have been solaced by cautery points applied over the length of the vertebral column.

"On the 30th June, in the evening, R. E. was about to pay a workman when he felt himself violently struck on the top of the chest by a shock, as if he had been pierced by a lance. The pain was so violent that he fainted whilst emitting a cry. He immediately spat blood by the mouth, *il dit des flots.** He could rise alone, nevertheless, and a doctor having been gotten, he went to bed. He suffered no more besides and slept. On the following morning, his expectorations were still tinged with blood. He did not experience any sensation in the thorax, so that in spite of its being Sunday he worked some hours.

"When he presented himself on the 3rd July for consultation there existed no morbid bruit in his lungs; the thoracic resonance was perfectly normal at all points and also the vocal resonance.

"Since this time R. E. has had no functional trouble of the respiratory organs. The last time he was seen in the month of February, 1891, the pulmonary auscultation revealed nothing fresh. One is therefore forced to reckon the hemorrhage in question as a hemorrhage connected with the terrific pain in the thorax.

"R. E. is moreover presently in the preataxic stage of tabes. He has experienced no new symptom, except some attacks of decubital numbing."

In a case of old lesion of the extraventricular ganglion, M. Landouzy† observed an athetosis suddenly begin after a fright. In spasmodic infantile hemiplegia the first fit of partial epilepsy produces itself sometimes apropos of a moral emotion.

General paralysis manifests itself sometimes after disappointments.

OBSERVATION XXIV.

General Paralysis developed after disappointments—Trophic Troubles of the Tongue.‡

"Maraicher B., aged 39 years, came to consult Dr. Féré on February 28th, 1888. He had no recollection of pathological antecedents in his family, he excuses himself from infantine explanations of the causes of his parents' death and his wife is unable to supplement his statement. The same uncertainty exists as to his personal antecedents. He has been married for 15 years, his wife had never anything particularly remarkable about her except

* *i.e.*, "he says, in floods."

† Oulmont. *Sur l'athétose*, th., 1877, p. 85.

‡ This observation has been utilised by M. Lerat, th., 1891, p. 16.

an excessive emotivity and a tendency to use alcohol too freely, manifesting itself in a fashion after long intervals. He has had three infants who are dead at a tender age of convulsions, but his wife is an ovarian hysterico.

"In June, 1885, after monetary losses, his habitual emotivity was exaggerated: he passed days weeping, and frequently he bewailed himself all the night. For two or three months he has only slept four or five hours nightly. Then he took on a complete indifference to his affairs: no one could make him rise nor put himself in motion for anything. In the month of September he was recovered so far as to resume work, but he complained much of lamenesses, but he maintained the same stolid indifference to his affairs which went from bad to worse.

"It was only in June 1886 that B. began to experience troubles of speech, at the same time his emotivity returned; he passed again weeks weeping. From time to time he refused to eat, saying he was unusual, that his bowels were pierced. His memory exhibited lacunæ. He repeated frequently the same thing several times, forgot his clothes, his hat, his tools. From time to time his walk was stumbling, but he never complained of pains.

"On the 15th January, 1887, he had an apoplectiform attack which left him without consciousness during 24 hours. He emerged from that with a right hemiplegia incomplete and a complex aphasia. He could not make a sound, appearing to hear what one said, turning himself to the noise but understanding not. One could not know if he might be capable of reading. In some days the hemiplegia and aphasia almost entirely disappeared. The embarrassment of speech which had commenced already several months ago remained more acute. We had then opportunity to determine the affections of writing which was tremulous. Besides, most of the words lacked a letter or a syllable, and whole words were wanting in certain phrases.

"In the springtime of 1887 B. appeared to experience a fresh amelioration: he was able to resume his work which he had had to give up for two months; the troubles of speech themselves were lessened and in several circumstances he wrote sufficiently correct letters. The betterment lasted up till the end of June. At this time, being in the act of throwing hay upon a waggon he received a bale thereof weighing about 12 lbs. upon his head. He was stunned by the blow and he was lifted unconscious. He recovered himself, however, at the end of some minutes, but had to be taken home: he sang. In the evening he was seized with extraordinary excitement, set himself singing and reciting absurd histories in which he spoke of brigands whom he had massacred, thanks to his extraordinary power.

"On the following day, having passed the night without sleep, passing his time reciting the same stories about, he refused to work. He could walk and talk almost as usual, but the exaltation of his ideas persisted, he manifested ideas of absurd satisfactions, which he expressed with a very special monotony. His wife was magnificent, she was 5 feet 6 inches; he had a blouse of gold cloth 5 feet 6 inches; he had cabbages which were 5 feet 6 inches, and so on. His delirious ideas manifested themselves sometimes under other forms: he remained towards the end of August for 48 hours without desire to make urine, pretending that he would inundate Ivry.

"On Sept. 2nd he had had a fresh apoplectiform attack which left him hemiplegic on the right side and aphonic for 8 days. As on the first

occasion he understood nothing of what passed around him. Speech returned again more altered than after the first attack. Since, these apoplectiform attacks have renewed themselves every 15 days. His intelligence is gradually degraded moreover since the month of December. He can no longer speak a word spontaneously. His right hand is almost completely paralysed since the attack of January 5th, 1888. Actual state, February 28th, B. still walks passably, trailing the right foot and leg, he has come on foot from Jory and will be able to return there. The lower right limb hangs flaccid along the body, there only remain some slight movements in the great toe. There exists facial paralysis upon the right, the pupils are pinhole and immobile. The left hand is tremulous and incapable of holding minute objects, the lips are also ceaselessly agitated with small convulsive movements which one observes also sometimes around the eyelids. The expression of the countenance is one of complete hebetude. B. never moves except when pushed, never replies except by an unintelligible grunt. Inspection of the tongue shows a considerable atrophy limited to the right side. The mucous is plicated and thickened on this side. This half of the tongue hardly measures 1½ centimetres long, whilst the other is 3; it offers a cottony consistence as if the muscles were completely absent. The atrophy is specially marked towards the point, it is much less at the base. In spite of this atrophy the deviation of the tongue is nil. Movements of deglutition are made quite regularly. This patient ought to be subjected to a much more minute examination, but we learn that he has succumbed to a renewed apoplectiform attack some days after his visit."

Observation XXV.

General Paralysis—Apparent Beginning after an Emotion.

"F., 38 years forgeman at Argenteuil, brought to Bicêtre by Dr. Biron 2nd June, 1892 comes of a family of agriculturists in whom no antecedent neuropathic trouble can be made out, and has himself presented no nervous trouble. His wife has never observed in him traces imputable to syphilis, he was never a drinker. He has never had children, though married 14 years. He has enjoyed perfect health apparently at least till the 3rd May last. That very day he was asleep, a candle resting against the blind, when all at once he was awakened by the curtain which was aflame. He was much frightened, but could nevertheless put out the flames with his hands and with the objects which he found to his hand. The danger had soon disappeared, but he remained all trembling and sweating. From this time the troubles of speech and trembling, of which no one up till then had ever any suspicion have not ceased and there is added to these a great number of other troubles whose value is hardly subject to dispute.

"From the morrow of the accident people remarked very evident troubles of memory: he forgot the hour, he sought continually his utensils, and former events entirely escaped him. He complained of fatigue, was obliged to take a seat during his work, which, moreover, he had to abandon at the end of 15 days; it happened to him, moreover, to lose himself in the streets in the neighbourhood of his home. He complained constantly of pain in his head. He became entirely incapable of holding a pen and he read with the greatest difficulty some words which he could not understand. As soon

as he was left alone he slept, but he has not committed so far any delirious act: it is depression which dominates the scene.

"Upon direct examination one can determine tremulousness of the tongue, of the lips, pulsing of the zygomatic muscles, movements of reptation of the tongue. Articulation is slow, especially of certain syllables, and there are lacunæ in the discourse not only of syllables but of words: the babble becomes incomprehensible as soon as the patient excites himself. The right pupil is very narrow and immobile to the light, and for accomodation the left reacts normally. There is tremulousness of the hands, uncertain gait, the rotulien reflexes are exaggerated, an imperious necessity for micturition, anosmia, pharyngeal anesthesia, hyperesthetic spots upon the skin of the region in front of the wrists. The patient knew Bicêtre of old, he had travelled from Ivry, he is incapable of telling by what railway he must return to Argenteuil, he cannot name any localities in the neighbourhood, he hesitates moreover on the name of several members of his family."

They are the depressing emotions which play the greatest *rôle* not only in provoking but also in exasperating general paralysis.*

The emotions modify the interior environment: they change the conditions of the elements of life proper to the individual: and the organisms which live in his tissues. One can compare their action to that of alterative remedies:† they break the organic memory of the tissues which have a tendency to resume their embryonic functions.

If the emotions play an important *rôle* in the etiology of the nervous maladies or in the provocation of their manifestations they hold a still more considerable place amongst the causes of the mental maladies and amongst the provocative agents of their symptoms.

The influence of the emotions expresses itself sometimes by a lasting modification of the moral being: "A young Spanish lord," says Morel,‡ "issued from one orgy to go to another debauch party. He passed before a church, which he entered for distraction. The singing of a young religieuse fixed his entire attention: he was astounded that a person consecrated to God could express what he experienced in accents so sweet and so harmonious. A return towards the first sentiments of his youth evoked in his heart a crowd of memories. His actual life passed under review by his mind in all its shames and ignominies. He issued suddenly from the temple to go and sell all his goods, to give them to the poor, and to con-

* Calmeil. *Traité des mal. inf. du cerveau*, 1859, t. i., p. 171, 271, 308, 447, 667.

† Creighton. *Illustrations of unconscious memory in disease, including a theory of alteratives*, 1886.

‡ Morel. *Etudes Cliniques*, t. ii., p. 151.

secrate himself to God alone." This fact merits comparison with the effects of emotion produced on Pascal by the accident of the Neuilly Bridge.*

We have sometimes attributed to the moral emotions the first manifestations of a vocation, artistic aptitudes or even genius: but the same effects have been also reported from purely physical causes.† It thus comes that Grety states positively that he owed his genius alone to the fall of a beam on his head: Colin d'Harleville saw his intelligence develop itself after a blow on the head: Talma, after a severe illness: Clement the Fifth attributed the development of his prodigious memory to a blow upon the head.

Emotion plays a very manifest *rôle* in the etiology of spasmodic exclamations (echolalia, coprolalia) or of the imitative tics.‡ One notes, for instance, that after fear of a serpent involuntary spasmodic imitation of the movements of the serpent remains: that after fear of a dog there are produced bayings which recall that animal, etc.

The emotions of the awakening reproduce themselves frequently, deforming themselves, during sleep, under the form of nightmares. The painful emotions play frequently an important *rôle* in the genesis of the nocturnal terrors of infants.§

An emotion can put into activity a delirium till then concealed, and it can give one birth when there existed as yet no trace thereof. A violent emotion is capable of evoking, just like a traumatic shock or an acute illness, a drunken delirium in an individual subject to alcoholic intoxication. Handfield Jones relates the case of a sailor who was seized with delirium tremens apropos of the murder of two of his comrades by the Japanese:‖ Morel cites a case of delirium tremens emerging after a household quarrel:¶ Griesinger says also that one fit of emotion alone can determine madness, especially under the influence of alcohol.** The acute sudden depressing emotions appear to act in these circumstances like any other shock: bleeding, injury, diarrhœa, etc.†† Bennett cites the case of a young man who

* Lelut. *L'Amulette de Pascal*, 1846.

† Pierquin. *Traité de la folie chez les animaux*, 1839, t. i., p. 66.

‡ Sigaud. *De l'échomatisme.* Th., Lyon, 1889.

§ Heber. *De Singulari terroris Effectu.* Leipsig, 1832.

‖ *Loc. cit.*, p. 193.

¶ Morel. *Etudes Cliniques.*

** *Loc. cit.*, p. 198.

†† Szerlecki. *Délires causés par l'abus des médicaments dystrophiques dits d'épargne.* Th., 1875, p. 22.

had fled the paternal mansion to go and make a spree in London, and who, having been attacked by his father, who severely reprimanded him, was seized the same evening with delirium tremens.* The following fact is not less interesting.

OBSERVATION XXVI.

Neuropathic Heredity—Intolerance for Fermented Drinks—Access of Delirium Tremens under the Influence of Emotion.

"M. T. 46 years of age: he is a man of great height, somewhat stout, his head perfectly normal, his physiognomy sufficiently intelligent and sympathetic, offers nothing in particular, except a special mobility of the eyes, which offer an azure coloration, with a somewhat glassy reflexion. No anatomical anomaly.

"M. T. has resided in Paris since the age of 18 years. But he is originally of Normandy. He is very reserved in his communications respecting his family, but his wife says that one of his paternal uncles committed suicide. He himself admits no antecedent neuropathic characteristic, he says only that he was easily moved and angered. We have sought with care but without success for the existence of associated accidents. He has always been a traveller and well set. The fact is he arrived in Paris a simple workman, he has founded an industry to-day in full activity. He affirms that he never committed excess of any kind. But we find in his life a circumstance which it is important to relate, for it indicates a very special psychic state. Towards the age of 30 years M. T. being already in a very strong, comfortable position, married a puella publica older than himself: this girl had a boy which he recognised, although this boy was already seven years old at the time when he saw this woman for the first time. This woman died after a short time from a chronic affection of the lung. As for the adopted child, pulmonary tuberculosis carried him off in a year. He was 13 years old, he was a frantic masturbator.

"M. T. only remained two years a widower, he married the second time a woman who had borne him two children both affected by convulsions in their prime infancy. The elder who is actually four years old is frequently attacked by nocturnal fits of spasmodic cough. It was some time after the birth of his first infant that M. T. began to present mental troubles which have impressed his friends and especially his wife, but he recognised that he had suffered therefrom for nearly a year.

"When I saw M. T. and his wife for the first time, in April 1883, here is what I learnt.

"He lives a very regular life and is more careful about his affairs. Sober: he drinks barely a bottle of wine daily with his food, and never brandy or liqueurs. He has recognised from his youth that he was incapable of supporting alcoholic liquors, which in a feeble dose for others procured for him a painful excitation: a very intense headache, only ending in a vomiting. When he went out on business exceptionally he drank two or three glasses of beer. One can therefore say that the doses of alcohol absorbed were

* Ball and Chambard. *Art. Delir. Tremens Dict. Encyc. des Sciences Méd.*, t. xxvi., p. 442.

very feeble, if one takes account of this circumstance that it acted upon a man in the prime of life, vigorous, giving himself every day to exercise and working, even manual labour, five or six hours daily.

"Since 18 months M. T. had very frequently quarrels in his household because he pretended that his wife 'thought' of another man who had asked her hand before him. She had refused this suitor and had never thought of him again. M. T. had no doubt on the subject and could not explain to himself how the absurd idea imposed itself upon his mind; but the fact is that it imposed itself frequently and that it made him mad. It happened to him several times, being in the country on business, being obliged to go at once, he returned to Paris and found his way noiselessly into his apartment where he found his wife *en course* of her domestic duties, or asleep, but notwithstanding, he provoked terrible quarrels, he has sometimes even come out into the street to make it. After this scene of violence he became exhausted and slept, the following day he was depressed, appeared much ashamed of what had happened, recognised that his conduct was absurd and shameful, made excuses, etc. But from the following day, although he made every effort to let nothing of it appear, his anxiety seized him again; at the end of some days a new fit returned, and so on.

"M. T. is under no hallucination, he sees nothing, hears nothing. What he himself calls his 'malady' hardly ever ceases, except when he is in presence of another person than his wife. 'So long as I am here,' says he, 'I know well that all that I do in my fits is absurd, but so soon as I leave here I will begin to become sad again and the idea will return to me that my wife perhaps thinks of another, that she thinks seriously about him. There will come to me a sensation of weight in the chest, a sensation of anguish of more and more painful character, and I will break out perhaps on arriving home without anything being able to arrest me.'

"If M. T. complains of no hallucination or any diurnal hallucination, he presents frequently mental and bodily troubles which merit attention. It is thus that since the beginning of the accidents which we have been describing his sleep is constantly vexed, it may be by dreams regarding business, it may be by frightful dreams which sometimes waken him suddenly. The least noise at night wakens him and terrifies him. He presents besides a slight trembling of the hands, but I have not been able to discover any trace of trouble of sensibiility nor of motility either on the face or the limbs. The various parts of his figure do not offer either from the point of view of colour or secretions any notable peculiarity, so that in fact the patient has not the aspect of an alcoholic. At no time does he present digestive troubles. Nevertheless, the troubles of sleep and the tremulousness of the hands have appeared to me enough to cause the suspicion of alcohol being the determining cause of the mental troubles. Not being very sure of the sincerity of the patient I told him, nevertheless, that it was to the usage of alcoholic liquids that his troubles were due and I made him promise to take no more, apart from his food, and not to increase the quantity of wine even then.

"When I saw him again at the end of 15 days with his wife he was quite certain he had only had one attack of violence in the first days, but he

had always the inward preoccupation and sadness. He, however, himself recognised amelioration, for he affirmed afresh that he had never taken more than two or three glasses of beer daily, and still that it only happened to him once or twice a week: in general only once.

"The origin of the evil becoming more exact: I bargained with him to suppress entirely his ration of wine with his food and to supplant it with milk.

"When I saw him again, 15 days later, his crises had disappeared entirely: his sleep had become calm and the cure appeared complete. There remained always the tremulousness of the hands.

"Gradually M. T. resumed the habit of taking with each repast one quarter bottle of wine and he did not in general exceed this dose. In these conditions no trouble is produced; but if, when he is travelling on business, he happens to take, besides, some glasses of beer in the day, the troubles reappear; and three months ago after an excess of this kind, his former absurd ideas returned, and he came back from Mans to Paris in order to surprise his wife, who was greatly frightened by his entering unexpectedly the chamber where she slept.

"This situation (1885)* is hardly modified since, the same thoughtless insults reproducing from time to time the same effects.

"On the 18th June, 1888, M. T. had joined several friends in order to celebrate the convalescence of his wife who had been subjected to a serious operation. Although on his guard he had drank more than his ordinary allowance when, towards the end of the dinner, someone announced to him a fire in his warehouse. M. T. arose hastily, his face red and covered with sweat, eyes starting and rolling in their sockets, all his body trembling strongly and rapidly. At the end of some minutes he fled into the court crying, 'Save who can!' He undressed, tearing the clothes he could not rid himself of quickly. He saw flames around him, called his wife, his children, his friends, said they were roasted. It was with great trouble that persons present could restrain him. During this time the fire had been got under without much loss. As it was impossible to take the patient up to his apartment again, he was installed on the pavement side on a bed rapidly arranged in a free place, but the agitation did not cease. M. T. saw himself always enveloped in flames, he called his comrades, told them to save his chattels, then he heard pistol shots, he said it was not he who raised the fire. The trembling was so intense that he shook the bed where I found him bound two hours after the beginning of the delirium.

"His pulse was 120, his skin hot and covered with sweat, his eyes very prominent, incessantly moving, expressive of terror. The patient made incessant efforts to loosen himself and fly. He appeared insensible to exterior sensations; it was only when he cried one could see his tongue dry and bloody. Nevertheless, when one spoke to him of his wife and his children,

* Ch. Féré. *Note sur les alcoolisables* (*Bull. et Mcon de la Soc. M. des Hop*).

he suddenly arrested himself. The tremulousness is constant, and from time to time one feels, in the muscles of the limbs, fibrillary tremblings, which are almost constant in the muscles of the lips.

"The limbs were tied bodily avoiding thoracic compression, and the patient was left in quietude with a very feeble light under the guard of two men who had to remain, unless under urgency, silent and motionless. The delirium maintained its intensity up till two o'clock next day afternoon, then it began to decrease. At half past six, that is about 24 hours after it began, the patient fell into a sound sleep which lasted till next day noon. On awakening, the patient had entirely lost recollection of what had transpired. There only remained from this fit a lumbago which has got well rapidly."

This dream of toxic troubles induced by the intervention of an agent of another kind is not unknown to experimental medicine: Claud Bernard has seen that when, to a chloroformed dog, one gave on awakening (from a dream) a dose of morphia, the chloroform sleep returned.*

But for rare exceptions, especially relative to the toxic deliriums, the emotions, even violent, do not immediately provoke madness, they act frequently by leaving after them a state of anxiety which produces insomnia and a progressive depression of the nervous system. Nevertheless fright especially can provoke at once a state of stupor, a sort of idiocy (Pinel), melancholia attonita, which can even end itself in death (Bamberger).

Fright can even cause dementia (Bucknill and Tuke).†

Very often also the emotions act upon the manifestations of delirium. One erotomaniac, cited by Trelat,‡ made herself imagine that the son of one of the physicians of the Salpetrière was her son, and she set herself also to pay particular attention to two young epileptics, especially to one of those whom she pretended to have had to the Prefect of Rennes. Her preference for this last having excited the jealousy of another, Mme. D. was one day struck by the dissatisfied one and abandoned both.

Most authors have related the influence of the moral causes upon the development of madness.§

* Cl. Bernard. *Léçons sur les anesthèsiques*, p. 225. Ribot. *Bull. Gèn. de Théra.*, 1884, t. 66, p. 233.

† Trélat. *La folie lucide*, p. 125.

‡ *Loc. cit.*, p. 190.

§ Mason Cox. Observations. 1813.

According to the statistics of Parchappe we find the following proportion of sequestered aliens owe their alienation to moral causes per 1,000.*

Causes.	Two Sexes.	Men.	Women.
Love and jealousy	72.3	46.4	99.8
Loss of fortune	52.7	47.2	58.5
Misery and deprivation	54.1	43.3	55.5
Religion	52.4	31.7	74.4
Violent emotions	40.9	37.3	44.7
Pride	35.1	39.7	30.2
Loss of loved persons	29.8	16.3	44.2
Betrayed ambition	29.0	34.1	23.6

It is interesting to relate that the emotions which provoke madness are depressing emotions. Bucknill and Tuke† cite, after Gregory, the fact of a mother and a daughter who had become aliens as the result of the joy of receiving a legacy. These altogether exceptional facts are not sufficiently explicit:‡ the same observation holds regarding two facts cited by Guislain;§ and another by Ellis.‖ It is possible that insomnia¶ and the change of habits and hygiene consecutive to agreeable emotion play the most important *rôle* in the pathogeny of troubles which follow it. If love, an agreeable and tonic emotion of the first quality, can provoke organic and psychic maladies, it is solely by reason of the disappointments and fatigues which it entails that it exercises its pathogenic influence. One must admit with Griesinger** that "it is extremely rare for an immoderate joy to determine madness of itself alone, so much so that, as a matter of fact, it never happens." Amard†† says that he does not know an example of madness caused by immoderate joy. It is, without adducing proofs thereof, Daquin‡‡ that affirms that madness caused by joy would be cured very easily. Moral causes play a *rôle* so important in the causation

* *Art. Aliénation. Encycl.*, t. iij., p. 44.

† *Loc. cit.*, p. 102.

‡ Morel. *Traité des Mal. Ment.*, 1860, p. 232.

§ Guislain. *Léçons orales sur phrenoss*, 2nd ed., 1880, t. i., p. 487.

‖ Ellis. *Traité de l'aliénation Ment.*, 1840, p. 149.

¶ Renandin. *Obs. sur l'influence pathog. de l'insomnie* (*Am. Med. Psych.*, 1857, 3rd ser., t. iii., p. 384.)

** *Loc. Cit.*, p. 197.

†† Amard. *Traité analytique de la folie*, etc. Lyon, 1807, p. 55.

‡‡ *Philosophie de la folie*, 1792, p. 46.

of psychic troubles that one might call them the natural causes of madness: but they are exclusively sad emotions which fulfil this *rôle*,* and they act always by determining the morbid depression which constitutes the essence of madness: the peculiar emotivity of the individual, his character, education, manners, profession only act under the form of a mental malady.

In the exceptional cases where joy appears to play the *rôle* of cause it is important to take into account the anterior conditions. Giron de Buzarsingnes,† who admits the innateness of the passions, cites the case of a madman whom a quack boasted of having cured: his mother, who for a long time had been extravagant and exalted, became mad with joy.

The sad emotions which entail most frequently mental troubles are those which act in a slow fashion and continue for a long time.‡ It is thus that we have been able to accuse certain peculiarly monotonous professions of a special influence: that of lighthouse keeper, for instance: although I am not favoured in any particular way I have had occasion to see two persecuted madmen who have been attacked in the exercise of this profession.§

Nevertheless the violent emotions can provoke a sharp invasion of madness.‖ And in a certain number of cases the madness which developes itself suddenly after a moral emotion constitutes a passing fit which ends in a sleep crisis (Krafft-Ebing) recalling that which we have seen produce itself in emotional intoxication. This final sleep is not always constant.¶

The nature of the emotions appears to have no influence upon mental troubles. "Although the causes that have determined madness in our patients," says Lunier,** "have been surrounded especially by debilitating and depressing circumstances, we have observed in them almost all the forms and varieties of mental alienation which are habitually met with in the asylums. The expansive forms have also been met with more frequently than the depressing."

* Georget. *Art. Folie. Dict. de Méd.*, 2nd ed., 1836.

† *Physiologie* in 8vo., 1848, p. 346.

‡ *Am. Méd. Psych.*, 1876, 5th ser., t. xiv., p. 305.

§ Morison. *Outlines*, 2nd ed., 1876, p. 71.

‖ Morel. *Du délire émotif (Arch. Gen. de Méd.*, 1866, t. j., p. 549).

¶ Ritti. *Folie transitoire*, etc. (*Am. Méd. Psych.*, 1880, 6th ser., t. iii., p. 234).

** Lunier. *De l'influence des grands commotions* (*Loc. Cit.*, 1874, 5th ser., t. x., p. 388).

The emotions do not always act as a moral shock directly in the production of mental troubles: it happens very often that the scene which has provoked the emotion reproduces itself in dreams, determining troubles of sleep, and progressively inducing an entirely unhappy state of irritable feebleness. Sometimes the scene reproduces itself under the form of hallucination during the whole duration of the malady.

Finally the moral emotions are capable of provoking all the affections depending upon hereditary (or acquired) predisposition, and in particular affections of the nervous system. It is not doubtful on the other hand that they can produce, and that they play most of the time an important *rôle* in the production of a particular morbid state of the nervous system susceptible of developing itself, in subjects in whom the predisposition is absolutely latent, neurasthenia.* The verification of this fact, which has already been related by Beard, and which is to-day accepted by all physicians who are conversant with neurasthenics, has great importance; for neurasthenia appears to be the mother of the degenerations of the nervous system of the neuropathic description.† It is certain that in order that fatigue may be able to establish itself as a chronic state under the influence of conditions which have not this result in most of the individuals who are healthy, it is necessary that a certain predisposition towards neurasthenia should exist in the victims: but as this predisposition does not manifest itself frequently by any physical sign, by any functional trouble, the symptoms of nervous exhaustion are the first phenomena observable, and one can practically consider them as the effects of the only accessible fact that has preceded them and without which they never produce themselves.

Just so when neurasthenia supervenes of itself as when it follows any other affection, the agreeable emotions only act very rarely, and when they do act it is by consecutive exhaustion. They are the sad emotions which play the most evident *rôle*. The violent and sudden emotions can mark the beginning of neurasthenia and even of an acute form of the malady (A. Latour):‡ but most frequently they

* Bouveret. *La Neurasthénie*, 2nd ed., 1891, p. 42.

† Ch. Féré. *La Famille Neuropathique* (*Arch. de Nevrologie*).

‡ Bouchut. *Du nervosism aiguë et chronique*, 2nd ed., 1877, p. 68.

are the prolonged emotions which gradually bring about nervous exhaustion.

The action of injuries upon the development of nerve troubles of every order is greatly influenced by the emotional state, Erichsen has already remarked that this action was much less when the victims were surprised in a state of drunkenness or during sleep. Inversely when the individual who suffers the shock is under the blow of a very violent emotion the accidents associated with injury become much more serious. Ziegler has instanced firemen and mechanics who under the shock of an emotion induced by imminent peril, have been, although the peril was avoided, attacked by symptoms of railway spine.

The symptoms do not in general appear immediately after the shock, moral or physical, but often some time after, when the physical conditions consecutive to the shock have attained all their intensity; it is the same in the case of the acute maladies: the mental troubles do not appear necessarily at the moment of greatest activity of the pathological process, but when failure of nutrition begins. It is thus that in pneumonia madness manifests itself most frequently when the fever falls or in convalescence. In the chronic troubles, on the contrary, where the failure of nutrition precedes frequently the physical signs, the mental troubles can manifest themselves from the apparent beginning: in phthisis, for instance, melancholy or mania frequently begins, when the pulmonary troubles are not as yet apparent.*

M. Savage, who would restrict the *rôle* of heredity and extend that of environment, remarked that in a great number of subjects affected by mental troubles one cannot find hereditary antecedents, and that it is not doubtful that the conditions of environment influence the form of the mental troubles.†

The physiological effects of the emotions are not produced solely during the state of waking, they are also produced during sleep in the dreams: the cold sweat, trembling, manifest themselves frequently in terrifying dreams. It is difficult to measure the importance of dream emotions from the pathological point of view of the symptoms due to the modifications of blood pressure which pro-

* Griesinger. *Traité des maladies mentales*, p. 230.

† *Infl. of surroundings on the production of insanity* (*Journal of Mental Science*, 1891, p. 529).

duce themselves during the night. It is likely that their *rôle* is more considerable than what has been attributed to them: we know, in fact, the suddenness of dream representations: and the intensity of the physical changes which constitute emotion is so much the greater as the corrective influence of the senses is lacking in the dream state.*

If, in the dream, there happen imaginary representations, the emotions which accompany these could not be more real. It is not only in the deliriums that these emotions can have and do have an influence, but also, without any doubt, upon the evolution of organic maladies. It will be interesting from this aspect to interrogate patients who have been attacked with nocturnal cerebral shocks.

The emotions have pathological effects so much the more marked as they produce themselves at the end of the malady, in the convalescence, in all the conditions, in one word, where they act upon an organism more feeble already.

The ideas which have preoccupied the patient a little time before the invasion of the madness figure frequently in his delirium, and it is the same in the deliriums of the fevers. We see the same fact reproduce itself in the post-paroxysmal deliriums of epilepsy.† The provocative emotions have also a considerable influence upon the form of the delirium; in the terminal delirium of the grand attack of hysteria the provocative emotion is often reproduced with an extraordinary intensity.‡

We must make reference briefly, in conclusion, and in a fashion purely mechanical, to some rare symptoms of the emotions.§

Mirault cites the case of an irascible jailor who, at each fit of anger, dislocated his lower jaw.‖ The muscular contractions which produce themselves under the influence of anger or fear can also provoke the production of hernias, but only when there exists a native predisposition.

* E. W. Cox. *A Monograph on Sleep and Dream.* London, 1871, p. 37.

† Féré. *Les épilepsies*, etc., p. 97.

‡ Boscher. *Essai sur la colère.* Th., 1832, no. 236, p. 13.

§ Moeren. *De tonitru herniam causante* (*Ephem Cur. Nat.*, Dec. 11, 1666, p. 49).

‖ Ch. Féré. *Etudes sur les orifices herniaires et, sur les hernies abdominales des nouveau-nés*, etc. Rev. Mens, 1879.

CHAPTER VIII.

Curative Effects of the Emotions.

Summary.—Influence of the Sthenic Emotions and the Asthenic—General Maladies—Gout—Rheumatism Infections—Nervous Maladies—Chorea—Hysteria—Insanities.

A malady only develops in consequence of an emotion when the physical conditions of the emotion reproduce, in a certain measure, the physiological conditions of said malady; or, at least, some condition which favours its development in presence of other favouring circumstances. Inversely, when the physical conditions of an emotion are incompatible with the conditions of the morbid state this last must find itself modified. We see an emotion, fear for instance, frequently provoke a malady, frequently cure it;* there is nothing in that contrary to the laws of physiology; emotion acts differently according to the state in which the organism finds itself at the moment when it is surprised. "When one excites a nerve," says Claud Bernard, "one puts the organ to which it goes into a state inverse to that in which it found itself prior to the experiment. It is a law which appears susceptible of generalisation."

The agreeable emotions, or in general a happy temperament, can have a good influence upon the evolution of all maladies: "in every disease good lies hid," says the Hippocratic aphorism.† And Galen was of the same mind, "Cor lætum benefacit morbis: tunc enim medicamentum proficit et juvat, dum alacri animo est qui illud excipit." Physiology shows us, in fact, that the sthenic emotions are accompanied by a general over-activity as well of the functions of nutrition as of the functions of relation: there is no room then for astonishment that these emotions favour a cure or the betterment of nutritional troubles, even when these last are due to gross material lesions.

* Walkenaer. *Diss. Méd. Inaug. De animi affect. Lugd.* Batt, 1748, p. 63.

† Hirzelius. *De animi lacti et erecti*, etc. *Diss. Inaug Lugd.* Batt, 1746. F. Voisin, etc. *De l'utilité*, th., 1819.

These emotions act equally well on local troubles as on general states; we have seen, in fact, that they act equally well on the local as on the general circulation: there is no room for surprise that they have a happy action equally well on the evolution of spots as on the progress of anemia or diathetic affections, or even on infectious maladies. But it is especially upon the nervous maladies that this efficaciousness shows itself in the highest degree.

The influence of the sthenic emotions upon the cure equally of medical and surgical maladies* has been illustrated from the beginning of time by the publication of more or less curious facts: the epochs of political upheavals are peculiarly fertile in works upon this subject.

Religious aids, where they do not arrive in circumstances only suggestive of death, are sometimes of happy effect.†

The most diverse maladies have been benefited by sthenic emotions; observation goes plainly to confirm the opinions of the ancients upon this point: but the experimental proof was not easily furnished because the facts presented themselves rarely with the simplicity desirable.

A great number of facts instanced by authors, and these the best, are subjects for discussion.‡ Tissot, for example, reports that Corringius was cured of a tertiary fever by the pleasure which Meibomius caused him. Cullen instances the case of a young man who had been cured of an intermittent fever by having seen his mistress one hour before the access of the fit. But it is well necessary to recognise, that apart from a few specifics, few medicines are capable of subjection with much certainty to the tests of experimental, the positive, philosophy.

There is nothing to be said of the singular histories of Pechlin and Mentz attributing to fear the cure of a prolapsed womb, of a hernia.§

Laughter can act mechanically in a favourable manner. Pechlin reports the history of a young man who in a burst of laughter evacuated a traumatic effusion in the lung which threatened

* Dahordel, etc. Th., 1830. † Hilscher, etc. *De mutatione. Jena*, 1730.

‡ L. Joubert. *Traité du ris*, 1579. Roy. *Traité Médico—philosophique sur le rire*, 1814, p. 371. Campardon. *Du courage dans les maladies* in 8vo., 1819.

§ Descuret. *La Méd. des Passions*, 3rd ed., 1860, t. i., p. 269.

his life. They say that in the same circumstances Erasmus emptied a vomica which was suffocating him.*

The influence of the sthenic emotions upon the energy of the voluntary movements is well known. It manifests itself especially in feeble and weak subjects, in convalescents. Wilks relates that a young girl of delicate complexion and incapable of a long walk experienced no fatigue when she leant on the arm of her fiancé. The rapid success obtained in the treatment of functional impotences by massage, hydrotherapy, suggestion in all its forms, can be cited in support of the happy therapeutic effects of the emotions.

The relaxation of the muscles provoked by the depressing emotions can also have its utility.

Ancient surgeons utilised the muscular relaxation induced by fear or shame in the reduction of luxations. Even since the administration of anæsthetics became common I have seen, several times, Achille Flaubert at the Hotel Dieu of Rouen have recourse to proceedings termed moral with a success almost constant.

The happy action of the emotions shows itself especially evidentially in the morbid states which are susceptible of a sudden disappearance, such as asthma, gout, and a large number of nervous troubles. It is especially in these conditions that one sees the painful emotions operate by their perturbating action: and the happy effects likewise of the agreeable emotions by their tonic action.

Ellis† relates the history of an officer whose fit of asthma was suddenly arrested under the influence of terror in a critical position.

The same author observed personally the cure of a gouty fit under the influence of acute emotions.

An ecclesiastic was for a long time subject to attacks of gout. One day, being in his library, kept to his couch by a violent attack in the foot, one of his daughters, about five years old, hurt herself against a plank placed insecurely by workmen charged with repairing the shelves. The plank threatened to fall upon the child, when the father, forgetting his ailment, threw himself in front of her to save her. He succeeded, and remained astonished that he no longer felt the pain in his foot, and to see that the attack of gout had in-

* Saml. Wilks. On Overwork (*The Lancet*, June 26th, 1875).

† Ellis. *Traité de l'aliénation Mentale*, 1840, p. 47.

stantly disappeared. A second instance occurred some years after in the same individual. His attack was then so cruel, that he was barely able to roll himself from his bed to his couch by the fire-place. He ordered a servant to bring a table into his room. This table was too large to enter by the door without being turned in a certain fashion, which the servant could neither do nor understand, although his master, a helpless spectator of his maladroitness, had well explained to him the manner in which it should be held. Finally he forgot his trouble, threw himself into a fit of anger, drew the table into the apartment, and was at once cured of his pains. Van Swieten has reported the history of the Marquis of Maignac at the battle of Sienna, relative also to the gout. Morel has cited also the case of the commandant of Phalsbourg at the siege of 1814.*

We have cited a good number of other cases of gout cured by fear. Sharp has seen the same emotion cure rheumatism.

The primitive sthenic emotions are not the only ones which can act happily on maladies. Haller has attributed to anger the cure of an attack of gout.†

I know a gouty subject whose fit has been suddenly broken by a violent anger.

The asthenic emotions themselves can have the same effects by various mechanisms.

Falconer‡ says that fear is capable of arresting hemorrhages. It is to fear that must be attributed the effect of a live toad applied to the neck in arresting hemorrhage. These effects ought no longer to surprise us now that we know that the asthenic emotions are accompanied by cooling and diminution of volume of peripheral parts, phenomena that cannot coincide without a spasmodic contraction of vessels.

Fear of shipwreck, or a violent emotion of whatsoever nature it may be, can arrest sea sickness. The poet Moore suffered from sea sickness crossing the Irish Sea; when someone told him of his father's death the sea sickness soon ceased.§ The fact is one of common observation during shipwrecks.

* Cotte. *Some Influences exercised by Emotions.* Th., Strasbourg, 1856, no. 357, p. 17.

† Haller. Elem. Phys., vol. v., p. 108.

‡ Falconer. *Du l'influence des passions*, tr. fr., 1788, p. 40.

§ Nisbet. Insanity of Genius, 1891, p. 25.

Velpeau* pointed out the absorption of an abscess under the influence of fear.

This happy influence of the painful emotions can perhaps explain itself by the fact that the vessels of the periphery contract themselves under the influence of shock, and that the absorption of the liquids is favoured at the moment when relaxation is induced. The physical pain which the same surgeon has observed in the treatment of the inflammations is probably to be similarly explained.† Always the means employed (mouchetures, the bistoury, transcurrent cauterisation, heat rays) provoke, in general, a local irritation which can be considered as a revulsion.

Lind reports that, during the siege of Breda in 1625, the scurvy devastated it severely, when the Prince of Orange conceived the idea of sending a so-called remedy which he said had cost him very much money; most of the patients were cured. No one whatever doubts but what the moral conditions are one of the most important factors of what one understands under the title "epidemic genius."

What we have said of the influence of the emotions upon the evolution of germs in the organism, and on the reactions which they provoke, suffices for comprehension how the sthenic emotions can have a happy influence upon the resistance to the infectious maladies and, upon their evolution when declared.

Escoubas reports that a urethral flux ceased under the influence of fear on the entry of the republican troops into Lyons. I could instance in detail the observation of a urethral blennorrhœa resisting for a year rational treatments, and which was cured on the day of a successful examination upon the internal hospital course. We can well understand that an emotion plays the *rôle* of an alterative after the same fashion as alcoholic excess.

Some have instanced cases of cure of parasitic affections of the skin, and especially itch, under the influence of violent emotions. These facts can claim acceptance by the same title as the cases of cure under the influence of change of régime. The modification of resistance can explain itself, as Duclaux remarks, by a change in the superficial blood circulation, in the reaction of the

* *Fl. de Méd. et de Chir. Pratiques*, 1850, t. xxi., p. 251.

† Salgues. *De la douleur considérée au point de vue de son utilité en medicine*, Dijon, 1823, in 8vo. Roby Pavillon. *De la douleur considérée comme moyen thérapeutique de l'inflammation*, th. 1855.

sweat, in the thickness of the epidermic couch, in rapidity of desquamation, etc:* all conditions capable of modification by the emotions.

The painful emotions can in certain conditions induce a happy effect by provoking a profound modification of the nutrition and functioning of the nervous system.

Chorea which develops itself so frequently after emotions, and especially after fear, can be cured by a shock of the same kind: Hughes has seen a girl attacked a second time by chorea, who in passing London Bridge in order to go to Guy's Hospital was frightened by an accident, and cured before her arrival at her destination.† Other authors, Radcliffe, Barthez, and Rilliet, have seen chorea cured under the influence of an exanthem. The two orders of facts are not without analogy: we have seen, in fact, that emotion can associate itself with very important vaso-motor troubles of the skin. Under the influence of the preoccupations which attacked him during his sojourn in Ireland apropos of troubles provoked by O'Connell, Lord Anglesey ceased to suffer from a tic which had given him no respite.‡

The emotions can have the same happy influence upon the symptomatic neuralgias.

OBSERVATION XXVII.

Diabetes—Very Marked Neuropathic Heredity—Double Sciatica.§

"M. L., 63 years, belongs to a nervous family. His father died at the age of 38 years of an affection of the spinal marrow, a paternal uncle was a stutterer. On the maternal side, he could instance among his uncles, aunts or cousins-german, eight persons who have been attacked with nervous troubles. He had two brothers, of whom one still lives in good health, the other died at 40 and in an asylum; he appeared to have been attacked with general paralysis. He was much affected by the death of this brother, who was one year younger than he, and fell into a melancholy. Up till then he had never complained, but he had presented, on several occasions, troubles which one could retrospectively refer to diabetes which was discovered at this time.

"Since then M. L. has had several melancholic fits which coincided with excessive secretions of sugar; he has had two attacks of facial neuralgia* which have lasted two or three months. The emotions, the awakenings,

* Duclaux. *Ferments et maladies*, 1882, p. 108.

† W. Gay. *Chorea Insaniens* (*Brain*, 1889, t. xii., p. 154).

‡ Calderwood. *Relation of Mind and Brain*, 1879, p. 324).

§ D. Bernard and C. Féré. *Des troubles diabétiques*, 1882.

fatigues increase the poly—and glycos—uria; under these diverse influences the sugar which changes from 30 to 40 grains per litre shews 60 to 70, and sometimes more. From the beginning of March, 1888, he began to suffer in the right sciatic, the pain was moderate during about a fortnight permitting his walking, dragging the limb; but on March 17 he was awakened during the night by the pain which had extended to both sides at the same time that it was become much worse. Dating from the moment when the double sciatica had become installed, he was subject to recrudescences and momentary cessations, but it had persisted in a continuous fashion. It was only after the apparition of the sciatica that one could determine the abolition of the rotation reflexes, which during intervals were wanting on both sides, then might be provoked anew, without these alternations having aught to do with the exasperations or lessening of the pain. Even in the days or hours when the pain was at its worst his walking and standing were become very difficult on account of the muscular atrophy, especially marked in the region of the muscles of the calf on the two sides.

"The situation went on aggravating when on the 3rd October, M.L. learnt all of a sudden of the nomination of his son to an important post of which he had given up hope. He went into a tearful crisis after which all pain had disappeared. Two months afterwards the function of the lower limbs was entirely re-established. Since this time M. L. has had a fresh facial neuralgia which has lasted four months and which, like the two preceding, has only disappeared gradually."

Lieutaud* instances an individual cured of epilepsy by the noise of a pistol fired near to him.

We have pointed out that under the influence of the sthenic emotions, the energy of the movements at the same time as the muscular tonicity augments: under the influence of the atonic emotions, on the contrary, the muscles relax, and it is a mechanical condition which has been able to be utilised.

I have already had occasion to relate that it is mainly by modifying the emotional state that one acts in suggestion therapeusis. The favourable modifications of the hysterical troubles are constantly preceded by a betterment of the moral state: also is this certain in hysteria that the emotions play an important *rôle* in the morbid evolution. The efficacy of the emotions shows itself so evident in a great number of cases of convulsive hysterical manifestations (epidemic of Härlem) or others, that we are compelled to reckon as hysterical all the affections which are cured under this influence.

But these spasmodic hysterical affections are not less subject to the influence of the emotions. There is hardly a spasm of paralytic

* *Museum Méd.*, t. ii., p. 176.

nature, a contracture, an anæsthesia, or dysæsthesia, which has not been able to yield, it may be momentarily, it may be definitely, to an emotion. Fear and anger are shown also to be as effective as joy.

Apart from hysteria, spasmodic manifestations can be influenced by emotions; it is thus that common hiccup can be arrested by surprise.

When people admitted that madness was a malady of "the soul," a great importance was attributed to the emotions for the cure of the various lunatic aberrations. In every time people have sought to utilise the emotions in the treatment of madness, from the leap of Laucade to the surprise bath and the terrifying douche of Leuret. To-day we are in a position to assimilate moral with physical shock, and we can better comprehend how the emotions can act on madness, an organic malady. Moreover, authors report numerous and incontestable examples thereof.

At the Congress of Alienist Physicians of the United States in 1888 M. Talcott reported several instances of the traumatic cure of madness.* It happened frequently, moreover, in these kinds of cases that it is not easy to make evident the part played by the physical and that of the moral shocks.† It was so, for instance, in the case now adduced.

OBSERVATION XXVIII.

Attempt at Suicide by Hanging—Œdema of the Glottis and Distension of the Brachial Plexus—Retro-active Amnesia—Momentary Modification of Delirium.‡

Antecedents.—Father in good health, a drinker, from time to time has neuralgias sometimes very tenacious.

"Mother very nervous, has had numerous attacks which persist still but in less great quantity since the menopause.

"Personal antecedents.—One cannot find in M. any trace of nervous affection in infancy; but her recollections do not appear very precise. She menstruated at an early period and presented, it appears, some slight excitement at the periods.

"First fit.—When eighteen she enters into the ward of M. Trélat, who made the diagnosis of hysterical mania.

"They had wished to make her marry by force. Suicidal attempt. Sojourn of sixteen months. Since, good health but for slight excitement at the

* *Ann. Méd. Psych*, 1889, t. i., p. 307.

† A. Paris. *De l'ictus Emotionnel en Méd. Ment.* (*Rév. Méd. de l'Est*, 1891, p. 11).

‡ *Arch. de Neur.*, 1886, t. xii., p. 377.

periods. Actually no hysterical marks are to be found upon her except perhaps an ovarian spot upon the right side.

"The second attack (18th Sept., 1885). Travelled to the Bon Marché. The cost of her journey was slight; a party, who had promised to meet her, profits thereby by substituting herself for her and putting disagreeable proposals on her and her husband; said that she would be revenged, made incoherent proposals and was agitated. Always till now she could have had no ideas of suicide.

"Third attack. Dismissed 9th October, 1895, she returns to Salpetrière some days after; and, if one is to believe her family, the betterment which justified her dismissal did not last more than 24 hours. October 20th, the day of her return, the same aspect, the same physiognomy, the same talk.

"From this time appeared ideas of suicide which she attempts to indicate by saying her malady is certainly incurable, and that she despaired of ever being able to remain at home to care for her infant.

"1st March, 1886. Attempts to commit suicide by swallowing needles; she pretends to having swallowed over 100. The patient becomes more and more sad, she bears also on the right arm a small sore which she says she has effected with broken glass, she pretends that she wishes to free her husband and society of a useless member; although she is unnatural enough to have no care for her infant and to abandon its nursing; she announces that she will strangle herself. No hallucinations.

"11th. Attempts to commit suicide by swallowing pounded glass which she vomits at once. No complications.

"16th. Swallows calcic chloride which had been deposited in the closets a few minutes previously. Vomitings. No other complications.

"Since then the patient became more sad saying that she is a fool, a wretch, that many who have passed the guillotine are not so capable as she. Insomnia constant.

"Melancholy accentuates itself daily at times by other little varied attempts at suicide which all successively abortive. No hallucinations. She finds herself more frequently in the ward with another inmate K.—who is also haunted by suicidal ideas. The latter was for this reason for the most part isolated; their intercourse concerned suicide almost constantly and the means of compassing a good ending.

"On August 26, 1886, at half past twelve o'clock K. came to find the warder and to say that B. had gone into the servants' dormitory and that it was probable she intended mischief to herself. The warder hastened to go to the place indicated and there found B. hung to an iron bar in the window. This glass window was open, but the opening was closed by a grating which left free below the sill of the casemate. B. after having attached the cord to the upper bar of the grill seated herself on the window-sill, her back turned round (endehors), then she allowed herself to slip. In the slipping she was borne to the left side so that the left arm was turned behind and below was pressed betwixt the body and the wall. The head was also borne to the same side, also the fold which the cord formed on the neck came round just to the middle line on the left, whilst on the right not so far. The constriction was specially borne by the left side towards which the head was strongly bent; thus is explained the dragging of the

cervical plexus on the left side, of which we will find the consequences further on.

"The cord was cut at once, B. was immediately stretched on the ground, but gave no sign of life; they beat her with cords dipped in vinegar; numerous sinapisms were applied to various parts of her body and life was finally brought back.

"Her voice was lost. Her neck is extremely swollen and bears a ring of ecchymosis much more marked on the left than on the right. On the left this trace of the cord reached to the nape of the neck, prolongs itself as far as the median line and even passes it a little. On the right the trace is much less deep which is explained by the position in which B. was found. On examination of the throat we find that the uvula is swollen out even to the pillars of the velum palati; two incisors and a lower canine are much shaken. It is impossible to carry the examination further in this direction on account of the difficulty in respiration. B. was placed upon a couch, the respiration is sibilant raucous, one hears a flapping cloth sound in the Larynx; the suffocation is such at certain moments that we are compelled to hold ourselves ready to perform tracheotomy. The patient is absolutely unconscious, she does not occupy herself in any fashion with what passes around her, nor reply to the questions put to her; the sensibility appears much lessened, to the extent that the patient does not draw back her arm even when severely pinched.

"A.m., Friday, August 27. The neck is always swollen, the lips are violet, the eyes brilliant, prominent: the tension is not lessened and there remains the possibility of having to perform tracheotomy. Injection of morphia.

"Noon, same day. Following the injection the suffocation fit diminished, the voice returned slightly, but raucous, veiled; screechy and difficult to make out, the patient breathes with difficulty but the tension is less.

"Evening same day. B. goes on progressing better: the neck is less swollen, *le tirage* has almost completely disappeared, the patient speaks but the voice is always veiled, tepid drinks ingested very easily.

"Sunday 28th. The swelling has almost entirely disappeared, the respiration has become normal, the voice remains always a little rough, the patient coughs from time to time. No expectoration.

"B. complains of pains in her right shoulder, the betterment which we establish from the point of view of symptoms which have followed upon the suicidal attempt do not stand alone, the mental state itself is bettered. B. who was previously sombre, anxious, has now an open countenance, she is surprised to see herself isolated and says that she will be much better able to assist the servants to put the dormitory in order. B. did not truly regain consciousness till Friday evening: that is to say, 31 hours after the accident; she recalls to herself the fact of having been oppressed at that moment, but she has lost recollection of her attempt at suicide.

"She explains her hoarseness by the cold which she got from walking barefoot in water in the morning.

"August 29. Amelioration continues.

"August 30. The question is asked anew, and an attempt is made to make her recall the suicidal attempt and the circumstances immediately preceding.

'We came up,' says she to us in the dormitory, 'K. and J. to report upon the linen, and there we remarked that it would be easy to make the window-bars serve to hang by and also to put a barrier betwixt ourselves and the world.'

"We press the patient a little and ask her if she did not try to put her project into execution. 'Oh! no!' she replied, 'I have too much fear of making myself ill; I had indeed a cord, but I made no use of it.' Under the new circumstances around, B. revolts, complains that the girl makes false reports to us; she takes to watching her and upbraids her with serving us badly. On several occasions the same subject is broached, but it is impossible to make her remember her attempted suicide; her memory fails her at the moment when, in concert with K. they examined the means of properly accomplishing their suicide. What proves the sincerity of B. is that she has sought several times for the cord of which she made use and which was placed in a bag belonging to her.

"If we ask B. to explain the black ring which we see on her neck and which is shown to her in a mirror. 'That!' says she, 'it is the camisole which has existed for two days, and which must have been very deep.' The mental state is changed. B. sought formerly not to be taken back to her family because she was unworthy of them; to-day, on the contrary, she asks to be sent out to them. 'I came here,' she says, 'with the idea of never going out and nothing being done for me; I was in doing that, very wrong; but now my husband forgives me entirely and I hope much that you will sign for my dismissal in order that I may live in the midst of my friends and care for my infant.' Moreover, since the suicidal attempt she has obtained sleep which she had lost for a long time.

"Sept. 4, B. complains of pains very sharp in the arm and shoulder. The bruising caused by the cord has almost disappeared upon the right side, whilst upon the left and in a space 7 to 8 cm. long the skin of the neck is scarified: the extent of the spot is about 4 mm. This suppuration is not shewn upon the right.

"The ideas of suicide have completely disappeared, the patient is no longer tormented by the question of knowing if we will let her out of Salpetrière she fears she might refuse to go out.

"March 7, 1887. The general state has not changed, only the ideas of indignity appear to return and the patient no longer demands to go out. She hopes to be compelled to go out, believing the power to be wanting in herself and being unable to conceive such a day.

"The pains in the right shoulder and the arm are become greater: this pain which the patient localised in the scapulo humeral articulation, is constant. When we press behind the sternomastoid, in the neighbourhood of the transverse apophyses we determine a very acute pain which, moreover, is found throughout the course of the brachial plexus into the subclavicular fossa, in the armpit and in the arm throughout the course of the main nerves, the median, circumflex, and radial. We cannot find cubital pain in the forearm or hand but only a slight numbness.

"The same pain is experienced at the nape of the neck all along the spinal apophyses from the occipital down to the prominens.

"A first blister was placed in the subclavicular fossa on Tuesday the 7th September.

"A second blister was placed upon the nucha and brought great relief, although the movements are still very painful it is difficult for the patient to carry her hand to her head.

"The slight betterment which we have established has not persisted and barely lasted eight days; to-day B. appears to have returned to her ancient delirium and repeats the same talk as prior to her attempt; nevertheless, the ideas of suicide have disappeared.

"Dating from September 16, after a visit from her mother who spoke much to her of going home, B. has afresh lost her sleep."

In resumé this suicidal attempt determined very important local effects:—

1st. At first accidents of œdema of the glottis, which put the prognosis in suspense during nearly 24 hours.

2nd. Distension of the cervical branches leaving after it a diffuse neuralgia of the cervical plexus which has not yet entirely disappeared.

But the most interesting phenomena are exhibited upon the side of the psychic functions:—

1st. What strikes one at first is the absence of all memory during the period of about 30 hours which followed the accident, but we recognised soon that this amnesia comprised the time when the preparations for the suicide were made.* It seems then that we must find in this circumstance one of the characters, of the highest importance, of traumatic amnesias, which are frequently retroactive, that is to say, comprise a certain period anterior to the shock.

2nd. Finally, another fact no less remarkable is the modification of delirium which has been such, during some days, that one might have been led to believe in a complete cure.

We have already related that sometimes mad folk, under the influence of a feverish excitement, momentarily recovered reason. It is not uninteresting to remark that sometimes even a lively emotion of the sthenic kind particularly produces exactly the same effect.† Esquirol instances a young melancholic who came to be tired of life, and who went to an armourer, bought a pistol, found it too dear, resisted payment with warmth, was carried away, threw

* Butakow has also observed a similar case. (*Bull de la Soc. de Méd. mentale de Belgique*, 1890. p. 488.

† *Note à Hoff Cauer*, p. 119.

the weapon with anger upon the counter, and issued from the shop cured of his desire to kill himself and of his melancholy. Madfolk who only manage imperfectly to conceal their delirium in the ordinary surroundings of an asylum, appear to forget really and completely when they are subject to expert examination, for instance, upon which their fate hangs.

Painful emotions can in some circumstances have a salutary effect. Renaudin instances a case in which the news of the death of his father brought about the cure of a melancholic stupor.*

We have instanced analogous cures induced by fear at the moment when the would-be suicide finds himself face to face with the death he sought: fright appears to have had the same effect in different circumstances.† Hill instances a girl who having set fire to her garments, was cured by the fear.‡

An attempt of the same sort can effectually provoke the cure of madness. Ellis reports that a seaman was cured of an attack of mania after having attempted suicide by cutting his throat.§

Gregory has instanced the case of a man who in a mad fit resolved to kill himself, escaped from his house in order to throw himself over Westminster Bridge into the Thames. At the moment of putting his project into execution, he was attacked by a robber armed who threatened him with immediate death. At the same instant, influenced by emotion, he abandoned his project, and returned home solaced of his previous perplexities.‖

It is a constant character of certain mental troubles that they are influenced at least during a long period of their evolution by moral emotions. The different forms of *aboulia*, the doubt-madness which reposes upon a defect of irritability, are lessened by the slightest encouragement by the sole presence of a stranger.

Amongst the facts most calculated to exhibit the influence of moral states upon mental affections there must be cited cases of cure which we have seen several times produce themselves after epilation or the destruction of the hairs of a woman's beard: the sole fact of feeling themselves brought to a normal condition morpho-

* *Etudes Médico Psychologiques.*

† *Ibid.*

‡ Hill. *Essay on Prevention and Cure of Insanity*, 1814, p. 141.

§ Ellis. *Traité de l'aliénation*, 1840, p. 244.

‖ Ellis. *Loc. cit.* p. 46.

logically has caused the profound and persisting melancholic troubles to disappear.

Aristotle thought that the passions might be powerful arms in the hands of those who could make them serve them: but, as Seneca remarked, they are unfaithful arms, for one cannot take them up and lay them down at will, "habent et non habentur."

The profound emotions can act, it may be well, it may be ill, and no human sagacity is capable of foreseeing the result.* They are "moral crises" which can have sometimes a happy, sometimes a deplorable effect.† One cannot "dose" the emotion one seeks to provoke; one can in general, therefore, bear them in timid attempts.

If one cannot reckon upon the sudden and short emotions which act rather as alterant after the fashion of revulsives (moral revulsion)‡ it is none the less the case also with the durable sthenic emotions: a change of environment, and good moral conditions show frequently favourable effects, not only upon nervous and mental patients, but also in diverse bradytrophies, in chronic maladies, in anemias, and especially in convalescence from acute ailments.

If the emotions, that is to say, in reality, troubles of imagination, can modify ills of physical origin: inversely pains of physical sort are capable of modifying imaginary ills on the side of traumatic cures: and it is not rare to observe diseases of the body provoke a happy modification in the course of a mental malady. It is, moreover, a fact which must confirm us in the opinion that physical ills and moral ills have a common basis: "Disappointment is a true physical evil," says La Mettrie.§

* Weir Mitchell. *Lectures*, 2nd ed. 1885, p. 35.

† Chérubin. *De l'influence du moral sur le physique de l'homme.* Th. 1840, p. 48.

‡ Briquet. *Traité clinique*, 1859, p. 22.

§ De la Mettrie. *De l'homme considéré moralement de ses mœurs et de celles des animaux*, 1802, t. ii. p. 376.

CHAPTER IX.

Influence of States of Excitement and Exhaustion upon Mental Activity.

Summary.—Relations of Somatic to Mental Activity—Physical Conditions and Emotions—Imagination—Memory—Association—Neologisms.

When the external excitations, the representations, physical exercise, or intellectual travail produce themselves in a measure such that they are accompanied by a general tension of the muscles of relational life, and a universal activity of the organs of vegetative life not tending to any incoercible local discharge, the individual is in the sthenic state which constitutes entirely the physical conditions of the agreeable emotions, and is characterised by an increase of all the activities.

We have seen that the absence or the insufficiency of sensorial excitations, physical exercises, or intellectual activity is capable of provoking troubles of the functions of nutrition or relation in all ways analogous to those which are provoked by the absence or insufficiency of the physical agents, indispensable to the maintenance of life. The sensorial excitations, the mental representations, which determine too violent reactions act in the same manner as physical fatigue: if the discharge is sudden it determines phenomena of collapse which differs in nought from the physical point of view from what would be the consequence of a reaction to too strong an excitation, of a violent emotion, or a premeditated effort.

Intense representations determine an impulsive desire, or a violent repulsion, an anger, which hardly differs from painful discharges provoked by strong excitations. These diverse reactions are accompanied by a secondary excitation which it is not necessary to confound with the primitive sthenic state we have been alluding to: it ends rapidly in exhaustion.

The feeble representations, the absence of emotion, coincide with a physical apathy which differs in no respect from those which

manifest themselves in cases of physical lack of irritation, or exhaustion.

The analogy of the effects of the sensorial excitations, of the physical activity and representations upon the psychic functions merit also attention. We have seen that a sensorial excitation can revive images, exalt memory: physical exercise has often analogous effects. The emotions can act similarly.

The peripherical excitations do not act upon the whole of the organic functions except by the intermediary of the central nervous system, and especially of the brain. We are about to see that the emotions express themselves by functional modes which by their form and their grouping repel the effects of the peripherical excitations.

Moreover, the general effects of the sensorial excitations manifest themselves also apropos of voluntary phenomena which are only produced by reason of a cerebral activity. Moderate exercises, circulatory, respiratory, calorific, induce psychic phenomena which differ in nothing from those which are determined by visual or auditory excitations moderate and agreeable. Exaggerated exercise and muscular fatigue entail, on the contrary, somatic and psychic phenomena altogether similar to those of excessive and disagreeable excitations: what produces itself in consequence of mechanical work manifests itself also apropos of psychic work: one finds then, according to the intensity and duration of the exercise, the same general phenomena of excitation and exhaustion.

And it is not without interest to remark that these different effects of voluntary activity accompany themselves to emotional states analogous to those which coincide with the effects of sensorial excitations according to their degree and intensity: the pleasure of power and the pain of powerlessness constitute emotional states which have the same physiological conditions as the others.

If we consider finally that according to their sthenic or asthenic characters, the sensorial excitations, the voluntary activity, the emotions, are susceptible of provoking analogous pathological states, it will be readily allowed to conclude as to the identity of the nervous processes which constitute the indispensable condition of them.

The peripherical excitations can be unconscious, but one can never say that their effect will be nil under the pretence that our means of investigation do not permit us to establish any of them. The emotions, howsoever feeble they may be, entail a state of consciousness, and consequently a certain duration, and a certain degree of attention: one cannot, therefore, say that they are neuter: attention which consists always in an activity cannot be otherwise than agreeable or disagreeable, but it cannot be indifferent.

From the point of view of their somatic manifestations, the sensations (and the sensations called muscular are not an exception) and the emotions, all the sentiments, in a word, present no fundamental difference. It must be remarked, however, that the physical accompaniments of the emotions increase and decrease more slowly than those of the emotions: it is because the physiological conditions of the sensations are simple reflexes, the conditions of the emotions are the result of compound reflexes. This condition relative to the duration explains how it is more easy to resist an emotion than a sensation.*

Whilst, in the sensations, the local phenomena preserve a marked predominance, a predominance which constitutes the specific character of the sensation, in the emotions it is the whole of the organism which is affected. The emotions are only distinguished by the degree of intensity of the general effects. The discrimination of this degree of intensity is much less easy than the discrimination of the effects of the external excitations. It is one of the reasons for which the difference betwixt the actual and ideal is less marked for the emotions than for the sensations (Spencer). Further the revivification of emotional states is subordinated to the association of the sensorial representations which can be multiplied.

"It must be remarked," says Gratiolet,† "that one wearies more easily in places where the air is not renewed, whilst the same effect produces itself more difficultly in the mountains or on the border of the sea, in all the places, in fact, where great masses of air circulate." The default of excitation, the absence of sufficient exercise, though it may be the consequence of excessive excitation or labour, produces the same result, and the same may be said of the default consecutive to excessive emotion.

* Bain *Emotion and Will*, p. 69. † *De la physiognomie*, p. 342.

Thus the external excitations, the emotions, voluntary activity, determine analogous effects from the physical point of view, and also from the psychical point of view. There is no room then for astonishment that these three orders of conscious phenomena can enforce or exclude one another, just as we see the physical activities compensate or exclude the intellectual.

Actual and very intense physical excitations attenuate emotions and emotivity; just as violent exercise of the motor functions does,* and, inversely, the very intense actual emotions weaken voluntary activity and the effects of outward excitations. The discharges which are provoked by painful emotions weaken pain: it is thus that one can understand with Aristotle that it is pleasant to give oneself up to anger; and with Homer that anger is sweet as honey. Anger weakens physical pain just like moral pain.

Intellectual activity also weakens emotivity: it is related of the German mathematician Gauss, that he was occupied in the solution of a problem when his servant came for the third time to inform him that his wife whom he loved much was very ill, and about to die: "Tell her," said he, "to wait till I come."

Physical, like moral pain, doth not express itself in all by the same phenomena, and it expresses itself in the same individual in a different manner according to circumstances. The expression of pain varies according to the physical state in which the patient finds himself at the moment of seizure. The direction of the reflex discharge at the bottom varies according to the initial attitude: it is a law which we have already had to recall.

Lasserre† divides moral pains into two classes: 1st. the explosive pains with reaction, amongst which he ranges anger, hatred, fury, horror, despair, etc.: 2nd. depressing pains without reaction, like terror, fear, fright, disappointment, etc. But apart from the state of the subject it is less the cause of the pain than its intensity which constitutes the difference of the reaction. Moderate pains are associated to reactions; intense pains provoke a general depression, and are incompatible with an active expression. Niobé, who

* *La Physiologie du Rire* (*Essais sur le Progress*, p. 302).

† *Sur les Douleurs dans les Passions Tristes.* Th., 1819.

came from seeing her fourteen children die, is changed into marble.

"Curæ leves loquuntur, ingentes stupent."*

"La douleur qui se tait n'en est que plus funeste."†

"Just as physical pain," says Griesinger, "when it attains in one of our senses to a very high degree is accompanied by anæsthesia; so, very profound moral pain brings about a complete state of mental insensibility to normal excitants."‡

Moral pain, like physical pain, diminishes sensibility in all its forms, enfeebles memory, association, narrows the field of intelligence, and ends by entailing incoherence and dementia.

Physical pain when it does not pass a mean intensity can also express itself by a certain exaltation of mental activity. It is said that Scarron had never more spirit and gaiety than when he had an attack of gout: Cardan also excited himself to labour by physical pains. In another order of ideas Helvetius has been able to say correctly that ennui is one of the most powerful stimulants to great actions. Fear does not only provoke activities adapted to the distancing of the danger, it determines, when it is not too acute, an exaggeration of the other activities: we see examples thereof in the perverted weaklings who cannot be satisfied except in public places where they are incessantly under the risk of being surprised, and in a general way, among the sweets of forbidden fruit. Fear induces a necessarily previous tension which favours the effects of the excitation.

A great number of the troubles of brain functions appear to have a sudden beginning when, in general, they are prepared for, a long way previously, by insidious manifestations which pass unperceived upon a superficial examination. This observation applies especially to mental maladies. Frequently, after their recovery, the patients relate that a long time before the official beginning of their trouble they felt themselves changed, they were no longer the same, their sensibility appeared to them altered, and it was especially in the domain of the emotions that they felt modified to such a degree that they had doubts of their identity. These premonitory troubles endure sometimes months and even years.§ They

* *Seneca. Hypolyte*, act ii., sc. ii.

† *Racine. Andromache*, act iii., sc. iii.

‡ *Traité des Maladies Mentales*, p. 39.

§ Forbes Winslow. On Obscure Diseases of the Brain, 2nd ed., 1861.

bear mainly, in appearance, it is true, upon the affective life: but in reality these troubles of sentiment repose upon troubles of sensibility in general which is itself much affected. After their cure the patients relate the strange condition of their general or special sensibility: they saw objects as through a mist, all the colours spoilt, and appearing uniformly grey: they only heard muffled sounds as if they had been inclosed in a diving bell: odours, savours had lost their usual characters, changes of temperature were badly appreciated. The coenaesthesia itself is profoundly attacked: the patients have consciousness that they are changed in their whole substance a long time before their conduct is so modified that the attention of their relations may be shocked.

A landscape appears to us entirely different according as the sun beams forth or the sky is covered with clouds. The outer world similarly appears to us under a different aspect according as our organism is under the possession of full vigour or is exhausted by illness. With light and health all beams and everything is well; in darkness and illness, all is dark and painful. Pleasure has for its physiological condition a sound organic state: pain has for its condition an unsound organic state, an estate of enfeeblement.

"Excessive cold has occasioned sometimes suspension of the intellectual faculties. Three girls travelling in a carriage, during a severe winter, found themselves all at once quite imbecile on arriving at their gates. Bartholin covered the heads of these with sheep skins after their stupid condition had lasted about 14 days: the functions of their soul were not slow then in regaining their former liberty."* Ellis† admits also the *rôle*, causally, of cold in mental troubles: when his annotator, Archambauld, remarks that the action of cold cannot manifest itself otherwise than by another organic lesion upon the functions, it proves his ignorance of the action of cold in the physiological state upon the functions of the nervous system.

The influence of darkness is not less manifest than that of cold as we have already remarked. In these different conditions the innermost feelings have a tendency to exteriorise themselves.

Seneca says, in one of his letters, that the servant of his wife

* Calmeil. *De la folie*, 1845.

† Ellis. *Traité de l'aliénation mentale*, 1840, p. 120.

Harpastes, became almost blind but, ignorant of her trouble, said that the house was become dark.

The study of the physiological conditions of the functioning of the mind appears to indicate that the terms of the ancient adage, "mens agitat molem," ought to be reversed. The mind does not awake until the body is agitated, and very often the body is agitated without awakening the mind: many movements, many very complicated acts accomplish themselves without consciousness being affected.

The idea, the desire, the need, hardly differ from one another except in intensity: they are only consequences of muscular actions determined by outer excitations or explosions of capitalised forces in consequence of previous excitations left without response. These motor acts frequently pass unperceived in the purely nutritive acts: they only evoke a doubtful consciousness when they are little complicated or frequently repeated, as in instinctive movements. Finally they become altogether conscious when they are very complex and when they are provoked by less habitual excitations.

It is only apparently that the intelligence has an action upon the body: the phenomena of intelligence are, on the contrary, the necessary effects of certain bodily modifications: and it is by the intermediation of these bodily manifestations that these mental representations act; by the fact of the physiological association of the somatic conditions, an association frequently unconscious. In the case instanced by Unzer of an individual who being in the habit of feeling ill when bled, ended by feeling similarly by the sole fact of meeting a surgeon. The trial of an effect of a certain kind does not act otherwise. This person did not find himself ill by the trial of a certain physiological effect but by the fact of an acute emotion. When in the middle of a terrifying apparition one binds the eyes of a person and makes him believe that he is about to be subjected to a mortal shock, or that one is going to bleed him to death, death does not come by imagination of the effects of the shock or the bleeding, but by the emotion of fear which can provoke a mortal syncope.

To be able to imagine with intensity it is requisite to find oneself in a suitable somatic state. What we call the will is not, over

this function, an absolute power. Sir Walter Scott, reading shortly after the death of the poet Byron an account relative to him, traversed a vestibule in which armour and skins of savage beasts etc., were suspended. Dressing in the midst thereof, he saw the striking image of his friend which disappeared as he approached it. He returned to the place where he had had his illusion and willed to reproduce it, but without success. Nevertheless one can have no doubt of the imaginative power of Sir Walter. The imagination is simply not commanded by the will, which is itself a consequence. Both are subject to necessary physiological conditions. When one seeks to recall to oneself a forgotten impression, or to take up again a broken thread of ideas, and the voluntary concentration of ideas is powerless, it suffices frequently to place oneself in the position where one found oneself at the moment of the excitation, or the previous representation, in order to awaken the organic conditions which command the recall of the sensation, or the representation.

Certain sensorial excitations, certain visceral irritations, appear to be, for a given person, especially appropriate for the recall of these representations (Maudsley).

OBSERVATION XXIX.

Recall of painful emotions by digestive troubles—Neuropathic inheritance.

M. S. came to consult about his son, aged 12, attacked by hysteriform symptoms and notably a plantar hyperaesthesia limited to the anterior two-thirds of the foot and forcing him to march exclusively upon his heels. This, an only child, had had convulsions in infancy, but since this he had had no illness: the actual troubles supervened upon an attack of influenza. One seeks in vain for hereditary antecedents in the family of the mother and in that of the father. The father declares himself to be in good health: "he has never been ill because," says he, "he is a vegetarian." He is a liberal vegetarian, not imposing his régime upon those around him. It must be said that vegetarianism has not been adopted by him as the result of a scientific dogma, but gradually, owing to a progressive disgust for aliments of the flesh sort, a disgust which began at College and became invincible towards the age of 25 years after an indigestion. He willingly expands upon the advantages of a vegetable diet, upon its variety, he eats all legumes, except Brussels sprouts (!!). This exclusion is not without interest. On the 8th May, 1884, he was about to lunch off Brussels sprouts when he received a dispatch that his only brother whom he loved much was dead at sea when returning from America to France. He was very painfully affected by this news, he left the table, but he had felt a shock in the region of the stomach, he was covered with sweat, his limbs supported him badly. At the

end of half an hour of this he rejected by vomiting all that he had taken to lunch. Since this period he cannot bear either the sight or the odour of Brussels sprouts which provokes at once a sensation of malaise and a painful recollection of the death of his brother. This same reminiscence he finds revived, besides, every time that he experiences indigestion from whatsoever cause.

If the general troubles of nutrition entail a depression of the mental state, inversely, the depressing troubles of the intelligence are associated with nutritional troubles capable of simulating general maladies: nostalgia, for instance, can be confounded with infectious maladies at the beginning or with infectious maladies assuming slight forms.*

Certain states of excitation emerge from the state of repose of the nervous system in general, but also from the repose of some organ in particular. After a long immobility people feel uneasiness in the limbs, an imperious need of movement. Long repose of the genital organs induces a peculiar psychic condition, an unwonted development of sentimentality which expresses itself objectively by acts which tend towards sexual intercourse. This psychical state has two well-known physiological conditions: the repletion of the spermatic apparatus, and a certain degree of tension of the nervous system. When one of these conditions is suppressed, all the emotional complex is suppressed. When the male frog is seated on the female for the purpose of fecundating her ova he holds her so firmly gripped that one might torture him, cut off a limb even, without making him let go. But if we open the seminal vesicles, he immediately abandons her: love is reduced thus to a necessity for evacuation. Even with man, an abundant evacuation, it may be by the skin, it may be by the bowel, can bring about the same result, like every traumatic or emotional shock, like an intellectual effort, like an ingestion of too copious a repast, which otherwise occupies the energy of the nervous system.

The activity of the imagination can only be subject to modifications of memory and association of ideas. This is, in fact, what exists.

We have already related that under the influence of physical excitations (light, noise, mechanical vibrations, etc.), it is possible to awaken faint consecutive sensations, or the memory of sensa-

* Goic. *Nostalgia*, Th., Lyon, 1890.

tions which have not attained the level of consciousness. Peripherical excitations revive representations and actuate memory. The emotions can produce the same effect and exalt imagination. This fact did not escape Malebranche.* Says he, "It happens sometimes in persons who have their animal spirits strongly agitated by children, by wakening, by hot fevers, or some violent passion, that these spirits mount to the inner fibres of the brain as strongly as external objects: so that these people feel what they ought only to imagine, and believe they see before their eyes objects which are only in their imagination. That shows clearly that in respect of what passes in the body the senses and the imagination differ only as more or less." Under the influence of the emotions habitual ideas assume frequently the character of hallucinations, and constitute a delirium which is not without analogy to the professional delirium of alcoholics.

The excitation produced by a lively emotion can induce an exaltation of memory. Forbes Winslow reports the fact of an individual who in danger of being crushed by a railway train experienced a panoramic vision of all the circumstances of his previous life analogous to what we have related as sequent to several kinds of death by asphyxia.†

One can compare the moral to the traumatic shock. Moreover Wilks‡ uses the expression "moral concussion of the brain," and Trousseau that of "brain surprise." The analogy is easily justified. I have already had occasion to establish a relation betwixt the amnesia resulting from a traumatic shock and that resulting from epileptic discharges. This amnesia can be met with again under the influence of other physical conditions which border upon nervous exhaustion, such as too intense a heat, too excessive cold.§ Cold and heat act so much the more efficaciously as their depressing action is combined to that of fatigue. Strong emotions can also be followed by retro-active amnesias. Forbes Winslow and Rouillard each report a case of this kind,‖ and M. Arnozan¶ has cited an

* *Recherche de la Vérité*, 1712, t. i., p. 81.

† F. Winslow. Obscure Diseases, 2nd ed., p. 217.

‡ Wilks. Lectures, 2nd ed., p. 1883, 502.

§ Laccassagne. *Etudes méd. légales sur le froid*, 1878.

‖ *Loc. cit.*, p. 378. Rouillard. *Essai sur les amnésies*, th., 1885, p. 88.

¶ Arnozan. *Amnésia rétrograde à la suite d'émotion morale (Bull. Soc. Méd. Chir. de Bordeaux*, 1887, p. 588).

instance thereof following the impression made by bad news. In the following observation retro-active amnesia succeeded to the explosion of a violent anger.

OBSERVATION XXX.

Neuropathic Antecedents Absent—Jealousy—Fit of Anger—Retro-active Amnesia—Chorea.

"M. D. B., aged 24, lives on the Fontainebleau road with her parents who do not present any neuropathic flaw and do not know of any in their family. The father was 46 years old at the time of his marriage, and the mother 39. She was born the year following and her younger brother four years after. This circumstance of the advanced age of the parents is the only one which merits being reported in the hereditary antecedents. The father and mother are well although living in poverty. M. D. has never had any ailment. Her brother had incontinence of urine up till 13 years of age, then he became indisciplined and, although laborious, only presented himself to his parents to demand money, which only M. D. provided: the latter gaining enough in a warehouse to maintain her old parents. Nevertheless, at the end of December, 1889, the poverty became greater because the mother had been ill and M. D., fatigued by an abundant loss, had been obliged to cease her work for several days. Knowing that her brother had been working for some time she decided to go and find him at his lodging in the avenue of Choisy. On the 24th December she left at half past seven saying to her father that she was going to her warehouse; and she went to her brother whom she found with a woman. The latter, who nevertheless treated her respectfully, wished to deny her entrance. She flew into a violent anger, shouting injuries and menaces which were altogether unknown to her mouth. She ended by going voluntarily *as a fact*, and went to her warehouse where she had not been for several days. She arrived late and in such a state of agitation that her employers demanded that she should go directly home again. When she returned she found her brother who, full of remorse, was come to apologise and bring some money. She spoke to him as usual, not appearing to remember what had passed. She could not recollect how it was that she had arrived late at her warehouse nor wherefore they had sent her back. Nevertheless, people remarked soon that she made singular grimaces and that her hands, especially the right, made sudden and aimless movements. All that one can draw from M. D. is that she found herself at the foot of the Choisy Avenue, astonished that she had not followed the Avenue d'Italie and that she took the tramway to the Place d'Italie in order to get to her warehouse. She could not recall the circumstance of leaving the house in the morning, no more than the alteration of the Avenue de Choisy, which she only ascertained by the recital of her brother.

"The movements which have been remarked since her return are rapidly accentuated, and when she presents herself for consultation, on the day following, the chorea was no longer in doubt. She presented no apparent hysterical mark, she was anemic and thin, short of breath. Subjected to a tonic treatment which she came to undergo at the hospital together with an hydrotherapy, she was cured of her chorea in about seven weeks. Asked

a great number of times relative to the emotion provocative of her accident she could recall nothing of it although all the details had been related to her and she had no reason to dissimulate. In proportion as her general estate bettered she remarked that her memory became more faithful. After the incident she was obliged to give up going to work at her warehouse, but she had put herself into the business of a mercer, whom she knew, who had decided to alter his warehouse to another plan: he wanted her to replace numbered packets in the lockers. This work was only done at night and usually during an hour at most, so that it entailed neither fatigue nor ennui. But M. D., who was endowed usually with a good memory, was incapable of keeping more than two numbers together, during the first evenings, and frequently she was obliged to have them repeated: this trouble of memory only slowly disappeared, and when we saw her for the last time, M. D. affirmed that the restitution was not yet complete."

One understands all the interest of retro-active amnesia of emotional origin, which can manifest itself equally well when the subject has been the victim of an outrage, as when he has been the author of one. The fact is equally important from the clinical point of view as from the medico-legal. We know, in fact, that amnesia is not a constant characteristic of the psychic manifestations of epilepsy.* We see, however, that it is not more exclusively attached to these troubles.

As for the troubles of memory which have ensued they also merit attention. A considerable number of observations inform us that in states of depression, not only the energy of movements, but still more their rapidity, finds itself weakened in variable proportions with the other organic conditions. This diminution of rapidity of movements which is appreciated by the measure of the time of simple reaction (motor) coincides with inconsiderable augmentation of the time of perception which is found out by the measure of the time of sensorial reaction (Lange). This elongation of the time of sensorial reaction is found again, like that of the time of motor reaction, in fatigue after nervous shocks, epileptic seizures, in hysteria, etc.: it entails a diminution of the receptivity. We know, moreover, that under the same conditions perception is diminished in intensity, the level of perception is lowered, that is to say, that, in fact, the excitations are feebly and slowly perceived. But we know that amongst the vital processes the least intense and most tardy are those which are first arrested: if we consider, for instance, the ossification of a bone, we note that

* Féré. *Les Epilepsies, etc.*, 1890, pp. 140, 143.

the parts which develop themselves most slowly are the first to become the seat of atrophy;* one was right to infer that in the conditions where the perceptions make themselves most painfully and slowly, waste manifests itself more quickly. This is, in fact, what happens: to the diminution of receptivity corresponds a diminution of retentivity. This diminution of retentivity in conditions of nerve exhaustion can be studied experimentally in several common conditions; in considering this function, for example, in healthy subjects in the normal state and under the influence of fatigue, in epileptics, in their habitual state and after paroxysms; in hysterios in their normal state and under the influence of an excitant (æsthesiogenes). If we determine, in these different categories of individuals, taken in their normal state, the quantity of numbers of two figures, which, heard or read successively, can be repeated or written without error; and if we renew the experiment in abnormal states, of depression for the fatigued and epileptic individual, or excitation for the hysterio under the influence of a stimulant, we obtain the most exact results. We see in the two first the quantity of retained numbers diminish almost in the same proportion as the time of sensorial reaction lengthens, whilst in the hysterio this quantity augments almost in the same proportions as the time of sensorial reaction diminishes. *These results show the subordination of the conscious memory to the sensibility.*

In the previous studies† I set myself to show that, under the influence of outward excitations, of mental representations, or normal or pathological modifications of the interior environment, the energy of voluntary movements, the sensibility under all its forms, the time of reaction, are subject to considerable variations akin to the modifications of the circulation and nutrition, which bring us very far from the precise formulas of German psychometry. If there only take place in the organism, in consequence of peripheral excitations, transformations of forces, these transformations, compared to what we observe in experimental mechanics, present the same complexity as the chemical phenomena of digestion and nutrition, compared to the chemical reactions in glass vessels.

"It is not far otherwise in the physiological order from what it

* Féré. *Atrophie Sénile des os du crane* (*Bull. Soc. Anat.*, 1876, p. 485, etc. etc.

† *C. R. de la Soc. de Biol., passim, etc.*

is in the abstract mechanical: to a double force a proportional result does not always correspond."* We are hardly yet in position to set fixed rules for the time and intensity of reactions and sensations: so much the more as we are able to study some of the conditions which must vary this time and this intensity. If sensible experience is the prime source of our knowledge (Locke), this source is very deceitful: for man is the measure of all things (Protagoras), and he is a most changeful re-agent. When something acts upon us this action depends not only upon the object which acts, but more upon that upon which the action is exercised (Lichtenberg). But we are modified by a host of conditions of which we are unable to calculate the effects with precision.

Nevertheless the precise laws which one believes oneself justified in formulating a propos of phenomena, apparently simple, such as simple perceptions and reactions, tend to introduce themselves into the most obscure processes of natural history. It is thus that the so complex phenomenon of association of ideas has been able to appear to manifest itself in a fixed time.

M. Galton† (who was one of the first to attach himself to the study of this physiological point), pre-occupied himself in ascertaining the number of associations which could be provoked in a given time by the sight of external objects. He has observed that their apparition is extremely rapid, and he has been able to reckon about fifteen per minute of them. He remarks only that the impressions of youth are more frequently recalled than the others.

W. Wundt,‡ who has made comparative measurements on several subjects, concludes therefrom that the processes of association accomplish themselves usually in three-quarters of a second. He observed that in one of his collaborators, less familiar with the German tongue, associations required a little longer. This remark concords with that of Galton, and confirms the rule that the most beaten ways are the most easily traversed. In the experiments reported by Trautscholdt§ one sees also the differences of time maintained further for the complexity of associated representations.

* Cl. Bernard. *Léçons*, etc. *Loc. Cit.*

† Galton, "Brain," 1879. Inquiry into human faculty, 1833, p. 182.

‡ Wundt. *Eléments de psychologie physiologique*, trad. fr. 1886, t. ii. p. 314.

§ *Philosoph. Studien*, i; Heft, ii, p. 245.

But the time requisite for the realisation of the association does not vary only according as the ideas to be associated are more or less familiar, or more or less complex: it varies also with the subject: and these personal variations offer the greatest interest. What one observes in studying comparatively different individuals ought not to be neglected, but those that one can put in evidence in the same individual, under the influence of general modifications of the nervous system, are especially instructive. These individual and temporary differences in the duration of the time of association are the natural differences consequent and relative to the perception and conservation of impressions. The temporary variation in an individual will not surprise us if we remember that all the peripheral irritations, by the general excitation which they provoke, are capable of increasing the sensibility of each sensorial organ in particular: and so even the recall of consecutive sensations, or the retro-active perception of an excitation unfelt, or seated in the antechamber of consciousness, according to Galton's expression.

The procedure of which I have taken advantage in order to measure the time of association merits some criticisms, but as it has the advantage of permitting the realisation in a short time of a great number of experiments, it has appeared to me to recommend itself for the study of the variations which interest me especially. Several hundreds of words of sundry categories are inscribed upon bits of paper of uniform size to be read or shown to the subject under experiment. The latter holds firm in his hand the pressure knob (presselle) of an Arsonval's chronometer, the needle of which is fixed at 0. When he has perceived the word by seeing or hearing, he relieves the pressure, and he presses anew when he pronounces the associated word. The space traversed by the needle of the chronometer betwixt the release and the new pressure gives the time of association. For each subject the signal word and its associated word are inscribed with the time: so that, on recapitulation, when the same word, or words of the same group, are not presented several times one can recognise the conditions of the variations which pertain to the word, and to the idea which it represents (similitude, contrast, contiguity in time or space).

Experiments were made (a) on twelve normal subjects (three boys of eight to ten years, three women and four adult men, two men aged more than 65 years): and (b) on five patients, (three hysterical women, whose condition could, so far as emotion is concerned, be easily modified, either by physical agents or by suggestion, and two epileptiform men observed in the normal state and in the post-paroxysmal state, that is to say, one or two hours after a convulsive attack).

The observations have been repeated several times upon the same subjects: and the normal subjects have been explored in very various physiological conditions.

I have made a choice of experiments in which the signal word designated a common object, plant, flower, fruit, movable utensil, aliment, etc., whose nature or use were familiarly known necessarily to all the subjects under observation.

I will detain myself only in this preliminary note upon the results which appear to me to be comparable.

In the normal state, that is to say, apart from every physical or grossly appreciable moral perturbation I have found the following figures, viz.:—

	No. of Exps.	Mean of Time of Association.
Adult men	82	0.70
Old men	38	0.80
Adult epileptic men	44	0.80
Infants	68	0.98
Adult females	54	0.83
Hysterios female	76	1.14

The differences observed in these different categories concord very nearly with those observed for the time of simple reaction.

In normal persons the time of association is modified in several physiological conditions, as Marie Manacéine* has already noted under the influence of fatigue: whether caused by physical or intellectual labour the time of association elongates sometimes so far as to double the ordinary time. The same modification is observed also under the influence of a painful digestion, an accidental pain, migraine, abuse of tobacco, excessive alcohol, moderate doses of

* *Le Surménage Mental*, 1890, p. 180. (Fr. Tr.)

opium. Opium, in small doses, on the contrary, like alcohol and tobacco in small quantities, produces a diminution in the time of association. Always it is remarked that the diminution hardly equals the third and rarely the half of the ordinary time even in the most favourable experiments.

In the two categories of patients upon whom I have experimented the relative modifications are much more considerable equally when it brings about a lengthening as when it brings about a diminution.

On the two epileptics (with infrequent and guarded attacks) whose ordinary time of association is almost normal, the post-paroxysmal period furnishes figures exceedingly high, although the subject has not been explored until he comprehends perfectly what he does, then he fulfils correctly the conditions of the experiment, the associated word can be heard ten or fifteen seconds, that is to say, the time of association is augmented by more than ten times, whilst in the same conditions of simple reaction time it is only doubled or tripled. Moreover, in normal subjects, in conditions of depression, we find a difference in the same sense but much less pronounced: if the time of association lengthens in the proportion of one to two the time of simple reaction only lengthens itself in the proportion of one to one and a half. In the post-epileptic state it happens frequently that the time of association does not make itself more, or become false; that is to say, that the associated word does not respond to one of the normal relations of association.

In hysterios provoked depressing emotions associate themselves to very important troubles of association. Besides the delay, which may be considerable, without, however, attaining the duration one can observe in the post-epileptic state, they show *qualitative* modifications which one is able to put in evidence by an experiment which consists in causing association of an adjective to each name signalled: we determine then that all the adjectives are chosen to depreciate the object: whilst in the tonic emotional states the optimist character of the qualifications appears exactly at the same time that the time of association diminishes.

What provoked emotions do peripherical irritations can do. A great number of sensorial excitations can, according to the neces-

sarily previous state of the subject, modify the time of association, as they modify the time of simple reaction, but in a different degree, as we have already seen. All the excitations which determine a general stimulation facilitate association and shorten the time thereof. But it is not uninteresting to remark that even in the most marked states of excitation hysterios do not come to have a shorter time of association than that of normal subjects placed in the most favourable positions. The following experiment brings well into light the possibility of exalting the power of association: we show successively to the subject a certain number of French words to which one attaches a Latin or English word, then we cause the French words to repass before the eyes of the subject asking him to associate therewith the word of another tongue: he is incapable theerof, not knowing that tongue, *but the instant after*, the association is possible and correct, under the influence of a luminous or auditory excitation, the mechanical vibration of a tuning fork, of a magnet.*

The absence of a physiological excitant, like light, constitutes, on the contrary, an obstacle to the association and delay. Darkness brings many other troubles to the functioning of the nervous system.†

To sum up, the time of association varies in the same conditions and in the same sense, but not in the same proportions, as the energy of the voluntary movements, sensibility in all its forms, and the time of simple reaction.

The study of these modifications of the time of association, which is interesting from the psychological point of view, where this phenomenon holds such an important place, is not without interest from the point of view of psychopathology: it can explain several important troubles.‡ A point worthy of remark is that in states of excitation the quickening of the processes of association is always less marked relatively to the lessening of states of depression.

The ease of association does not manifest itself only by the rapidity of the phenomenon, but also by the multiplicity of the

* The action of the magnet on psychic phenomena and especially on the emotions was indicated long before Luys (*C. R. Soc. de Biol.*, 1890, p. 143). Without going back to ancient time we find it studied in two articles on Psychic Polarisation (*Rev. Ph.*, 1885), Bianchi and Sommer, 1887, et alia.

† *Cont. to the Phys. of Night* (*Brain*, Oct. 1889, Oct., t. xii.)

‡ Ferri. *La psychologie de l'association*, in 8vo, 1883.

recalls whose number is in relation to the previous impressions and with the permeability of the central tracts. The associations of words are determined not only by the relations of similitude, contrast, contiguity of ideas which they represent, but further by their consonance and contiguity in habitual discourse. In states of excitation consonance and habitual contiguity of words tend to assume a predominant *rôle* in association. Poetic improvisation which necessitates associations of ideas and consonances marks a degree of excitation superior to that of ordinary discourse: but the association by contiguity of the words and by consonance tends to invade discourse in the exaltation of inebriety where one sees frequently appear the automatic pun. In the maniacal state these superficial associations entail incoherence: I will cite, for instance, fragments of discourse written upon the instant, even by an epileptic in a state of maniacal agitation: "A mustard bath, d'épice, bread I like best so. It was my friend, it was Brûlant, the fire burns so: J'ai foutu le bromure dans les chiottes, chiottes à l'anglaise: on n'y voyait goutte, j'ai allumé une bougie à Bougival. . . . Ah! vrai! une chouette tête, j'ai jamais pu enpiquer de tête dans la Seine. . . . A force de parler j'ai soif, je voudrais de l'eau: j'en suis un salop. . . . V'là le temps qui se couvre, je m'en vas tout de suite, c'est pas un jésuite lui. . . . Personne ne me donne une cigarette: la vie est amère et ta sœur: . . . Je ne fais pas de train, j'aime pas aller en chemin de fer, j'ai eu une fois peur sur la voie rigolboche. . . . Donnez une cigarette (he takes and opens the box of lights) il n'y en a plus que trois en Champagne."

We see that in this trouble where excitation is considerable, the association is frequently determined by the consonance of the last syllable of the word, or even it is made from syllabic associations of contiguity which produce fusion by contraction of two words. These associations are automatic associations, there is no room then for astonishment that they are more rapid than correct associations, chosen and voluntary. Marie Walitzky has noted also that in general paralysis at the beginning the automatic associations are more rapid than in the normal state.*

* *Rev. Phil.*, 1889, t. 28, p. 583.—Marie Walitzkey. *Contrib. à l'étude des mensurations psychométriques des aliénés*

But in reality we cannot say that in mania associations are most rapid: what is most rapid, are false associations. These false or absurd associations are always a sign of intellectual enfeeblement, and are due to an enfeeblement of the power of discrimination. We see frequently in the wards of asylums lunatics who regard the first advent as an old acquaintance. In reality these patients are quite incapable of distinguishing betwixt two very distinct things: they make proof of a kind of psychic blindness;* there is no sign there of an intellectual exaltation. "In proportion as one has more spirit, we find more original men: common people find no difference between men."†

In states of depression, association becomes suddenly slow and loose. It can be troubled by reason of the diminution of the special sensibility which makes perception of the signal imperfect. It can appear without natural tie and absurd, when there exists a local persistent cause of excitation, for then it is this local excitation which serves for the recall of the associations, and not so much the outward excitation: also in hypochondriacs or hallucinés, frequently outward excitations only determine associations in relation with habitual pre-occupations.

Obsessions are born of a neurasthenic foundation, of mental depression: also patients recur to them in order to solace artificial excitations which have only in general a momentary success, for though they may be only slightly excessive they entail a consecutive exhaustion which can only aggravate the situation. We see frequently that it is after alcoholic excesses to which the patient has voluntary recourse that fixed ideas assume an intensity such that they determine irresistible impulsions.

In all the states of depression the subjective sensations assume an unwonted intensity: the exaggerated development of the sensations of simultaneous and successive contrast is very evident in these conditions even in the most normal subjects.

But as the conditions in which association becomes slower and more painful are precisely those in which sensibility becomes most obtuse and discrimination most difficult, we understand that there arrives a limit where the subjective sensations are no more distin-

* Hoppe. *All. Zeitsch. f. Psych.*, xliv., 6.

† *Pascal Pensées*, pt. 1, art x., 1.

guished from objective sensations, and that there are produced false associations and consecutive emotional states entailing volitions which appear anti-physiological; when it is impossible to follow the *rôle* of the subjective sensations.

Apart from these causes of troubles association can moreover be perverted by another procedure, under similar circumstances, which will explain itself by the following example, viz.: One of the normal subjects suffering from migraine had passed under his eyes the word "biscuit," to which he associated at the end of 2.70 sec. the word "Jean d'Arc:" the word had awakened successively the idea of a biscuit basket with biscuits superposed in quadrilateral form, then that of eating, and then that of Jean d'Arc. The two intermediary representations had been too feeble to be considered as real by the subject himself. One can suppose that in other cases the intermediary representations remain below the level of consciousness, and false association is unexplained. In this example, one sees that taking count of the intermediate ideas the time of association, although increased, did not attain one second: the feebleness of the representations plays, therefore, an important *rôle* in the production of error.

If we consider that delirium "is constituted by a perversion of hearing, which makes the patient associate incompatible ideas, and take these ideas thus allied for real verities;" one will understand how all states of depression where these kinds of association take place, realise the physiological conditions of delirium. Moreover, we know what *rôle* moral and physical shocks play (pain in all its forms, especially when prolonged, acute or chronic maladies, which realise the conditions where feebleness and slowness of perception and association are produced), in the causation of mental troubles. On the other hand it is averred that all mental maladies begin by phenomena of depression: some have even denied that the tonic emotions can ever have provoked alienation (Esquirol), and the contradictory observations are not strongly probative.

Finally, the return to normal associations which marks the cure of mental troubles coincides generally with an improvement of the physical health and emotional tone, and experiment shows that they are the most proper means for restoring the function of nutri-

tion which act most efficaciously for the restoration of the psychic functions.

In general the activity of the psychic functions appears in relation to the intensity of the processes of nutrition. This relation does not exist only in states of exaltation and depression: the perversions of nutrition entail also perturbations of intelligence by analogous procedures. If certain subjects in an habitual state of psychic depression, like the dements or the mentally feeble, are capable of showing an intellectual hyper-activity under the influence of febrile states, the same cannot be said of subjects in the normal condition.

When the temperature has exceeded the limits that it can attain in physiological excitations, we observe a diminution of sensibility in all its forms, of the power of discrimination, a lengthening of reaction time, and association time: I have been able to determine the existence of these troubles in several cases of influenza, erysipelas, in a case of diffuse phlegmon, etc. The functional troubles of sensibility and association play probably an important *rôle* in the different forms of aphasia, of fevers: in every case they constitute the physiological conditions of delirium which so frequently produces itself in these maladies.

In the nutritional troubles of toxic origin, as in alcoholism, we find again the same disorders or alterations of sensibility, motility, reaction time, and association time, physiological conditions of delirium, which develop themselves so much the more readily as the subject was under the burden of fixed pre-occupations (hereditary, professional, or other obsessions).

All the accidental troubles which are capable of entailing a lengthening of the time of association act so much the more efficaciously when taking place in infants, women or old men whose association time is normally longer. We know, moreover, that these conditions of age and sex constitute the predisposing circumstances of delirium.

When once a state of consciousness is associated to a given somatic state, all the physical or moral conditions which can re-establish this somatic state, this organic tonality, are susceptible of bringing about the state of consciousness, the recollection which

has been once associated with it.* Gratiolet has related a sufficiently characteristic fact, in a case of operation during incomplete chloroform sleep. "Thus, at the instant of the introduction of the lithotrite, there were throughout all the body of the patient agonising reactions, he agitated himself, he resisted energetically, but when the pain was at its height he cried out, 'You will not triumph over me! What signify these violences? Pierre, Antoine!' says he, calling on his domestics, 'chase these men!' And he added, 'You have done well: you will obtain nothing, I will not consent to an unequal division. My children are all equal in my affection.'" Thus a general sentiment of anguish, born of physical pain, awoke in him the idea of a moral restraint.

When an event, susceptible of provoking a moral shock, has been foreseen a long time previously, its representation provokes a permanent emotional state of less intensity; but the same order, tonic or atonic, which sometimes weakens itself by its continuity even and at other times, especially if it acts upon a depressing condition, determines a state of asthenia, so that the definitive shock becomes the more severe thereon.

In the case where custom has produced itself, once the shock has taken effect, we observe frequently a very interesting fact of psychological order. It is an illusion of memory which entails a chronological error. A short time before the foreseen accident happens, the person who has experienced the shock is weakened by a tendency to represent it as already a long time past. The necessarily previous representation produces in the memory an anticipation of the representation of the fact. I have heard several times persons who came to lose, (by a chronic malady whose fatal issue was foreseen), a member of their family, being astonished, almost shocked, only feeling their loss as in the distance.

When the shock, on the contrary, is at the time unforeseen, sudden and violent, it obscures the memory of the facts nearest it in time, exactly as physical shocks do. The psychic troubles which manifest themselves apropos of a physical or moral shock can be compared to the phenomena of simultaneous and successive contrast allied to the visual sensations.

The functional modifications provoked by certain excitants are

* Gratiolet. *Anat. Comp.*, t. ii., p. 576.

capable of disturbing the notion of personality: "A man addicted to wine related, whilst he was drunk, his feebleness, and all that he felt to those who were about him. When he came to himself he wished with all his power to unclothe all the members of his family and put them into their bed, because, said he, they were too drunk to do it themselves. But that did not happen to him once only, but every time that he was drunk."*

This phenomenon to which I have given the name "altruistic† phenomenon," can be met with again in other morbid conditions.

"Time," says Pascal, "deadens the affections and hatreds, because we change and become as another person. Neither the offender nor the offended remain the same. It is as a people whom one has irritated, and whom one loves after two generations. They are French but not the same."‡

Reminiscence bears especially upon the purely intellectual order of phenomena, but in general the memory of the emotions is extremely feeble. That the representation of a painful event rarely induces an outbreak of tears to recall the pain provoked by the real fact which happened long ago, is here a proof that, in general, representations, reminiscences, are not so precise as we are pleased to believe: if they reproduced truly the real sensations, they would be accompanied by the same physical phenomena, that is to say, by the same emotional state.§ Littré has described, under the name emotional autamnesia an automatic reminiscence of an emotion long since passed: the moral pain was awakened so acutely that the tears flowed. In general the will is powerless to recall with acuity an emotional state, except when the subject finds himself in such a state that an association of ideas may be capable of bringing about an explosion. Most frequently emotional states are automatically recalled by the physical conditions which are once associated to them. The physical conditions have more action upon the intellectual reminiscences than the intellectual reminiscences upon the physical conditions. So, it is well to repeat, reminiscences are only rarely faithful reproductions.

* Hunter, J. *Complete Works*, 1839, t. i., p. 385.

† Ch. Féré. *Notes sur les hallucinations autoscopiques ou spéculaires et sur les hallucinations altruistiques (C. R. Soc. de Biol.*, 1891, p. 451).

‡ *Pensées.* Art. ix., xlv.

§ *Remarques psycho-phys. (La. Ph. Pos.*, 1877, 2nd ed., vol. xix., p. 216).

We have established experimentally that the conditions of memory change under the influence of physical excitants proceeding from the environment. One can repeat the experiment more efficaciously with the provoked sthenic emotions which bring memories which it is impossible to recall in the normal state. Psychologists have, moreover, described this effect of the emotions: "Trivial impressions, which have not offered any interest survive frequently in memory when much more important or imposing impressions have disappeared: on considering the circumstances one will find frequently that these impressions have been received when the energy was much raised, when exercise, pleasure, or the two combined, had greatly augmented the action of the heart."*

Aliens use frequently new words which form themselves according to the same processes as those which introduce themselves into ordinary language. Some are formed by association of similar sounds and resemblances, automatically somewhat, and are without any apparent kinship to delirium. Others, on the contrary, appear logical, and respond to sensations or to special and new ideas. M. Ball indicates the first under the title passive neologisms, the second, active neologisms.† The first are met with mainly in maniacs, alcoholics, dements, general paralytics: others are met with specially in the systematic deliriums, in the persecuted, erotomaniacs, theomaniacs, etc.

But there exist amongst aliens neologisms which can neither be explained by automatic association of consonance or images, nor by a pseudological construction corresponding to a new psychic state: there are neologisms which appear absolutely incoherent (Tanzi).‡

It showed itself in a persécuté who took part at a consultation relative to a change of residence for his family. The most probable arrangements not being to his taste he went into a violent anger, in which a great number of words were altered, and which ended in a list of grievances against his wife, a series of vulgar and gross words; the last which he pronounced at the moment when he fell exhausted was the word *crouque*, which they heard for the first

* H. Spencer. Principles of Psychology, t. i., p. 239.

† Lefèbre. *Etude clinique*, th., 1891.

‡ Féré. *Note on Méchanism of certain Néologisms of Aliens* (*C. R. Soc. de Biol.*)

time. From this moment each time the patient was the subject of an excitation the same word returned into his mouth.

The word which has no signification, appears the product of an articulatory spasm. It is a paralogism analogous to those which can produce themselves under the influence of every acute emotion. The word after being fixed by association to the emotional state became definitely installed. This process is not special to aliens. We know that aphasics have often some paralogisms or incoherent neologisms which install themselves in the same manner: incapable of pronouncing a word without a violent effort, they come to pronounce with great pain a word like macassa coussi coussi, and this incoherent neologism becomes fixed for the whole life of the invalid.

The association of a co-ordinated act to a physical state with which there is no normal physiological relation is no exception in pathology. Hughlings Jackson has described facts of this kind:* it happens in epilepsy, for instance, when after each fit the patient repeats automatically the act which he was about to do when he was first seized.

To sum up, a certain number of neologisms of aliens which are neither the logical expressions of a new psychical state nor the result of associations of consonances or representations are produced by the association of spasmodic vocal movements with an emotional state.

The states of consciousness of internal origin, or representative, and the states of consciousness of external origin, or presentative, could only exist concurrently with identical physical conditions which differ according as they are agreeable or painful. It is by reason of this community of physical conditions that a state of consciousness of external origin can recall a state of representative consciousness, which is not bound to it by any other tie of association. Just as two sensations which co-exist reciprocally weaken one another, so two representations do, and frequently the one ends by annulling the other. So also when one representation coincides with a sensation the one obscures the other. A state of consciousness can only take predominance by organic changes which become incompatible with the most feeble state. A pleasure or an internal

* On the comparative study of diseases of the nervous system (*Lancet*, Avg. 25, 1889).

physical pain can check every kind of representation, so an internal representation can prevent every sensation. It is what we see in ecstasy and similar states.

"The bodily disposition," says Marat,* "changes the spectacle of nature." "The different states of the body," says Dufour,† "give, if the expression be permissible, different tastes to the soul as well as to the palate." "Reasoning depends as much upon the diverse modifications of our body as sensations and ideas," said Le Camus before them.‡

* Of man or the principles and laws of the influence of the soul on the body (Amst., 1775, t. ii., p. 142.)

† *Essai sur les opérations de l'entendement humain et cur les maladies qui les derangent*, 1770, p. 111.

‡ Le Camus. *Médicine de l'esprit*, 1753. t. i., p. 61.

CHAPTER X.

Psychic Troubles in Relation to the Morbid States of Excitation and Exhaustion.

Summary—Imagination and Delirium—Mania and Melancholia—The Physiology of some deliria.

The derangements of the mind ("l'esprit"),* such as epilepsy,† hysteria,‡ and neurasthenia, do not constitute specific maladies, but only symptoms dependent upon very varied somatic alterations capable of affecting brain function in very different manners, accordingly as they manifest themselves by states of excitement or depression.

States of excitement which have their origin in central discharges or emotional reactions are characterised in general by transitoriness, and shortness of duration in proportion to their violence; there are present almost always the characters of rapid and easy reaction to pain.

Mental depression and moral pain form the basis of most troubles of the intelligence. This is the primary state in which the delirious ideas are developed which provoke reactions more or less intense and enduring, but varying in their form infinitely, so to speak, from melancholy with stupor to furious mania, impulsion, and agitative melancholy. Long before Guislain had brought into full view the strength of phrenalgia, Battie had indicated anxiety as a percursor of madness.§

In the differing conditions of physical depression the creations of the imagination assume often an intensity such that they come

* Combe. Observations on Mental Derangement, ed. A. Mitchell, ed. 1888.

† Burnes. Correlation of sexual functions and mental disorders of women (*Prov. Med. Journal*, 1890, ix., p. 643).

‡ Féré. *Les épilepsies, &c.*

§ Battie. Treatise in 4to, 1758, p. 89.

to constitute a veritable delirium. Take the following case as an example of this, for instance:—*

OBSERVATION XXXI.

Neurasthenia—Imagination and Delirium.

This observation refers to a commercial man, aged 37, belonging to a family, in which one could, on superficial inquiry, find a certain number of nervous phenomena. The mother had had convulsive attacks in her youth. A maternal uncle—subject to migraine—attempted suicide. A cousin, daughter of a maternal aunt, is subject of an exclamatory tic of which record has been made elsewhere ("Les Epilepsies et les épileptiques," p. 234).

Himself has been subject since infancy to nocturnal terrors and to frequent accesses of sadness: he was habitually dull, avoided sports, and sought solitude. For several years he presents neurasthenic troubles, vertigos, cephalagias, dyspepsia, suboccipital crepitation. No malformation could be found on him, nor painful point, no anaesthesia, nothing which could suggest hysteria. Married for ten years, he has two children who never had convulsions nor any neuropathic trouble.

M. M. appeared to have only to felicitate himself on his situation in respect both of his business and his family. No explication of his morose and depressed attitude was to be found in his environment; but if his friends had to suffer from his indifference, they had not to complain of any violent reaction nor of want. M. M. appeared as resigned as unhappy. About the middle of 1886 he was steadily engaged in business, but from this date it was observed that he had fits of absent-mindedness. Sometimes he would suspend his work in the office or warehouse and remain idle and dreaming. These suspensions would endure sometimes for more than a quarter of an hour when he would find near him one of his employées afraid to address him; and at other times they lasted till some accidental interruption such as a noise made in his vicinity occurred. Several times indeed it was observed that he did not reply to questions unless put in an elevated tone of voice. These attacks became more and more pronounced, but it was not till the 8th January, 1887, that M. M. had for the first time, in the midst of his family when dining, an attack which only ended after repeated questioning. The previous occasions had not always been unperceived and M. M. had lost much of his personal authority over his entourage; a certain number of strangers had become cognisant of the trouble also and the affairs of M. M. became much embarrassed. On the other hand, it was feared to upset and aggravate the situation by disclosing to him, so it was decided to consult me without informing him. I concluded at once that the phenomena were of comatose character and I at once instituted a watch in this regard without his knowledge. It was found on this occasion that M. M., during his "absences," presented no pallor but was rather flushed slightly and that he exhibited often an expression of beatitude which had been unknown to him for many years. The same phenomena were reproduced daily and uneasiness concerning him augmented, when, on the 24th February, his father-in-law being in his office along with several other

* Féré. *Note sur les rapports* (*Rév. de Méd.*, 1887, p. 881).

persons, a stranger arrived and addressing M. M. himself asked if M. M. was at home, he being at the time near the door in one of his "absences." When the question was repeated he replied, "He is at Chaville." This strange response evoked in M. M. a sort of terror, he flew precipitately behind a screen at the back of his warehouse in a state of unusual anxiety. He was brought into his apartment as soon as his emotion abated. He asked to be alone and he was left but observed. At the end of some minutes M. M. had anew an expression of beatitude and rested in complete immobility. The family then determined to take steps for his care. We believed the case to be one of epilepsy with unconscious manifestations. M. M. who took an account of his state and who was frightened thereby since he had been wakened out of his dream, so to say, by his strange reply, said he would go to consult me on the day after to-morrow. He came so and here is what I found:—

He had been, from his earliest infancy, as his neighbours witnessed, prone to attacks of sadness, during which he had a great tendency to construe badly what passed around him and to be seized with momentary hate of the persons with whom he came in contact. He concealed these antipathies, because his father who was strict, would not tolerate them: but he would absent himself, going away to conceal himself in the least frequented parts of the house, remaining there seated for hours. Later, when he was allowed to go abroad, he wandered alone a great part of a day. It was during these wanderings that he began to build castles in the air which grew gradually to assume importance in his life. Whenever he experienced the necessity of isolating himself he recalled his dream of the evening or the morning and pursued a career parallel to the same, a rapid career the evolution of which took some days, a week, or two. When he was well saturated by his imaginary character he came often to continue his dream even in the presence of strangers. When at college entire classes passed themselves before him in dream: he frequently neither heard nor saw aught of what passed before him. M. M. had in this way pursued a multitude of fictitious careers in different directions: sometimes military, sometimes marine, sometimes engineer. The events seemed to connect themselves quite naturally to the satisfaction of the dreamer who preferred his fictitious to his real life.

M. M. ended his studies for good or ill. When his college days ended his life changed: he lived all day in presence of the other employés of the warehouse, his family duties and pleasures occupied the evenings. His urgent and manifold affairs took up attention incessantly. There was no time left for dreaming.

He married in 1877 and at the same time became head of the commercial house where he was employed. He was satisfied with his station in all respects and was moreover preoccupied with his affairs, having hardly any respite. Eighteen months after marriage his wife became pregnant and subject to frequent indispositions which disturbed her sleep. He commenced to suffer from insomnia. At the same time they became dissatisfied with the conduct of their household and business. But gradually he returned to his former imaginations. They began by being less enduring and absorbing than formerly: but gradually they acquired greater persistence and duration and finally became fixed in a defined form.

Here is a résumé of what this ideal life consisted for more than the space of four years:—M. M. had constructed at Chaville on the borders of the wood, a pavillion surrounded by a garden. By successive additions the pavillion became a château, the garden a park; stables horses and pieces of water were introduced to ornament the domain. The interior furnishings were contemporaneously modified. Every time he could isolate himself M. M. transported himself there dreaming a betterment, an ornation, which he soon effected. A woman arrived to animate this scene: two children were born, it only remained to make this ideal ménage legitimate. This was the only drawback to the happiness of our dreamer.

It is certain that he maintained a great coolness towards his wife, but it was not possible to harbour doubt of his sincerity. It looked as if his legitimate offspring had been completely forgotten. His affairs interested him no longer. He was only maintained by his staff and employés who obeyed the established traditions, and who forced him, after a fashion, to march with the machine in movement, but it came about that several important operations which could not be put through without his taking an active part in them and of which he was unable to recall any detail, fell to be dealt with. A great number of the acts of his daily life were accomplished in an unconscious manner, quite mechanically: he retained no memory of them, whilst his imaginary adventures were always very much present in his memory.

It is more especially during the past month that the subjective phenomena have acquired this intensity. I asked him what he had done on Sunday, being the 20th February, which I had noted as one of those days on which he had been most absorbed and distracted, and of this day he knew absolutely nothing except his dreams. It is certain that he went to mass with his wife at ten o'clock, and when I recalled this circumstance he replied to me, "I believe thoroughly what you say, because all that transpires shows that I have lost my reason; but if I do keep hold of my dreams only I would affirm to you that I was sent to Versailles to buy green plants in order to replace those of the dining room which are dead." The rest of the day was passed at Chaville. It was the Tuesday following that he made the curious reply to the client who had asked him. At the moment when this individual accosted him, he was, he said, in his Chaville salon occupied in examining an upholsterer who was modifying the arrangement of a tapestry hanging, and was so absorbed by this imaginary occupation that he did not see the man coming towards him, and to the question "M. M. if you please?" he replied without taking notice, "He is at Chaville." But this reply, made in public, evoked in him a veritable terror. "I understood," said he, "that I was mad." When he had become calm, he came to himself, recalled that it was he who had voluntarily interpreted his delirium: but, nevertheless, at the end of a period of isolation he could not avoid falling back into his imaginary conception. He was ready to do anything to get rid of his ideas.

M. M. is tall and slender, abundantly furnished with hair, and well muscled. A careful examination reveals no vice of conformation. I can only confirm the previous examination as to the absence of every hysterical trace. Pale he is with under-coloured mucosœ and a slight anemic murmur. He

suffered vertigo frequently before meals, and somnolence afterwards, distension of stomach and cephalic congestions. He experienced frequent eructations and gastric expulsions of flatus. He complains besides of occipital headache and constriction of the neck; and sometimes of suboccipital creakings. Besides he has insomnia but he pretends that he frequently does not remember his dreams. He is very persistent in affirming that his mania did not take origin in a persistent dream. One day that he had a slight difference with his wife, he wished to distract himself.

M. M. was put under the following treatment: viz., a cold douche at a fixed hour morning and evening, four drops Tr. Fe. Perchl. and 8 Tr. Nuc. Vom. before each meal, and 3 grammes K. Br. each night. Besides, it was arranged that his father-in-law who had been his predecessor in the business should be installed anew, that he himself should not be allowed out of sight, and that he should be recalled to reality each time he appeared to be wandering. M. M. undertook not to leave his wife except during business hours. She accompanied him to the douche, for promenade, etc.

I saw M. M. again on March 10. Under the strict oversight, his interrupted "absences," even at night, for his wife imposed upon herself to watch him even during sleep, had already almost completely disappeared. It had not been necessary to interrupt his waking: he had had one in the morning. His deportment was much better, the sad expression of visage had disappeared. He tells me that when he passes before the shops in the Boulevards, he sees articles of furniture, which he had without doubt chosen to adorn his castle in the air. As soon as the objects caught his eye the location in the apartment where he had imaginarily placed them immediately appeared before him. In general M. M. came to be master of the hallucination but, this morning, for instance, he has returned plainly to his dream.

The visual images appear besides to have played the main *rôle* in the delirium of M. M., who could not give responses without precision relatively to auditory and olfactory memories.

It must be noted that he had a very lively imagination. It is thus that he is capable of representing to himself a coloured surface, with a sufficient intensity to have the complementary sensation when he regards a white surface, and he can repeat the sensation with all the colours. This is an extremely rare fact outside hypnotism.

One month after his surveillance M. M. whose state was considerably ameliorated, was no longer subject to "absence," and when, under the influence of a visual sensation, an hallucinatory tableau reproduced itself he did not allow himself to be deceived as to its reality and the image disappeared rapidly.

On the 14th May M. M., who is no longer subject to surveillance since several weeks, has had no "absence," and he affirms that for more than a month he has not been affected by any recall of his visual hallucinations.

The interpretation of these facts leads us to recognise that, generally, in mental maladies, a painful impression has been made upon, or imported into, the moral life, and that a morbid state of impressionability, quite special, ought to be considered a funda-

mental element of these affections."* "Alienation is, properly considered, a pain; also, let us say that it is, primarily, a phrenalgia," says Guislain. "The trouble of ideas is a secondary phenomenon."†‡

The study of the physiological conditions of the emotions brings us to recognise two main groups of emotional states, viz., the sthenic and the asthenic, the first characterised by phenomena of excitation, the second by those of depression. This division corresponds in short to the definition of Bain, whose given facts yield the experimental demonstration.§ "Agreeable states," says he, "are associated with an increase, painful states with a diminution of activity of *some vital function* or of *all* the vital functions," and it is not possible to establish a physiological distinction between the sentiments and the emotions. *But* it must be remarked that if pleasure, which derives its origin from physical or moral causes, is due primitively, and as long as it lasts, to augmentation of function, it cannot be said that pain is due exclusively to a diminution of function. Pain, in fact, frequently entails reaction-phenomena which characterise a functional exaltation, at least partial and momentary. Anger which, at first regard, appears to belong, by the exaltation of its phenomena, to the sthenic group, differs entirely, from the physiological point of view, from that truly sthenic emotion called joy. In pleasure, as a matter of fact, exaltation *is* a primitive element; the entire organism, all its functions, take part in it. And if this exaltation, which essentially characterises sthenic emotion, takes place during a period of depression, this depression rarely takes on morbid form. Exaltation of itself rarely provokes pathological phenomena except where previously there existed organic alterations. We have seen that the pathology of joy is extremely restricted.

In anger, on the contrary, exaltation is a secondary fact, and constitutes a reaction to a moral pain. From the point of view of evolution it is a secondary sthenic emotion. In place of being characterised by an universal and harmonious exaltation it presents frequently discordant phenomena of depression and spasmodic

* Guislain. *Leçons orales sur les phrenopathies*, 2nd ed., 1880, t. i., p. 457.

† and ‡ *Ibid. Loc. cit.*

§ Bain. Body and Mind, p. 62. Emotions and Will, p. 247. In the second thesis printed at Stuttgart in 1780, he says that "the general sentiment of the animal harmony is the source of spiritual pleasures, and animal pain the source of spiritual sufferings."

phenomena of depression which recall convulsive discharges, and it is exactly because of this discordance that anger has been compared to a pathological condition: ira furor brevis est.

This distinctive feature of anger and emotions of like species,—envy, hatred, jealousy—primitively sthenic emotions, is of great importance from the point of view of the physiological interpretation of morbid emotional states which hold such an important place in mental pathology.

The analogy which exists between the different forms of melancholia and mania and the normal emotions has struck observers of all times. Melancholy, says one, is a morbid sadness; mania is a prolonged anger. Various madnesses of expansive forms, certain monomanias of Esquirol, have been regarded as morbid gaieties (amenomania of Rush, habromania), just like the hilarious form of mania so frequent among adolescents.

The analogy of the physiological aspect of the different forms of fear (which varies from suspicion to terror), and the different forms of melancholy is specially striking to the observer.*

From the physiological point of view mania has been regarded in these later times, as the very antithesis of melancholy, and its differing symptomatic forms have been related to normal emotional states, anger, and joy.† If, as we will see, it is anger which it approaches most from the sympathetic point of view, it is also to this kind of emotion that it is kin by its antecedents. It is thus with reason that Linas relates the frequency of anger, insubordination, and tendency to destruction in infancy among maniacs.‡

The reality of these analogies appears quite naturally to conduct to an emotional theory of mania and melancholia. One is brought to recognise that these mental troubles are born of a simple exaggeration of normal emotions.

But the observation shows us that the primitive sthenic emotions, joy, pleasure, under their different forms, are rarely, and perhaps *never*, the determining cause of mental ailments, in the etiology of which, we find almost always depressing emotions, or the physical conditions which give these birth. On the other hand, as Guis-

* and † J. M. Robertson. Melancholia, etc., *(Jl. of Mental Sc.*, 1890, p. 53) and Does Mania include two distinct varieties, *ibid*, p. 338; also McPherson, *ibid*, p. 212.

‡ *Art. Manie. Dict. Encycl. des Sc. Med.*, 2nd ser., t. iv., 1871, p. 514.

lain has well shown, the first manifestations of the mental affections of the depressed kind, the most exuberant forms of morbid exaltations are preceded by a period of melancholy.

These two orders of facts bring us to doubt, on the one part, whether a joyful mania can be really the result of the physiological process involved in a primitive sthenic emotion constituting pleasure: and, on the other hand, whether mania can be really the antithesis of melancholy.

The emotional theory of the different states of depression and excitation designated under the names of mania and melancholy can only be established on the existence of secondary sthenic emotions of which the type is anger.

The physiological conditions of anger, in fact, induce a state of psychic exaltation with which is rapidly associated exaltation of the personality, well adapted to give birth to the ideas of satisfaction, which, in fact, soon manifest themselves. To the physiological reaction of moral pain, which constitutes anger, correspond the furious and destructive forms of mania. To the exaggeration of the personality which accompanies the physiological state, this secondary sthenic emotion, corresponds the sarcastic or joyous hilarity which characterises the exulting form of maniacal exaltation. The secondary sthenic emotion entails by association antithetic ideas: it is thus we see ideas of power emerging apropos of injuries to selflove. Ambitious delirium springs frequently from a moral pain.

Observation shows us, in fact, that the different forms of mania and melancholy spring from a basis of depression; that they issue in phenomena of depression with moral pain, and that they are the physiological expression of an identical emotional state, viz., pain. Besides, the analogy betwixt the nature of melancholia and mania is an ancient notion. Alexander of Tralles says that mania is only melancholy in its last period. Aretæus regarded melancholy as the origin of mania. That mania and melancholy are essentially one, that melancholy is the beginning or a simple modification of mania, that the two troubles can succeed and replace one another, is a fact recognised from the time of Aretæus, by a great number of authors (Bonet, Boerhaave, Willis, etc.) Boerhaave, Cullen, Mead, moreover, reckon mania to be a degenerescence of melancholy.

Haslam also states that there is no need to consider them to be opposed morbid states: and Pargeter recognised their common basis in depression or collapse. Ferrier thinks that melancholy and mania are frequently confused together at the beginning; Mayo does not distinguish them.

All varieties of melancholy are found represented in the various degrees of asthenic emotion, from inquietude to terror. The antecedent and individual conditions and the surrounding circumstances, especially the psychic effects of depression, determine the form of delirium.

Simple melancholy is accompanied by a state of general relaxation; the eyelid falls over dull eyes: the nose is pinched, and the nostrils tend towards effacement. It appears that by occlusion of the sense organs' orifices the organism would defend itself from exterior excitations. The angles of the mouth are lowered, the muscles no longer supporting the jaw, the face lengthens, the head hangs over the chest, the back is stooped, the arms extend along the body, the limbs become bent. The circulation becomes slow, the respiration superficial and infrequent, the voice feeble and monotonous, speech slow, all the secretions are diminished, there are constipation and inappetence. On the moral side indifference to all excitants is observed. The sick person is not interested in anything, has no taste for any exercise, is forgetful of his ordinary occupations and affections, and comes to neglect his person, being entirely absorbed by his chagrin, from the thought of which nothing will distract him. This state in no respect differs, except by insufficiency or absence of motive, from physiological sadness, in its depressive form, without tendency to reaction.

But resigned sadness is not the only aspect of moral pain, which, however intense it may be, however it may be subject to violent reactions, often entails noisy manifestations recalling those which in infants accompany, almost constantly, pain in all its forms. The depression is broken by the expression of despair or anger. The subject becomes agitated, walks about, wrings his hands, strikes his chest, grinds his teeth, threatens, frowns, fixes his furious or despairing look in the direction whence his pain comes. In active or agitated melancholy we see reproduced in a more disordered form all the manifestations of reaction to pain: the patients who

are attacked are violent, incessantly agitated, go and come precipitately, groan, shout, weep, utter noisy wailings, roll upon the ground, strike, bite, bite even themselves.

Mania in its furious forms is only an exaggeration, in duration and in intensity, of the fits of excitement of agitated melancholy. The agitation is more noisy and violent; there are savage gestures, vociferations, menaces, aggressive and destructive acts, without regard to personal benefit: no obstacle can arrest, except an invincible material obstacle, the disordered impulsions of a maniac. But there is nothing in these manifestations that cannot be found in furious anger, and mainly in that which manifests in infants and the degenerate.

The anger of infants, the degenerate, the feeble in spirit, put in evidence another order of phenomena which it is interesting to relate. In proportion as the excitation becomes more intense, but sometimes from the beginning of anger, an increasing exaltation of the personality is observed.

In proportion as the motor reactions become more energetic the individual comes to take an exaggerated idea of his powers, his intellectual aptitudes, of all his means of action: the vocabulary of boasting is utilised in all its forms, and is joined to menaces; irony, sarcasm unite themselves to the sense of injury, and sometimes one observes the expression of satisfaction filling in the whole scene. To the attitude of menace one sees that of frolic and hilarity succeed, evoking the idea of a facile vengeance. This secondary form of pain reaction takes account of the physiological process of hilarious mania, which, in fact, is met with most frequently in young men, and which, moreover, is most usually preceded by a melancholic period in most aspects.

It is, moreover, only in the acute forms of mental alienation that we see the ideas of satisfaction developing themselves parallel to reactionary tendencies. They are to be found in the persecution delirium described by Lasègue.

Whilst the reactionary character constitutes a predisposition to the different forms of mania: so an easily depressible character with tendency to inertia predisposes to the different forms of melancholy. These different forms are frequently determined by organic conditions. The hypochondriacal melancholy appears often

in subjects who have had to suffer in their infancy from troubles of evolution or maladies which have rendered their health precarious, and have directed their attention to their visceral functions, which have become the subject of their constant pre-occupation. The anxious melancholy develops frequently in individuals prompt to alarm themselves—over fastidious.

The persecution ideas in general exhibit themselves in individuals who have always been suspicious and distrustful. This is a fact which has been emphasised with good reason by my colleague, M. Charpentier, and utilised by others since.

Certain tendencies towards reaction which have appeared sufficient to characterise certain forms of melancholy, suicidal melancholy, homicidal melancholy, acknowledge also for their origin habitual dispositions of character.

The specialisation of hallucinatory phenomena is itself necessitated by a special sensorial excitability or by the existence of irritative lesions of sensorial organs, of the viscera.

The disciples of Spencer have sought to connect the symptomatic forms of madness to a regressive expression of the emotions.

The idea is not absolutely new. Fodéré thought that a madman was one returned to a state of nature. Every scientific hypothesis, says Comte, in order to be really amenable to reason, ought to come under the laws of phenomena, and never under their mode of production.

We may content ourselves with the statement that the reactions of man to pain, even when they are morbid, find analogies in the expression of the emotions amongst animals.

The forms of melancholy termed stupid are really normal emotional reactions exaggerated, manifested with a purely passive character, or with a tendency towards resistance, rigidity, or with cataleptic plasticity.

The state of stupidity, of which the first description has been attributed to Bellini, was known to Felix Plater: but it is only through the work of Baillarger that it is well understood. It is not always a state of profound depression with absence of reaction: in a number of cases the patients, when cured, have revealed that during the access they were incessantly under the terror provoked by very intense hallucinations. The patients of this last category, instead of being

in a relaxed condition, are, on the contrary, in a state of general contraction, which exaggerates every new excitation. Besides, the passive form does not always present itself with the inert flaccidity of the muscular system, sometimes it is accompanied by a plasticity which recalls the true cataleptic condition of hypnotism. Moreover, it is not unusual for the catalepsy of hypnotics to be characterised by the expression of a painful emotion. Paul Richter remarked that hypnotics, impressed by a bright light, are generally catalepsised in an attitude of defence. So far as absolute flaccidity and general rigidity are concerned, they form part of the symptomatology of moral shock not only in man but in animals. We find them particularly in insects which it is said feign death, like certain other animals which fall into *kataplexy* under the influence of fear, and remain in a relaxed or rigid state of immobility, the physical consequence of nervous action in which the will counts for nothing.

These differing states are in reality more intense degrees of primordial emotion of astonishment comprised in its most physical sense.

Tulpius reports that a young man consumed with love for a young damsel whom he sought to marry, was so upset by the refusal which she gave him, that he became rigid as a baton all at once, remained seated on his chair as if he had been throttled and frozen, and continued in this attitude throughout an entire day having his eyes open. But facts of this kind, which were, of old, attributed indistinctly to melancholy, receive frequently, now that the history of hysteria is better known, another explanation.

It is admitted in general that madness of the exalted form is less serious than that of the depressed form. This is a fact which is not without relation to the expression in diverse intensity of sad emotion.

The physical depression which characterises the commencement of the delirium of persecutions entails a moral depression, and constitutes the physiological condition indispensable to the production of subjective sensations. These sensations are at first vague, ill-defined, fleeting, incomprehensible: it is owing to these characters that the sick persons attribute to them a mysterious origin, as to

electricity, magnetism, somnambulism, freemasons, jesuits, police, etc.

Besides, in the very intense emotions, both of the sthenic and asthenic types, the sensibility is so modified, that there is produced frequently a veritable delirium of sensations; objects and persons appear sometimes entirely deformed; everything is well, or everything is bad.

If, ordinarily, ideas of persecution yield consecutively to birth of ideas of grandeur, they may also assist in an inverse evolution of delirium. Foville has cited cases of this kind. The patient ended by imagining that the advantages with which he was endowed in his opinion could only provoke jealousy and hate in those around him.

The perversion of the affections is an essential character of mental alienation. It is upon it that the principle of isolation, in treatment, is founded.*

* Esquirol. *Des passions considérées comme causes, symptômes et moyens curatifs de l'aliénation mentale, thèse*, an. xiv., no. 574, p. 31.

CHAPTER XI.

The Physical Signs of Psychopathies.

Summary.—Troubles of Respiration and Circulation—Temperature—State of the Blood—Troubles of the Nutrition of the Skin—Troubles of the Secretions—Troubles of Sensibility and Motility—Resistance to Physical Agents and Injections—Influence of Intercurrent Maladies—Alternations.

The emotions are in such manner dependent on or allied with organic modifications that one cannot affirm that a person is under emotion except and unless he presents some outward physical sign of emotion. It is exactly the same in respect of mental ailments which are always accompanied by affective modifications: their diagnosis can only be based on physical signs regarding which there can be no manner of question. The progress of physiological psychology has already put us in process of demonstrating and measuring a certain number of motor and sensory troubles; but, frequently for lack of better methods of examination, we are induced to the search for gross organic lesions only. It is not always without interest to place summarily in parallel columns the physical signs of the psychopathies with those of the emotions.

We will not confine ourselves to the organic maladies which constitute causal conditions.

In melancholics respiration becomes slow and superficial, and in some are observed, time after time, deep and noisy inspirations which have for their aim, the compensation of the ordinary respirations. Sighing also is very frequent with these patients; besides, this phenomenon ensues in all conditions of fatigue, whether due to excessive muscular exercise, hunger, over-feeding, cold, excessive heat, etc. In melancholic stupor, the respiratory movements are sometimes so feeble that no audible murmur is produced in the lungs and that the changes in thoracic volume can only be perceived by the aid of instruments.

The observations of Klippel and Boëteau* and Pachon,† have added nothing very new or very positive to what was known about this subject, rendered so difficult of study by reason of the variability of emotional states due to external conditions.

The pulmonary capacity is in general very notably diminished as well amongst maniacs as amongst melancholics.

In acute mania a considerable increase in the frequency of the pulse has been ascertained: Double,‡ *e.g.*, admits a possible rise beyond 240 beats per minute. After the researches of Jacobi, in half the cases of mania, in the midst even of the most violent exacerbations, the frequency of the pulse did not pass the normal, indeed was sometimes even below that.

If acceleration of pulse and increased force of beat are not constant in maniacs, in the periods of consecutive depression are observed constantly feebleness and retardation of pulsations, which may descend so far even as 30 and 25 in melancholic stupor.§ Frequently the pulse is not only small and slow but irregular. The heart-beats can become so feeble that they are barely perceptible on the thoracic wall.

Wolff, who first studied the pulse of aliens by the aid of the sphymograph, has admitted that all have for a common character a pathological pulse of a slow type.‖ Apart from cardiac or vasomotor troubles which might modify it the pulse appears frequently influenced by the emotional state. In stupor, a considerable tension may obtain (Greenlees, Whitwell), perhaps having relation to terrifying representations.

We have been often astonished at the depression and feebleness of pulse in some furious cases of madness.¶

Feeble tension of pulse has been recorded in cases of neurasthenia and melancholia (Webber, Schule, Broadbent). In mania pulse tension is very variable with the state of excitation.

In all mental affections, nutrition is more or less altered, and

* Klippel and Boëteau. Respiratory troubles in mental maladies and especially in general paralysis (*Mém. de la Soc. de Biol.*, 1842, p. 49).

† Pachon. *Rech. sur la resp. dans les mal. ment. (C. R. de S. B.*, 1892, p. 207).

‡ Double. *Semeiologie Générala*, 1817, t, ii., p. 169.

§ *Des périodes et du rôle du pouls dans l'aliénation ment.*, th., 1858, p. 14.

‖ Huard. *Aperçu historique sur la sphignographie*, th., 1892.

¶ Morel. *Traité*, 1860, p. 455.

this alteration is objectified by a lowering of temperature observable in all forms.

Bechtereu has established a lowering beneath 35 deg. (Cent.) in cases of grave melancholy: he has found this also in idiocy and dementia. Lamoure has observed a mean temperature below 36 deg. in melancholic stupor.* In mania à potu,† Lœvenhardt has observed temperatures extremely low, oscillating from 23.7 deg. to 30.8 deg.; it is only exceptionally that the temperature of the insane rises above the normal.

In most cases of melancholy apart from periods of violent reaction, there is a tendency towards lowering of the temperature. Meyer‡ has related long ago that in the majority of cases of mania, there is no elevation of temperature, which may even be below the normal. When the temperature rises: this takes place in relation to violent exercises. The period of excitation of general paralytics, on the contrary, exhibits frequently elevation of temperature. Finally the temperature of the insane varies, especially with the intensity of their reactions. They have on the whole a tendency to lowering, a fact evidenced by their tendency to shiver under the influence of a depression of external temperature (Bechtereu).

The central temperature is frequently below the normal: but it is especially the extremities which show considerable cooling. The physiological cooling of night is more marked than in normal subjects.

We have seen that under the influence of the *absence* of physiological excitants, or of sad emotions, the volume of the members diminishes, and, at the same time, electrical resistance increases. These same conditions might be expected to discover themselves in cases of madness of the depressed kind; and as a matter of fact, it is found to be so. The observations of M. Séglas and M. A. Vigouroux have shown that the electrical resistance is constantly increased amongst melancholics, as I have observed under painful emotions. In the state of depression following an epileptic seizure I have found this increased electrical resistance. But the modifications of electrical resistance amongst the insane are not bound to a

* *De l'abaissement de la température*, th., 1878.

† Mossé. *Art Thermométrie Méd. Dict. Enc. des Sc. Méd.*, p. 248.

‡ Griesinger. *Traité*, p. 338.

classification entirely artificial. The augmentation is not a specific character of melancholy: I have found it very marked in several cases of mania; it is thus allied to a condition *common* to various categories of the insane.

The ancient observations of Wittorf and Eulenmeyer have shown in the blood of the insane a diminution of globules and solid materials. The under-globulation is more marked in the depressive forms than in the maniacal almost constantly (Raggi, Seppili). This is established more easily by the calorimetric methods than by numeration.

Mad folk present frequently troubles of skin nutrition which express themselves by changes in coloration, and an extreme dryness. This dryness is due to a diminution of dermal secretions of which the odour is frequently altered. Certain melancholics exhale, in spite of every and most minute hygienic and other precautions, a special odour comparable to that of mice. It is to these modifications of cutaneous secretions that we have attributed the fact reported by Alibert of a man attacked by periodical madness, whose dog abandoned him during the period of his delirium, and rejoined him as soon as the access was ended.

Changes in coloration of the skin occur either as decolorations such as vitiligo (Morselli), or as abnormal pigmentations. Frequently patches of vitiligo are surrounded by a zone which presents a more pronounced colour than the neighbouring regions. Sometimes the excess of pigmentation presents a considerable extent and intensity, and this blackness may follow in a remarkable manner the course of the mental malady. These trophic troubles of the skin are most common amongst melancholics whose skin is often black, brown, yellow, dry, scaly; but they may be present in various forms of madness.

The hairy system is often mainly affected in chronic cases; black hair takes on a reddish tint, as if it was painted or dyed; blond hairs frequently pale, they become dry, and split at their extremities and fall out. In vitiligo decoloration of the nails accompanies that of the skin.

Hack Tuke reports a case of recurrent mania in which the hair became grey on each attack and resumed its natural brown colour in the intervals.

In states of repression all the secretions are diminished. The skin becomes dry and roughish, except at the extremities where it is sometimes covered with a viscous sweat.

The buccal mucous is dry, the teeth are covered with a gluey covering, the tongue is furred. The gastro-intestinal secretions are also insufficient, the digestions are slow and painful, there is a determined constipation. These troubles entail frequently a complete anorexia: but the rejection of aliments must only be reckoned a secondary symptom, for very often, a very considerable wasting can be established before the period when the alimentation has begun to be insufficient. Gastric troubles are, with lumbago and sleeplessness, the first prodromic signs of madness.

In melancholy, in spite of the state of moral pain which dominates the subject, the secretion of tears is rarely increased: frequently, on the contrary, the eye is dry and dull, and recalls the eye of a boiled fish, the patients complain frequently of having no power to weep, of having eyes dry as their hearts. Sometimes one sees a violent emotion, in calling forth tears, act as a happy crisis in the evolution of the malady.

In the periods of excitation there is frequently produced an abundant salivation necessitating frequent expectoration. In periods of depression, on the other hand, the tongue is dry, the mouth is parched, the deglutition becomes difficult. It must be remarked that in the most intense excitation as in the most profound depression there exists a determined constipation indicating a diminution of the quantity of the intestinal secretions: and that, on the other hand, almost constantly, the nostrils remain dry. It may be considered then that the abundant salivary secretion of maniacs is only the consequence of jaw movements, and a secondary manifestation of the same kind as sweat which is induced under the same circumstances. One has sometimes observed a cure coinciding with a crisis of ptyalism (Foville, Thore).

The beginnings of most psychoses are accompanied by loss of flesh; and their cure, on the contrary, by a return of form and proportion so rapid that one might almost think it due to a trophoneurosis.

Maniacs absorb frequently a large quantity of aliments, they do not thrive any the more. Melancholics lose flesh, not only by reason

of the atony of their digestive tube, but also frequently as a result of insufficient alimentation, which is itself, in part, dependent upon this somatic condition.

Van Noorden and Pachoud have pointed out the particular rapid digestion of viands amongst the insane, and especially the melancholic class who present a notable augmentation in the acidity of the gastric juice.

The urine of melancholics is scanty, and their horror of movement, which makes them keep it as long as possible, only ends by increasing its concentration.

It has been noted sometimes in a sufficiently precise manner—an exaggeration of special sensibility. M. Clouston has seen an individual who in ordinary times required strongly magnifying spectacles, and who, during attacks of simple mania, was capable of laying them aside and reading small print. This exaltation of sensibility may be perhaps admitted in cases of maniacal excitation without delirium; but, whilst the intellectual functions present a certain perversion, there exists a diminution of general sensibility under all its forms.

It is the diminution of sensibility which dominates the condition of melancholics. After the cure of a case of melancholic stupor a patient of Esquirol said to him, "This loss of activity arises from my sensations being too feeble to exercise an influence upon my will."

The anæsthesia is sometimes so complete that accouchement may take place without any sign of pain. Maniacs frequently eat their excrements, which seems to indicate in them a profound perversion of taste and odour (*i.e.*, in their respective senses).

Double form madness furnishes opportunity for studying the differences which exist in the conditions following excitation or depression of mind. Clouston says sight and hearing are often more acute in the period of excitation.

Reflex sensibility offers sometimes considerable alterations in the insane. Guislain cites the case of a melancholic who, when in health, was very sensitive to the action of tobacco, snuff, and when he was ill could not evoke any sneezing even by considerable quantities.

Jacoby has determined that erotic ideas seldom occur to maniacs

whatever their sex. Amongst melancholics the genital functions are in general abrogated, and Morel is constrained to believe that a great number of hypochondriacs are in reality impotent. Griesinger remarked that before the commencement of madness there is a diminution of sexual sensations and venereal desires.

The attitude of the insane, at first sight, derives frequently from an enfeeblement of muscular power. Melancholics exhibit a remarkable tendency to be seated or to recline: a large number hold themselves bent, their knees on a level with their chin, and their head hanging over. In this last attitude all the extensor muscles, equally those of the members, the trunk, and the neck, find themselves relaxed. In the intervals of their accesses of agitation maniacs have a great tendency to assume similar attitudes. Moreover the extreme mobility of maniacs, the unforeseen character of their movements, is not at all due to, or a proof of, their voluntary motility, but to the lack thereof: it betokens great reflex excitability.

Maniacs have an exaggerated idea of their physical power, and they continue to say they are very strong when they are already very wasted and weak. Pinel, Esquirol, and Ideler, and a great number of authors speak of a real exaggeration of the muscular forces of maniacs. "In the majority of cases," says Griesinger, "nothing of the kind exists; it is so little true that the patients are really stronger than in a state of health that one keeper only is equal to keeping them in order: usually this appearance of exaggeration of the physical forces comes only from the decided manner with which the patient, in each of his acts, causes his muscles to contract." Most of the patients rapidly fatigue themselves with the tasks apportioned to them in the asylums. Even in the access of epileptic mania which passes for one of the states in which exaltation of the forces is most marked, I have been able to establish under the most favourable circumstances, and in particular, in a case where the patient promised to smash the dynamometer, that the pressure was less than in the normal state.

In melancholics, the depression of the forces is very considerable: not only are the movements without vigour, but they are of a remarkable slowness and incertitude. This state of the muscular forces expresses itself not only by particular attitudes, but by an

effacement of traits which remain without expression, and frequently a stupid immobility. The horror of movement amongst the patients leads them to forget all their most urgent needs. This enfeeblement further expresses itself in trembling. Rigidity, contraction, spasms, cataleptic immobility observed amongst melancholics are in reality defensive spasms which partake less of maniacal agitation than one might be led to believe. We have often noted the uncertain look which preserves an expression of inquietude in convalescents, and Merier has indicated vertical oscillations, or more frequently, lateral of the eyeball (nystagmus). We have seen that these movements present a certain relation to the tremulousness of certain exhaustion states, and that they manifest themselves especially in the period of depression following the epileptic fit.

The harmony of movements is especially affected in psychopathics: and the default makes itself principally remarked in the physiognomy so easily altered. One may say that madness is the enemy of beauty: beauty is rare amongst the insane; when they regain harmony of expression one may prophesy a speedy cure. The mask of mental alienation has for its character incoherence of expression, which corresponds to the frank expression of no normal emotion, because always some muscle is relaxed or contracted, when it ought to be in an exactly opposite condition by its normal associations. It is to this motor inco-ordination that must be attributed the default of attention so common amongst the insane; the relaxation pure and simple can only enfeeble it. M. Laurent lays down the principle, "that the type of the insane, in general, is recognisable from the expression of the eye, from the ocular centre of action, and the buccal centre of action not being in harmony." This author recognises, moreover, that the defect of harmony betwixt the expression of the eye and the mouth characterises also the lie and dissimulation. It is found also in what are called "false expressions," the laugh at the corner of the mouth, etc. Turner has insisted upon the asymmetry of expression.

The depression of muscular energy makes itself felt in the organs of speech by alterations of articulation and voice. The speech is slow and monotonous in melancholics; the voice is enfeebled in

respect of both height and intensity: frequently the timbre itself is modified. In stupor the voice is thin, veiled.

It is not only verbal and mimetic expression which translates externally the psychic status of the insane. The writing also betrays characteristic features. Besides the delirious ideas which they represent, their writings expose important graphic peculiarities. The writing of maniacs is bold, hurried, the letters have exaggerated dimensions, the flourishes an unwonted development. The writing of melancholics is, on the contrary, slow and hesitating, the characters repeat themselves. The predominating ideas inscribe themselves with special characters or an unmeasured volume: their fixity unveils itself by the particular pains taken to trace and underline the words which represent them.

Sometimes the visual representations objectify themselves by illustrations which are only the reproductions of fixed images. Marcé cites the case of a religious maniac who mixed his writing with crosses, small calvaries, and so on.

In madness of the double form the writing is observed to modify itself with the different periods so that the correspondence of the insane permits itself alone to rule in the state wherein it is found. In many cases the modifications of writing enable one to recognise that an access is on the point of cure, or that a relapse is imminent.

Kush reports that a young man who had a "stutter" lost this vice of pronunciation during an access of mania, and that it reproduced itself after the cure of the mania.

The unstriated muscles also take part in the expression of reflex excitability. The horripilation of passing chill establishes itself in a durable manner with some maniacs. However, the erect aspect of the hairy scalp ought not to be attributed exclusively to the erector muscles of the hair, for the trophic troubles of the hairs, which are dry and hard, concur also, on their part, to this modification.

In a general way one may say that to the psychic deficiencies correspond the physical deformities, so that most degenerates are ugly, and this is so much the more marked as the psychic degeneracy is the more. In the asylums for the insane one rarely

sees a fine physiognomy: "There are few Lears, and fewer Ophelias."

The study of the forms of the head (cranium) and face gives no precise indication of the character and emotivity. The character being no other thing than the expression of the sensibility, can only translate itself on the face by movements in relation to the excitation perceived, or by the traces which these movements could bring to the soft parts. Also most frequently the permanent forms are not of any use in the study of the physiognomy. We know that Lavater did not hesitate to recognise the philosopher Herder in the portrait of an assassin recently executed, and which Zimmerman had addressed to him. If modern anthropology has taught us that certain deformations are more frequent in some categories of the degenerate, these are not exclusive to them, and they are not constant to them.

It is thus the study of active physiognomy which is capable of furnishing useful indications. "Speak in order that I may see thee," said Socrates to the disciples presented to him.

Regarded from the somatic point of view the maniac differs only superficially from the melancholic. We know, moreover, that in the great majority of the cases of madness the first periods are constituted by sentimental troubles of which the character is usually that of sadness. Mania is frequently interrupted by periods of depression when melancholic: melancholy, also, seems often to break the monotony of its course by periods of exaltation known under the name of "raptus melancholicus," the rapture of melancholy. In some circumstances even one observes melancholy passing into mania under the influence of a cause manifestly adapted to augment depression, such as a bleeding. Mania is by no means the sign externally of a functional exaltation.

The maniac is not a madman who distinguishes himself by a perfection of organic and psychic forces. He is a melancholic who reacts violently and foolishly against moral pain. It is thus that one can comprehend that the two syndromic forms succeed one another, sometimes at irregular intervals, and sometimes at regular intervals, just as in double form madness, where we see sometimes the aspect of the patient change every day in the year (Baillarger, Morel).

Authors have often attributed to the insane an exceptional resistance to physical agents, notably to cold, or to inanition. In reality, as I have already observed with Esquirol, this resistance is rare, because almost all aliens press around the fire whenever they have opportunity, and almost all eat much and very frequently. This apparent resistance is not due to a greater vitality, but to a defect of sensibility which extends equally to the inward sensations as to the outward and to the emotions.

An attempt has been made to attribute the diarrhœas of the insane to a nervous depression; but the pathogeny of this symptom is too complex for anyone to formulate a precise opinion upon this point.

We have seen that several infectious maladies appeared to be favoured by depressing emotions. Amongst the insane it is observed that several affections present an extreme frequency, especially among those who are suffering under the more asthenic forms. Calmeil says that two fifths of the insane are phthisical; but this mortality by tuberculosis does not appear always the same.

The conditions of depression which are unfavourable to phagocytism, constitute a predisposition to infectious maladies. The microbes of pneumonia find a congenial soil in the insane. "Pneumonia is one of the incidental maladies which we observe most frequently amongst the insane" (Thore). Most statistics show that it enrols almost one-fifth of the subjects who die in the asylums.

Pulmonary gangrene shows itself also among them with a frequency positively great (Guislain), even apart from mechanical causes which can provoke it.

These affections are generally symmetrical, especially pneumonia.

It is not alone by their frequency that these maladies make themselves remarkable among the insane, they present also frequently peculiarities entirely special in their evolution among them. Pneumonia passes often unnoticed, because most of the functional troubles, except dyspnœa, are wanting, such as initial friction, pain in the side, cough and expectoration.

Melancholics who become phthisical have sometimes an amelioration of mental state when the fever lights up. The hopefulness of the consumptive (spes phthisica) appears to have for its

physiological condition super-activity of the cerebral circulation in harmony with the febrile state. Other affections have an influence on depressed conditions of the intelligence by the general reaction. Bevan Lewis records a case of dementia of an acute type under the influence of a pneumonia.

M. Clouston has remarked that most patients affected by general paralysis who die of tubercle have been melancholics, and that almost all aliens affected by delirium of suspicion succumb more or less quickly to phthisis. The delirium of suspicion and of secret agencies is very common in the madness of the tuberculous.

Burckhardt has remarked that in the circular madness the struggles which are induced during the maniacal seizure cause a very lively circulation.

The vaso-motor paralysis with venous stasis is frequent among melancholics who present frequently a veritable cyanosis of the extremities, which are swollen and offer a bluish colour, simultaneously with a lowering of temperature. Montanus has recorded since long ago scorbutic spots among melancholics. M. Ritti has seen local asphyxia of the extremities reproduce themselves during each period of the depression of double form madness.

Baillarger and other authors have noted that with general paralytics the tendency to gangrene is specially notable among those also affected with hypochondriasis.

Under the same conditions Beadles has observed the relative frequency of biliary calculi among insane women compared with sane.

The *rôle* of the physical conditions in the psychic troubles is further put in evidence by the modifications which these last can induce under the influence of organic perturbations. The troubles of the menstrual fluxes coincide frequently with exasperations in madness: their return or regularisation is also a good sign of cure in a number of cases. In other cases the return of reason is related to an exaggerated secretion of saliva, of urine, or of tears; at other times, it comes in the wake of a hemorrhage, of a local inflammation, of an infectious malady, of cutaneous eruptions. We have observed cures of all the forms of madness apropos of general or local ailments: the most profound stupidity is no exception. Aubanel has observed the cure of stupor under the influence of an

erysipelas. More frequently we observe a momentary attenuation of mental troubles.

Amongst the facts which place the organic nature of madness in more favourable light must be cited metastases, and especially those of gout. Lorry reports the fact of a mental alienation which took origin in the wake of a gouty metastasis, and disappeared when the gout resumed its normal seat in the feet. "Erumpete podagra solvitur melancholia," he says. Scudamore cites also a case of delirium in a gouty subject whose knee pain had disappeared. Guislain speaks of mental alienation alternating with asthma, of alienation disappearing apropos of a skin eruption, of a gout replaced by vague terrors, a profound sadness, a hypochondria with tendency towards suicide. Lord Chatham had suffered for two years from a melancholic anguish of which he was cured by a return of an access of gout. Dagonet alludes to a fact of a similar nature. These changes can be provoked by a sudden and violent emotion; or by a violent and improper medication.

These facts have been especially studied by Berthier and by Rayner: they are less rare than one might be led to believe, I myself having observed two examples.

The same alternation has been sometimes observed for diabetes, rheumatism, asthma, chronic bronchitis, but it is especially frequent for migraine, hysteria, and epilepsy.

In a certain number of cases already known to Esquirol, mental alienation influences in a remarkable way the progress of pulmonary tuberculosis which is subject to a period of arrest during the psychic crisis.

The succinct exposition of the preceding facts shows that, in short, madness, like emotion, affects the entire being. This notion which it would appear ought to be admitted without dispute, is not, however, unanimously accepted. M.M. Mairet and Bose admit that "on the side of mental alienation, *neuroses* ought to take the place of mental alienations due to troubles of nutrition." But, it must be remarked that the experiences of these authors on the urines of the insane do not at all comport with the conclusion that those mental alienations entitled "neuroses" can exist without troubles of nutrition.

CHAPTER XII.

The Affective State in Psychopathies.

Summary.—Intellectual and moral defects correspond to somatic defect—All the abnormal manifestations of the mind are the consequences of this deficit.

We have seen that all the sad emotions accompany themselves with phenomena of general depression of physiological activity: and that agreeable emotions when they are too prolonged are followed by a period of depression which has the same physical accompaniments. These physical conditions of the emotions are comparable to what is produced under the influence of the absence of physiological excitations under normal conditions: or following excessive excitations.

We come to see, on the other hand, that, in short, all physical accompaniments of the psychopathies are constituted by troubles which, in their entirety, characterise a deficiency of organic functions. It seems now that one may be allowed to presume that psychical and moral depression, sadness, and discouragement, are, in general, the foundation of all morbid psychical states. This, in actual fact, is the case.

We have shown, moreover, that the morbid states of excitation and depression, mania, and melancholia, are not so unlike that one cannot believe at the outset that they both constitute a sign of moral pain. We can add that frequently they succeed one another, and that it is melancholy which opens the way to show the nature of the troubles.

Guislain has made sure that the beginning of all mental ailments is by a period of mental depression. Nothing, says Griesinger, opposes the statement that the initial period of all mental maladies is a state of melancholy. If in fevers and in some other morbid conditions mania appears to have a sudden beginning, it has, in reality, been preceded by the physiological (physical)

conditions of depression which have masked the psychic depression.

This depression is often conscious: some patients are haunted during years by the idea that they will become mad. Mania constitutes, in short, a form of reaction to moral pain, and it does not often end except after passing anew through a short period of melancholy. Sometimes this short commencing period of melancholy expresses itself by an effacement so profound that it is only the later progress of the malady which enables it to be distinguished from dementia. The access of mania preceded by a short period of moral pain, and followed by a period of exhaustion, is comparable, in respect of duration to the epileptic discharge. It is in fact, as we have already related above, mania, which can vary in intensity from maniacal excitation, to the furious blaze of acute mania; that it is, in reality, a reflex discharge provoked by painful representations, quite as the access of epilepsy is provoked by a peripherical excitation, or by an irritative lesion in the cerebral cortex.

The character of the patients affected by painful hysteria is well adapted for setting in light the influence of moral pain upon intellectual functioning. All their psychical activity exhausts itself in the expression of their pain which they describe in an infinite variety of terms. When they fail to excite sympathy, their sufferings augment, and they come to hate those who possess the attributes of health, or who can do what is impossible for them. From that to accusing them of being the cause of their ills, there is but one step, and when this step is taken, the stage of delirium is entered upon: all the environment provokes painful representations, and becomes the point of departure of morbid reactions. The same process is found again in a large number of painful conditions capable of bringing about madness in individuals predisposed. The exteriorisation of the cause of the pain marks the end of the period of reaction.

If the sentiments are always affected in the lunacies this can hardly be in the direction of benevolence, since at the bottom of every psychopathy there is a somatic deterioration and a moral pain.

"After the passage from melancholy to mania," says Guislain, "it is a change in the application of the personal pronoun which announces this transformation. The patient says no more, 'I am

unhappy,' but 'they will hit me.' From this to the idea of reprisal it is not far."

If in the normal life, moral pain, ennui, is often the origin of the most useful works to the individual and the species; in the abnormal, moral pain, like physical pain, entails the most unforeseen reactions, and the most frequently hurtful at the time to the individual and the species. Most of the hurtful acts of criminals and lunatics are only the effects of moral pain.

"The first sigh of love is the last of wisdom," says Young. All the strong emotions are also destructive of reason; the morbid emotions can only induce the same effect and with greater intensity.

If there does not exist in lunatics true exaltation of physical functions, there does not exist either, properly speaking, an intellectual exaltation. The pretended psychic over-activity of mania ought to be rejected. It is only an appearance: memory sometimes exhibits an extraordinary fidelity: but the association of ideas makes itself after a defective fashion, and the incoherent memories only serve to direct activity into a reasonable and useful direction.

The time of simple reaction is lengthened in most forms of alienation; epileptic idiocy, alcoholism, hypochondriasis, neurasthenia, mania; except, sometimes, in the prodromic period of progressive general paralysis; but it is liable to be subject to important modifications under the influence of the actual emotional state.

Melancholy expresses itself in depressing sentiments with tendency to negation and destructive impulsions towards objects, persons, and the self. One may observe an expression of satisfaction even after abortive efforts. The expression of an exuberant gaiety can coincide with the commission of suicide; an instance of the Socratic irony, the patient in ecstacy because he believes that he is going to live again.

In mania one sometimes sees the habitual peculiarities of character manifest themselves in exaggeration, but frequently one sees hitherto unknown instincts manifest themselves. So one is surprised to hear young girls using obscene expressions with which one thought them entirely unfamiliar: so one can be surprised to hear patients express unaccustomed sentiments. But, the anomaly is only apparent, frequently the madness only inspires expressions which were already familiar in a certain degree: and frequently

the sentiments are more modified in their intensity than in their form. The morbid emotion only sets in relief the dissembled sentiments. A number of individuals affect virtues which they have not: in order to dissemble the contrary vice which they really have.

The normal or morbid emotions act, in fact, after the fashion of external excitants or diffusible excitants introduced into the organism: their psychological effects are identical. In vino veritas. What wine does that also emotion does whether in the normal or abnormal states. Anger is often as sincere as drunkenness. All the changes of being and opinion which one observes in madness are not necessarily manifestations of diseases of the affective or intellectual life: it is not unusual for them to be, on the contrary, the sincere expression of habitual sentiments which the subject had concealed for reasons of convenience.

These apparent exaltations are, in reality, the proof of an enfeeblement of the power of control, an enfeeblement which itself coincides always with a deficiency of some one of the organic functions, or of all the organic functions.

One cannot too much insist upon the necessity of the physical conditions for the production of psychic phenomena; on the inevitable corelation of the two orders of phenomena, that it proceeds from states of consciousness of internal origin or external origin.

The following chapter will again adduce some illustrations of this general truth.

CHAPTER XIII.

The Signs of Hallucinations.

Summary.—Hallucinations in general—Those of Sight—Those of Hearing—Mental Hallucinations—Those of Taste—Those of Odour—Those of General Sensibility—Those of the Genital Sense—Those of the Viscera—Those of the Cœnæsthesia.

There is hardly a work of medicine which does not contain some recrimination against the ignorance of the magistrates, of the public, and even of medical practitioners, who are sometimes accused of want of faith in the decisions of alienist physicians: the practitioners are frequently *lay* in psychiatry, as is said in a recent book (Mercier). Without staying to criticise an expression which appears to suppose among the non-laity some supra-scientific initiation, it is useful to give an explanation of the scepticism of laics. If the psychiatric descriptions are regarded with less confidence than those of other medical specialties, it is not that the patients who form the subject of these studies are less numerous or fall rarely under observation, nor that they are less interesting to the physician. It is that, very often, the alienist speaks a language which the practitioner is not in the habit of hearing. The latter knows that all his progress is due to the experimental method which has taught him the conditions of the phenomena: he knows that he can only fulfil his mission to relieve pain by determining the physical conditions thereof. Apart from the physical conditions he knows he can do nothing: he remains in dubiety of the narration of troubles minus signs accessible to the senses; he gathers with repugnance classifications of these undecided ailments: he only admits with hesitation the possibility of their distinction, he rejects wilfully the practical and legal deductions which one would draw from them. Certain of the method which is conform to that of the physical sciences the practitioner only allows himself to be convinced by the experience of the senses,he only accepts in all sincerity those phenomena of the subjective order when one has set

them in relation with the physical facts which constitute their necessary conditions. In order to persuade him, it serves the physiatrist nothing to reveal the metaphysic, to substitute for the soul and the vital force the dynamogeny and inhibition, the anabolism and catabolism, etc., he is obliged to laicise his methods, and to bring himself to demonstrate the physical conditions of the psychical facts of which he makes a study.

"The action of the nervous system," says Bernard, "is not variable with each of the effects which one sees produced under its influence. It is an identical action, which appears always a motor influence, whether it has for its agent the system of the great sympathetic or the system of the cerebro-spinal axis. Without doubt all these phenomena are kin to sensitive impressions: but these last are not apparent except when a motor phenomenon comes to manifest them. The isolated existence of sensibility cannot be conceived; we only consider it separately by abstraction, and in every nervous act the sensitive impression is inseparable from the motor reaction which it provokes."

Nothing takes place in the mind without a change in the corresponding relations of the organic elements, without movement, be it a sensation provoked by an external object, or a representation. Thought is a physical travail which never executes itself (*i.e.*, is never attained) without movement; and they are the results of the study of this movement, of this physical phenomenon, which are the scientific bases of normal or morbid psychology.

But in what measure and how is it possible to establish a relation between the physical conditions and the psychical phenomena, whether normal or morbid? We now proceed to attempt to put this in the light, by a study of one of the most important troubles from the point of view of morbid psychology; hallucination.

Hallucination figures in a great many of the morbid states of the mind: its importance in psychiatry can be measured by the efforts which have been made to give it theoretical interpretations. We understand, in general, under this term, a state of consciousness characterised by a perception without an object: that is to say, a perception which is not determined by a peripherical excitation homochronous to the sense whose perceptive centre appears affected. The hallucination can be apparently spontaneous: that is to say,

that we are ignorant of its cause, although it is allied to changes in the relationships of the organic elements which escape us. The excitation of a sense can be provoked by the excitation of another sense: this is the reflex hallucination of Kahlbaum, heterologous hallucination reflex. It can be provoked by the excitation of the sense affected; this homologous reflex hallucination comprehends illusion, which does not differ markedly from hallucination. The distinction betwixt hallucination and illusion contended for by Esquirol has, moreover, never been unanimously admitted.

The purely subjective phenomenon seen under this definition is not exclusively known except by that which is affected by it, it is only appreciable by the movements which accompany the perception: it is only appreciable by the witness of the movements which accompany the perception: it is not susceptible of a scientific study otherwise than as these movements are susceptible of being seen, weighed, or registered.

The existence of the concomitant physical phenomena of hallucination may appear doubtful at the first sight, but clinical observation and experimentation permit of its being put in evidence in a certain number of positive facts.

The experimentation on man presents great difficulties: however, it is capable of subjection to rules which allow one to keep clear of error, especially when one pre-occupies oneself with investigation of physical phenomena. We will not hesitate to utilise some of the facts with which it furnishes us. We are induced to remark, further, that the external facts which serve us to control the real existence of hallucinations, spontaneous or provoked, do not differ from those which the physiologists use to gage the sensorial effects of cerebral excitations. It is simply by the movements of the animal, movements recalling those which are provoked by sensorial excitations, external, that the physiologist can explain the sensations which he has determined by an irritation of the cortex, when he has provoked a perception in the absence of any actual external object, that is to say, in reality, an hallucination.

We now come to the facts, and we will pass in review the phenomena accessible to the senses or susceptible of being put in evidence by the usual methods of experimental physiology, which accompany hallucination, and permit the recognition of the real existence of

the subjective phenomenon. Let us consider successively each of the senses capable of being affected by hallucinations.

I.—Hallucinations of Sight.

Long ago Brewster indicated the possibility of doubling the visual hallucination by mechanical displacement of the optic axis of an eye by finger pressure. In this experiment of doubling the image, there is, besides and moreover, brought about a subjective phenomenon without possible control on the part of the observer; but, appearing to have, nevertheless, a value in the case of spontaneous response, by reason of the physical condition determining the same. I have applied this procedure of control to the hallucinations provoked in hysterios, and I have seen in them the object which figures in hallucination doubling itself by the mechanical displacement of the eye or by the interposition of a prism betwixt the eye and the imaginary object. But my experiment is subject to a fundamental objection, which applies itself also to the experiments derived from it: the object which figures in hallucination is not projected into empty space: but, whilst the subject can fix the image at an outer point, (be the subject sincere or not), he can declare that he sees double, when the prism or the mechanical displacement of an eye shall have doubled le point de repère. The doubling of the image, the reflexion in a mirror, etc., cannot then be held to be signs of the truth of hallucination. It must be said, moreover, that the doubling of the image in the spontaneous hallucinations of aliens has not been found, by those observers who have found them, in favourable conditions to seek it. In spite of appearances then this mode of exploration does not furnish an objective sign of a visual hallucination.

On the other hand, I have observed that the visual hallucination, spontaneous or provoked, can be accompanied by changes in dimensions of the pupillary orifice or changes which appear to be in relation with the efforts of accommodation provoked by the lengthening or shortening of the distance of the object which figures in the hallucination. Although the movements of the iris can make themselves in a certain measure, and indirectly, under the influence of the will, they constitute nevertheless an objective phenomenon which has a great value, mainly when they can be taken in connec-

tion with forced movements of respiration, and when they concord with facial expression, and attitude of the body.

Visual hallucination, moreover, is frequently accompanied by local motor reactions, which express themselves in movements of the eyelids, more or less energetic and repeated winking, determining eventually permanent furrows of the skin, furrows perpendicular to the direction of the muscular fibres which enter into action.

These furrows, these wrinkles, merit a minute study. I have already had occasion to relate this fact: under the influence of a somewhat lively sensorial excitation, there are produced in the face apparent reflex movements, which show themselves more quickly and energetically in the muscles functionally associated to the sensorial organ excited or those neighbouring. This idea explains how in certain hallucinations of sight the subjects exhibit a development of wrinkles in the periorbital region whilst none exist on the rest of the face. The movements of the cutaneous muscles and the folds of the skin in the periorbital region merit attention in relation to the control of experiment regarding the existence of visual hallucination. Let us add that the visual sensations are accompanied by associated movements of rotation of the head and eyes on the corresponding side, movements associated which produce themselves equally well under the same form apropos of peripherical excitations as of subjective sensations. These associated movements are found again very often in the case of hallucination. The absence of external excitation, the briskness of movement, and its repetition can satisfy one as to the reality of hallucination and its direction.

The motor phenomena are not those only which can determine the reality of a visual hallucination.

In cases of permanent organic lesion such as the affections we call dynamic because we are ignorant of their organic condition the troubles of the visual function are often associated to the troubles of sensibility of the organ coverings. An analogous association is observed sometimes in visual hallucination. Certain persons suffering from hallucination of vision complain of a sensation of tension, heat, prickings: they have the illusion of strange bodies, of grits which irritate the conjunctiva. These sensa-

tions are found again in the provoked hallucinations of hysterios: sometimes they are accompanied by redness of the conjunctiva independent of all rubbing.

It is not without interest to compare with these facts, the phenomena which accompany tegumentary irritations, that is to say, bearing upon the general sensibility of the organs of the senses and especially of the eye. Persons attacked by conjunctivitis or chronic blepharitis, for example, present frequently a considerable variety of periorbital wrinkles. We know, on the other hand, that the painful irritations of the tegumentary nerves can provoke hallucinations. I have instanced, for example, the existence of sensorial hallucinations in a case of zona of the face.

If the irritations of general sensibility or of the special sensibility of the visual organ provoke motor phenomena which leave indelible traces: inversely the loss of vision appears to suppress in part the action of the muscles annexed to the eye: it is not unusual to see amongst the infant blind the upper region of the face entirely deprived of wrinkles, whilst among the deaf mutes it is the lower part of the face which is without expression.

Birch Hirschfeld has also remarked that in individuals who have early become blind the mimetic activity of the orbicular muscle, of the superciliary and frontal, is suppressed. A remark to compare with the preceding is that during normal or artificial sleep the eyelids are immobile and without wrinkle. If a visual dream occurs to trouble them movements are immediately seen. Auditive dreams are accompanied by movements of the mouth.

We know, moreover, in general way, that there exists a constant relation between the motility of an organ and its sensibility. This relation exists not only from the physiological but from the anatomical point of view. In man the eye owes its sensibility to the most bulky sensorial nerve; the muscles which move the eye receive nerves of a colossal volume if one compares it to that of the nerves which serve other muscles.

This relation between sensibility and motility of the sensorial organs, is found again in different races of animals where one observes the motility of the ear or of the nose, for instance, in relation with the development of audition or olfaction.

II.—Hallucinations of Hearing.

The physical accompaniments of hallucinations of hearing are not less interesting than those which we have just passed under review.

When we provoke a painful sensation of hearing we determine at the same time a reflex contraction of the muscles neighbouring the ear, a contraction which can be associated with contractions of muscles at greater or less distance, but which precedes these always by a measurable time: when the excitation affects especially one side the muscles of the excited side contract more quickly and energetically than those of the opposite side. These easily registrable physiological facts, when set a-going by violent excitations, manifest themselves necessarily to a certain degree under the influence of feeble excitants: they can explain some external phenomena which one may observe with the greatest nicety amongst those suffering from hallucinations of the masseter, contractions of the sterno-cleido mastoid, entailing a deviation of the face to the opposite side, and bringing the pavilion of the ear into the direction of the hallucination, which is by this means revealed to the observer. This contraction of the sterno-mastoid entails sometimes a permanent attitude in the case of unilateral hallucination.

The repetition of hallucinations of the hearing can further bring about another consequence in relation with the muscular contraction which accompanies it. The wrinkles are determined, it may be, by the weight of the soft parts of the skin, in which case they are called passive: or it may be by repeated muscular contractions, in which case they are termed active or expressive. The folds, lines, or wrinkles of the first category which one may observe in front of the pavilion of the ear, are, in general, oblique from behind forwards and from above to beneath, prolonging themselves more or less according to the direction of the lower border of the jaw. But one may meet, in front of the tragus, lines with perpendicular posterior concavity consequent upon the direction of the anterior auricular muscle fibres; and one may observe it presenting a remarkable depth in a certain number of cases of auditory hallucination. In one patient who had unilateral hallucinations these furrows only existed on the affected side.

We have often mentioned that subjects of auditory hallucinations

speak their hallucinations: we often observe these patients moving their lips whilst they hear: and these movements are sharply arrested if one addresses them sharply, that is to say, when the hallucination is broken. These movements are frequently enough perceived by the patient. A patient of Legrand du Saule wrote to him: "Hallucinated artificially for ten years incessantly, day and night, even during my sleep, by mercenaries brought to live in the hidden places of the establishment, and who profit by my involuntary babbling to hear my thoughts."

Littré cites a case of a medical man with whom auditory impressions preceded by a little time the movement of involuntary phonation.

In the provoked hallucinations of hearing I have noted that there exist tongue movements, and that when a mechanical obstacle is placed in the way of these movements the hallucination ceases. We know further the help which movements of articulation bring to patients attacked by word deafness.

If in hallucinations of hearing patients have not, in general, consciousness of their movements of articulation, it is a special form of hallucination, which is, in fact, a feeble form of auditory hallucination, the patient having only the idea that the words are pronounced (psychic hallucination of Baillarger), and in which the sensation of the movement is very frequent (hallucination of speech of Lébut). In an epileptic who has, sometimes, during several hours, these hallucinations called psychic or psychomotor, the movements of the tongue and lips are easily seen. In this case hallucination is not, in reality, a subjective phenomenon; the patient has the sensation of a co-ordinated convulsion of the muscles of articulation which correspond to the idea of the words. It is just so that the idea of the words is evoked in a patient attacked with verbal deafness when he wants to imitate the movements of articulation which he sees made. It is probable that in the variety of motor aura of epileptics, constituted by a representation of movement so-called without movement, one would find some displacement, if one could place oneself under good conditions of observation. A good number of interjections, or even phrases, which figure in the epileptic aura, can be reckoned as convulsions of

phonating muscles whose movements are habitually associated with these.

In reality, in the psychic hallucination of Baillarger, there is no hallucination at all, but only an articulatory convulsion which is accompanied by states of consciousness of varying intensity following the energy and rapidity of the movement. All living beings, from the most simple to the most complex, only feel by reason of changes of form. Whether these changes are provoked by an external excitation or a cerebral irritation: no idea without motion, no hallucination without change of form. Hallucination is evoked by a similar process to that which evokes suggestion by provoked movements in hypnotism: it is a suggestion by attitude, it becomes fixed and seated when the attitude is fixed.

I have seen recently at Neuilly with Dr. Thuvien a patient very fit to demonstrate the convulsive nature of hallucinations; one makes her speak German, says she, when, in reality, she only articulates sounds which do not constitute words in any language; one forces her, she affirms, to stenograph speeches which she does not understand. She knows neither stenography nor German. She only traces convulsive lines which, in reality, have no signification. She has, moreover, auditory hallucinations which accompany themselves by movements of the tongue which she seeks in vain to arrest by fixing it between her teeth.

The association of vocal movements with the representation of words has been, moreover, very naively recorded after each systematic study. "Patients have assured me," says Gueneau de Mussy, "that the mere action of writing may provoke in them a painful sensation of the pharynx, as if this organ, when they traced words, became subject to a nervous excitation which had preceded their articulation."

The facts of echolalie, of reflex language, in which the patients repeat automatically words which they hear, appear to me adapted to put in evidence the relations which exist between the audition and articulation of words.

This series of facts appears to demonstrate that motion is the physiological condition of sensation, and that it constitutes par excellence, and consequently, the physical sign thereof; and that it is this physical sign which must be brought into play in order to

set it in evidence when it is necessary to establish an objective diagnosis. The study of movement, in respect of energy, rapidity, form, precision, constitutes the most solid bases of our psychological knowledge, and it can give precious indications to the practitioner, since it permits him to gather positive observations without the intervention of the patient, whose story they serve to check. The representations are perceived as real objects. They accompany themselves always with movements which may become provoked by a real excitation.

The research of these movements is not always easy. In fact, the motor reactions determined by representations are always less violent than those determined by external excitations: even among the mad, where the representations assume an intensity such that they beget the perception of actual excitations, the reactions are of remarkable feebleness. Further a number relatively less considerable respond with violence to hallucinations of hearing which would appear to justify them: rarely they pass from idea to act: the passage from the idea to the act is, as Falret has justly remarked, a sign of acuity. The halluciné, says Lélut, altogether regarding his false perceptions as true, is in a sort of doubt as to their cause and the conformity of their nature with that of other sensations. He makes of them a separate order of sensations apart, which he connects with causes of which he can render but small account, and if they are not very intense, and they have no bearing on essential objects, and are mobile, he will just put them to one side, and they will not have any marked influence on his determinations nor on his acts.

If, as in the case of visual hallucinations, the external movements, the attitudes and the stigmata which result from them, are the main revealing signs of auditory hallucinations and the ideas which attach themselves thereto, they are not the only ones. Like visual hallucinations, those of hearing are accompanied by other correlative troubles of general sensibility.

A good number of audial hallucinés complain of a sensation of heat, itching in the auditory meatus, in the upper pharynx, with movements of deglutition, etc. These sensations manifest themselves sometimes before the auditory trouble has assumed a precise character, whilst it is constituted by a weight, tingling, a vague

bruising (or murmuring). Sometimes the patient seeks the removal of an imaginary foreign body: certain others repeat designedly the manœuvre (of attempting to remove a foreign substance) as the local excitation induced thereby causes the momentary disappearance of the subjective phenomena.

The existence of tegumentary sensations in hallucinations of the hearing has for its corollary, the existence of hallucinations of hearing induced by foreign bodies in the ear.

M. Jolly has recognised in most of those subject to hallucinations of hearing an acoustic hyperæsthesia, and the possibility of provoking the hallucinations by passing the continued current from ear to ear. The constant existence of an organic predisposition of this kind is not unlikely.

Other congenital peculiarities of development appear to exclude certain hallucinatory localisations. One well known "persecuté," (it would not be discreet to mention him more clearly, for he has often placarded the walls of Paris with his deliriums), presents hallucinations of all the senses except that of sight: but, although he is a laureate of the School of Fine Arts, he is totally deprived of visual memory, and he is incapable of designing from memory even the most classic subject. The aptitude for hallucinations appears to have its source in an organic individual predisposition: just as the form of the delirium is governed by former ideas, and the violence of the reactions by the character.

The physical phenomena which accompany the hallucinations of the other senses are still more rarely accessible to our actual means of observation than those which can characterise hallucinations of sight and hearing.

III.—Hallucinations of Taste.

The phenomena of motility which associate themselves to the gustative function have not escaped observers. Brillat Savarin says expressly that the chevaliers and the gormandizing abbés have "the promenading tongue," illustrating the physiological law which shows us that the mobility of an organ is always in relation to the development of its sensibility. The subjective sensations of taste accompany themselves with apparent movements of the tongue and lips, movements of mastication and deglutition. These last

movements are in relation with another physical symptom, salivation, which sometimes is so abundant as to provoke movements of expectoration, whose frequency augments by the necessity for the expulsion of a disagreeable substance. The attitude of those subject to hallucinations of taste varies according to the quality of the sensation. When the subjective sensation is disagreeable, the physiognomy assumes an expression of disgust; when it is doubtful and provokes suspicion the neck is stretched and the head is carried well forwards. I have only once seen an halluciné of taste who presented furrows perpendicular to the buccal orifice and well marked, even when the teeth were not wanting.

Movements of the tongue manifest themselves, besides, at the same time as salivation under the influence of desire. A diabetic patient to whom Dr. Jagot had prohibited the use of sugared aliments said: "when I see them on the table, my tongue goes in procession."

IV.—Hallucinations of Odour.

The physical accompaniments of hallucinations of odour are still further motor phenomena; if there exist secretory troubles they are with difficulty accessible. These movements are those that Ferrier has seen produce themselves under the influence of the electrical excitation of the olfactive zone, that is to say, an elevation of the nostril and lip. When it brings about disagreeable sensations there is joined to these a movement of nasal expression, the physiognomy assumes the expression of contempt. The dilatation of the nares is accompanied by a folding of the skin in the nasogenial region which sometimes leaves vertical wrinkles in the dorsal region of the nose.

A patient who had subjective sensations of foreign bodies in the nostrils presented exactly the same reactions. There is no room for astonishment at this: in animals also the special sensations and the general sensations of the olfactive mucous membrane determine the same reflexes: it is thanks to this circumstance that Majendie has been able to conclude from his experiments with acetic acid, ammonia, etc., that the trigeminal nerve was the nerve of olfaction.

V.—Hallucinations of Cutaneous Sensibility.

The subjective sensations of cutaneous sensibility, are accom-

panied solely by movements of flight or defence varying in form according to the region attacked, and in extent according to the intensity of the hallucination. They are only hallucinations bearing upon the genital organs which entail modifications of circulation and of volume. One person (halluciné) pretended that he produced rednesses on the skin of the regions upon which electric discharges had been made. I have never confirmed those vascular troubles whose possibility one must admit when one has seen provoked hallucinations in hysterios accompany themselves with all the physical phenomena of a scalding redness, and blister even. It is not without interest to search for the existence of these phenomena in cases of spontaneous hallucination.

This study has so much the more chance of success in proportion as one observes better how other subjective phenomena (migraines, facial neuralgia) which are not without analogy to those which now occupy us, can be put into relation with physical phenomena: migraines, facial neuralgias, are frequently accompanied by easily appreciable vascular troubles. Every sensation of inner origin which calls to have itself understood or misunderstood as a sensation provoked by an external excitation, comes in short, under the definition of hallucination, perception without an actual object: the pains of the neurasthenics and the ataxics take sometimes the character of hallucinations, and entail thus the conviction of the patients to such a degree that it frequently happens to them to remove their garments in order to verify if they have been subject to a penetrating wound. The observations of Strauss and Keller have shown that these sensations have a gross physical condition, vascular ruptures, which when they are superficial express themselves artificially by ecchymoses.

Hallucinations, like painful phenomena of central origin, appear to accompany peripherical organic troubles recalling those which are produced by a local irritation, and which constitute the sole physical characters of the subjective phenomena. Without doubt the vascular phenomena are still more difficultly accessible to gross observation than the motor: but experimental physiology furnishes us with methods and instruments which allow of our putting in evidence facts which escape the eye.

The study of the energy, the rapidity, the form of movements,

already furnishes precious indications: the study of the modifications of local circulation, of arterial pressure, of electrical resistance, of secretions, etc., whose description has been hardly outlined in states of depression and excitation, although a good number of authors have already been pre-occupied with them, will not be less fruitful.

Every new method of physiological exploration, every new instrument applicable to the study of the organic functions can serve to clear up the physical conditions of the psychical phenomena. I will cite one instance thereof which is not without interest in the history of one particular form of hallucination.

VI.—Hallucinations of the Genital Sense.

Schenkius reports the observation of a young man who, prior to each access of epilepsy, saw a woman who provoked him by lascivious gestures: an hallucination constantly followed by ejaculation. The experience of lubricious dreams is very instructive in this respect.

VII.—Visceral Hallucinations.

The gravidic hallucinations which develop in females who are possessed by a strong desire for maternity, or who have good reason to fear the same, are accompanied sometimes by development of the breasts, and even by secretion of milk.

We know, on the other hand, that visceral lesions give place to hallucinations relative to the presence of foreign bodies in the viscera. A trouble of the circulation or of localised nutrition provokes hallucinations or dreams. Arnaud de Villeneuve dreamt one night that a black cat was eating him on the side: the next day an anthrax exhibited itself at the part (supposed) eaten. A patient of Galen's dreamt that one of his legs was changed into stone; some days after it was paralysed.

An hemiplegic alien imagined he had a stranger in his bed or a corpse.

VIII.—Hallucinations of the Coenaesthesia.

Certain patients experience, from time to time, briskly, general sensations of well being or illness more or less durable whose disappearance is also rapid. With epileptics especially, the instan-

taneousness of these sensations shows exactly their independence of external conditions: these are sensations without apparent actual object which have consequently the character of hallucinations. These sensations have a physical condition which shows once more how the appreciation of the resistance of the environment is dependent upon the energy at the command of the individual.

An epileptic who presents from time to time these crises of well being had had a severe convulsive attack one hour previously, and I studied his resistance to fatigue with the ergograph of Mosso. With his left medius the patient lifted every two seconds a weight of two kilogrammes, the lowering of the curves indicated clearly fatigue when all at once he produced a series of most energetic contractions. During this period the depressed physiognomy of the patient cleared up suddenly. When he regained his wonted look and fatigue manifested itself anew by the lowering of the curves we asked him what it was he had experienced: "I have had what I have already told you of, I have felt myself very well, I felt everything go well." The sensation of well being had had for its condition physically a veritable motor discharge which manifested itself by a manifestation of the energy of voluntary movement (fig. 12). The result of the experiment was so much the more interesting that it manifested itself spontaneously, without being sought, and that it has had for witness besides my internes MM. Dupasquier and Marie M. Claus, physician to the Grand Asylum, and Van Eugelen of Brussels.

The facts which we proceed to gather up show that the physics of hallucinations are not very advanced, and it is necessary to recollect that the history of other elementary troubles of the mind is not richer in objective phenomena. They are enough albeit to put in evidence the possibility of studying psychical after the same manner as physical troubles by the aid of external signs. It is only theoretically and by a course of induction that psychology can proclaim that renewed sensation, representation, occupies the same parts as the original sensation, and in the same manner as it (Bain); physiology does more, she shows experimentally that representations accompany themselves by the same external phenomena as peripherical excitations. Psychiatry must appropriate the physiological methods utilised by the medical men;

leaving the metaphysical period of its evolution, she is entering upon a positive experimental period. It is only on this condition, it is only by thus becoming laic that she will obtain the same credit as the other experimental sciences, and that she will cease to suffer from the scepticism of which she complains.

Maury remarks on several occasions that with him hypnagogic hallucinations coincide with congestion of the head. Baillarger cites a patient of Pinel whose hallucinations only produced themselves when she lay down and disappeared when she sat up: and he remarked that the hypnagogic hallucinations are frequent among women upon occasion of a suspension of their periods and a congestion of the head.

Irritative lesions of the organs of sense can give place to motor reactions which do not differ from those of sensorial hallucinations; but, it is needful to add that it is not rare for these same irritative lesions to provoke sensorial hallucinations. We have cited cases of hallucinations of hearing provoked by foreign bodies in the ear: and ceasing after extraction or in relation to other lesions of the ear whose evolution they follow.

We have observed lesions of the membranes of the eye which have provoked unilateral or bilateral hallucinations according to the case and according to the evolution of the material lesion.

CHAPTER XIV.

Morbid Emotivity.

Summary.—Division: diffuse emotivity, systematic emotivity—Excess—Diminution of Emotivity—Apathy—Morbid Fears—Misoneism—Agaraphobia—Atremia, Stasophobia—Amaxophobia—Claustrophobia—Fear of Darkness—Fear of Water and Liquids—Astraphobia—Anthropophobia—Fear of Crowds—Hematophobia—Zoophobia—Nosophobia—Thanatophobia Misophobia—Fear of being Afraid—Fear of an Idea—Rôle of Association—Scruples.

Mental evolution, at once intellectual and emotional, can be measured by the lengthening of the time of reflex action. "When we compare the inferior human races with the superior we see that, in general, poverty of sentiments goes with violence. Those emotions which in inferior races exhibit themselves in man by fits, are excessive as well as transitory, and it is credible that these two characters are not without relationship; their violence brings a more rapid exhaustion. These two characteristics find themselves exactly united in the passions of infants, and frequently also in women and nervous subjects."* "In a being easily moved the nervous phenomena differ less from reflex acts than in a calm (self-contained) person. Take an individual in whom the sensibility is less complex: an event raises an emotion in such an one: at once she brightens, acts before any other emotion has been able to enter into line or even for any others when their turn comes. But when, in an individual, the possible emotions come to form a more complex organism, the simple emotions find themselves co-ordinated there in such manner that they can arouse the one without the other. Before an awakened one has been able to induce an act the excitation communicates itself to others which often are opposed to the first; from all which arises a combination of tendencies, resulting, consequently, in modified conduct. Thus emotional promptitude declines and emotion becomes more durable."† The relation which exists betwixt the development of the intel-

* and † Spencer. *The Comparative Psychology of Humanity* (essays moral, scientific, and æsthetic), pp. 296-7.

ligence and that of emotivity is not without interest of a practical kind.

"The more the modes of an animal's activity are varied," says Spencer again, "the more varied ought to become the relations which it has with its environment, and consequently the more ought to be varied the modes whereby environning objects affect it." The relation which exists between the qualities of movement, intelligence, and emotivity manifest themselves clearly in idiots, who are of an extraordinary maladroitness, and almost entirely lacking emotivity.

The degree and extent of the sympathy depend upon the clearness and extent of the representation; to inflict, or permit the infliction of, a pain upon others, implies necessarily a reeble representation of the pain. This absence of sympathy implies a defect of intelligence. The previous experience thereof favouring the representation augments the emotion. A robust person enters with difficulty into the sentiments of a feeble person: after an illness he becomes more accessible to it: one says then that his character is only the expression of the emotivity.

Where does normal emotivity end? Where does abnormal emotivity begin? Says Claud Bernard, "What we call the normal state is a purely mental conception, a typical ideal form artificially distinguished from a thousand divergences betwixt which floats incessantly the organism in the midst of its alternating and intermitting functions." "It is not then physiology which can serve us to limit it." "Animi motus eos putemus sanissimos, validissimosque, qui nostro arbitrio ibunt, non suo ferentur," says Seneca.* But our judgment is only a measure when it is applied to precise facts. Morbid emotivity appears to me characterised by the fact that it entails reactions badly adapted to the interest of the individual or the species.

Thus comprised morbid emotivity presents itself in two forms: 1st. a diffuse and permanent morbid emotivity which constitutes a pathological character; 2nd. a systematic morbid emotivity which is only induced under special conditions which are always the same for the same individual.

Morbid emotivity, either diffuse or systematic, equally can con-

* *De irâ*, lib ii. 35.

sist in a diminution or in an augmentation to which one ought to reserve the general term morbid emotivity: the diminution may be designated under the term apathy, diffuse apathy, or systematic apathy.

Diffuse morbid emotivity objectifies itself in the irritable character of epileptics, choreics, hysterical persons, neurasthenics; so easily accessible to all emotions, to all passions, passing in a few moments from enthusiasm to anger, to fear, etc. The systematic emotivity can exist in addition to every other apparent trouble of emotivity, and it is constituted by a fear, an irresistible penchant, always the same and accompanying itself frequently by painful nervous troubles. The diffuse apathy consists in a diminution or an absence of emotivity applying itself to all kinds of representation. This it is which one observes in idiots and imbeciles, in stupor or epileptic apathy, and in states of stupor in general. Systematic apathy indicates the loss of emotivity, apparently limited to a given representation, relative say, for instance, to the genital sense. All forms of representation can be constitutional and permanent, or accidental and transitory.

We must not stay long over the description of diffuse morbid emotivity and its morbid characters; it is well in evidence in the mind of the whole world.

Permanent diffuse emotivity frequently dates back to infancy: the choleric character, the timid, enthusiastic, etc., can be manifest under all circumstances without special organic condition.

Certain individuals present a paroxysmal emotivity which expresses itself in general by accesses of violent anger. This malady of character expresses itself mainly in epileptics, hysterios, unceasingly pre-occupied with their personality, ego-maniacs, whom the slightest contradiction exasperates. Besides these admitted pathological conditions, one observes it frequently in infants and women: but we observe it in men of every age, as Cheyne and Forbes Winslow have cited examples thereof. Sometimes these furies present themselves without any appreciable motive under the form of transitory mania most difficult to distinguish, if ever it is possible, from the psychic troubles of epilepsy. Paroxysmal emotivity can in general be set in relation with changes in the organic state. If it manifests itself more frequently by anger, it can also appear

under every other form of emotion: in the accesses of gaiety and chagrin for instance, of hysteria or of chorea for example.

Systematic morbid emotivity is especially well evidenced in the category of facts which Morel has described under the term emotional delirium. This delirium, with consciousness, which has since been the subject of numerous studies, rests most frequently on terror: but terror is not the only emotion which can serve as its basis: the opposite emotion, love, can also fill this function, and all the intermediary emotions appear also capable of producing the same result.

Let us shortly pass in review the facts which have drawn to fear, and which Rush has had especially in view in his chapter on the derangement of the passions.

Unjustified fears exist much more frequently than one in general would believe. All weakly people fear the NEW: most often, misonéism* ought to be reckoned a morbid fear, and one is, unhappily, obliged to recognise with Lombroso, that it is one of the feeble points in the French character. This fear, which is the mother of routine, manifests itself under very varied forms of which this is not the place to write the history. The morbid nature of these fears is often put in evidence by its association with other symptoms of irritability, which constitute the marks of irritable feebleness. Sighele remarked "that a nation could be misonéist, and at the same time amorous of novelties, like a lady who loves to change her toilet according to the fashion, but remains incredulous before the discoveries of science, and shows herself offended if you tell her that religion is only a mass of prejudices."

But morbid fears, as a rule, present themselves under a more defined form.

"Who has not heard," says Morel, "of the febrile fits which were produced in the savant Erasmus at the sight of a plate of lentils? That of a caraffe of water, which caused the savant Scaliger nervous tremblings? Sénac cites analogous facts apropos of Paoli and other personages. Pierre Bayle, it is said, was seized with syncope, on hearing water fall from a caraffe: the illustrious Bacon, it is further affirmed, experienced a state of syncope during eclipses of the moon. King James II. trembled at the sight of a naked sword: and the sight of an ass, if the chronicle of the time

* *i.e.*: The fear of the new.

can be believed, sufficed to cause the Duke of Epernon to lose consciousness."

This rapid enumeration of Morel affords a general idea of this trouble, but a more detailed review is requisite. Let us commence with one of the most frequent and first described fears.

The fear of spaces comprises the fear of places and horror of elevated places. The fear of places, the known Agoraphobia of Sauvages, observed by Morel, defined by Benedikt under the term vertigo of places, is particularly well known since the description of Westphal.

Agoraphobia is producible in presence of an open space of any kind, such as a public place, a street, a vast locality like a church (Sauvages), or the simple outlook from a window. But for each patient it is one special circumstance which exclusively determines the fit of anguish.

The fears disappear as quickly as they had appeared, and by a circumstance apparently insignificant. To certain patients it is enough to be accompanied by an infant, furnished with a cane or an umbrella in order that they should allow themselves to traverse a place over which they could not trust themselves, were they absolutely alone or empty-handed. Legrand du Saulle cites the case of an officer who could not traverse a place when he was in civil costume, but who easily did so when in uniform or on horseback. Many patients are freed of their anxiety if they can fix on a point. Bourdin cites an agoraphobic who could risk himself on sharp rocks provided he was able to fix his gaze upon some prominent point.

Atremia (Neftel) or Stasophobia (Bouveret), fear of a vertical station, appears to be a variety of the fear of spaces.

Agoraphobia can be simulated by the exaggerated fear of carriages, another form of morbid emotivity which arrests the patient when he would traverse a street or a place by the constant fear of being run over. Maguant and Doyen have cited cases of this kind to which Ball proposed to apply the name Amaxophobia.

The horror of a void, which merits being put in the same category with fear of spaces, can produce itself every time a patient is placed on an elevated position beneath the sun. Morel cites a patient in whom the access of anxiety is produced apropos of the idea of being helpless: this individual can only live on a ground floor.

Westphal cites an observation of Bruck in which the fear of a space manifested itself in a still more singular manner. It was a priest who was seized with terror whenever there was no shelter over his head. He could only march on routes bordered by trees: and when these were wanting he was obliged to open his umbrella which he never left. The fear of precipices has received the name of cremnophobia; the fear of elevated places, acrophobia, or hypsophobia.

On the side of fear of spaces there must be placed the fear of closed places, claustrophobia or clitrophobia. Meschede, Raggi, Verga, Ball, have described this form of morbid emotivity which is far from being rare. The patients cannot endure the idea that they are in a closed place, their anxiety is so much the greater that they realise that the fastenings are more secure. A patient compares his sufferings to what one would feel if one were crushed under sacks of grain.

The fear of darkness is one of the most frequent forms of morbid emotivity. It is one of the most common forms of the neuropathic state in infancy. This form of emotivity has probably for its physiological condition the diminution of vital activity which is dependent upon the absence of the physiological excitant—light. Hobbes, whose mother was brought to bed of him when in the anguish of terror, could not rest without light.

OBSERVATION XXXII.

Fear of Darkness—Neuropathic Heredity.

"M. D., aged 60, diabetic for 20 years, has still his mother living, aged 82 years, but attacked with erotomania and placed for 14 years in a Health-home. Pretends to never having any previous personal neuropathy except an absolute intolerance of darkness. He has never been able to rest in an unlighted chamber. When he wakens in darkness in spite of all precautions taken, he is seized with a crisis of anxiety with oppression, and even to-day he is unable to repress his cries and it is impossible for him to make a movement in order to get light for himself. When he travels by rail he takes with him a lamp so as to be sure of avoiding darkness in passing through a tunnel. When darkness is not complete and especially if he is in open air he can resist although he feels a strong oppression. However, he avoids walking at night through badly-lighted streets. M. D. has a son 38 years of age, who has never been able to apply himself to anything, has changed his profession several times, and, in the wake of every sort of debauch, has had to be interned in an asylum from which he has not issued for five years."

Salemi Pace has defined under the name of Oicophobia a mental state in which the alien finds an unconquerable aversion to return

home, to such an extent that he prefers to remain in the asylum. Verga has remarked that these patients are, in general, persécutés, who are dubious, and not without reason, to rediscover to themselves the proofs of the past, and that their fear is perfectly legitimate. But the horror of the home can present itself under the form of systematic emotivity, and determine flight, which brings these patients close to the migratory creatures.

The fear of water and liquids presents itself under very diverse and independent forms of Lyssophobia. Certain individuals, (I have seen several examples of them among neurasthenic females), have an invincible repugnance to contact with water, and especially cold water, to such point that the most cursory toilet pains, even limited to the parts usually uncovered, determine veritable fits of anguish. Hydrophobia also manifests itself under the form of repugnance to the ingestion of drink. It is a phenomenon which accompanies very frequently nervous anorexia; with certain of these patients (for they are usually female) the repugnance for liquids is often more marked than the repulsion for aliments. This form of hydrophobia exists sometimes in a state of isolation. Prosper Lucas cites a case of a family in whom the repugnance to liquids was so great that fever even failed to overcome it.

In short, Hydrophobia manifests itself in a form which can be compared with Agoraphobia. Certain individuals are seized with a veritable anguish at sight of the sea, and cannot think of it without fear, even when they are at some distance from the coast, or still find a painful emotion each time it is necessary to cross by bridge over a river. A neurasthenic who presents this form of emotivity cannot traverse a bridge without fixing his eyes on the other side sufficiently high for him not to perceive the surface of the water.

It has happened to him several times, not having been able to avoid seeing water, to collapse, on his legs becoming unable to support him, and following this accident, not to be able to walk when upstanding. After being thrown into water in his infancy, Pierre le Grand preserved a terror thereof all his life, to the extent that he would not cross a bridge.

It is still further needful to indicate cases in which hydrophobia can be allied to the fear of death. Hoffding cites the case of a

woman who, following a nervous shock which she had obtained at an accident where she was not hurt, lost at once the use of several senses, the faculty of speech, and memory. She remained, besides, subject to an extreme agitation at the sight of water, even in a painting.

Boyle had a syncope when he was splashed with water. It is also another form of morbid emotivity, but which, in certain cases, merits comparison with delirium of touch, the fear of contacts, and can be confounded with the fear of cold (Psychrophobia).

We must instance also the fear of air currents (Aerophobia).

The fear of thunder (Astrophobia) presents itself frequently in a morbid degree. Other cosmic phenomena can be the occasion of an abnormal emotivity. Bacon found himself ill during an eclipse of the sun. Baillon and Ramazzini cite analogous facts, which discover themselves again, moreover, in a good number of animals. They cite also the case of a woman who died some days after a fright occasioned by the sight of a comet.

The fear of fire (Pyrophobia) and inflammable objects, fusées, is one of the forms of morbid emotivity which has most frequently for its origin a moral shock following even an insignificant accident or chance of accident, the fear of fire installs itself with an intensity so great that the patient becomes incapable of sleeping before exploring the apartment without a light in order to assure herself that there is nothing which can possibly be in danger of alighting, and all warming and lighting apparatus must be surrounded by protective appliances.

This emotivity can even develop itself in the wake of a sharp luminous impression without danger of fire. A man, 45 years of age, has been seized with it after having been surprised by a brisk illumination by the electric light of a railway station.

The fear of solitude, Monophobia, manifests itself frequently in hysteria, in neurasthenia. It is found again in a great number of suspicion madnesses when the sufferers from it are arrived at the period when the need of a strange affirmation becomes quite urgent.

With an hysterio whom I have long watched the Monophobia had manifested itself for a long time in the most simple form. She could not remain alone in a chamber where there was nothing else animate, but any animal could prevent the anguish, such as a bird

or cat. Then it was necessary it should be a human being, and at last it became indispensable that the person who lived with her should move about or speak, she could not go to sleep save during conversation or reading.

At the end of most madnesses we can observe a trouble of sentiments which manifests by a desire for solitude and shunning people like what Wedel has designated by the name Aphilanthropy. But this repulsion can manifest itself under the form of systematic emotivity.

Anthropophobia manifests itself under several forms. Certain patients hesitate to meet people whom they know. Legrand du Saulle has instanced an Agarophobe who presented this trouble at the same time. Beard has reported cases in which fear manifests itself exclusively in the society of women. Baillarger has instanced a man of 40 years who was seized with an anxiety of an extremely violent kind when he found himself in the society of pretty women. Dumont (de Monteux) had a horror of pregnant women, carriage hirers, and of the old flower dealers, a sight of whom caused him a real pain. The painter, Charles Gleyre, was also from infancy subject to Gynophobia. Sometimes it is a particular category of individuals who alone provoke the morbid emotion: the meeting with a capuchin aroused terrors, which proceeded even to cowardice, in an officer who had given proofs of his bravery in several battles.

The fear of crowds manifests itself in several forms. A great number of individuals experience an extraordinary emotion when it becomes necessary to speak in public, and present then all the physical signs of fear. John Hunter was affected by this kind of emotivity, and came to overcome it by taking a small quantity of opium before his lecture. Others are seized with fear of being tramped under foot, or more often of being suffocated: whilst they feel the elbows of their neighbours in a reunion they have a sensation of thoracic constriction, oppression, and sometimes anguish.

M. Juhel-Kénoy has pointed out under the sufficiently improper name of fear of slight noises an emotivity developed from the age of six years, and which consisted in a painful enervation of insupportable kind induced, as the patient says, by human noises, such as coughs, sneezes, wheezes, and wind-breakings. She had been pro-

voked for the first time by the aggravating noises made by her grandmother when eating soup.

The fear of blood—hematophobia—is often a family emotivity. It presents itself in very diverse forms: certain subjects are only affected by human blood when they see it flow from a wound: others cannot even view shed blood: others cannot support the sight of any kind of blood: others are profoundly moved simply by the idea of a wound that bleeds. I have reported the observation of an hematophobe in whom the contact with a bloody cicatrix provoked a syncope just like the sight of blood. It is frequently only human blood which alone provokes this emotivity.

The fear of animals (Zoophobia) has been regarded for long as a mental malady. Germanicus could neither see nor hear cocks: Marshal D'Albret took himself off when he saw the head of a moccassin: Tycho Brahé experienced a syncope at the sight of a fox. Henry the Third could not support the sight of a cat. Copland instances an old domestic who became mad at the sight of a mouse: her mother had had the same antipathy whilst she carried her. The fear of dogs—Cynophobia—is one of the most frequent of these systematic emotivities. The morbid fear of insects and animals of small size is perhaps more frequent than that of large. Séguin instances a female who had a fear of bugs, and who saw them where one had never been.

OBSERVATION XXXIII.

Fear of Insects—Neuropathic Heredity.

"M. P. aged 52, the subject for 14 years of confirmed ataxia, whose mother died of melancholia in an asylum, has (1st) an hysterical sister; (2nd) a debauched, drunken, criminal, self-exiled brother; (3rd) another brother who has managed his affairs well and conducts himself well but has married an old puella publica. The sister and the second brother who are married for over 20 years have never had children. M. P. has two sons: the elder eight years old, has had convulsions during the first dentition and is still incontinent of urine; he is sulky and remains sometimes a whole day squatted in a corner without anyone being able to draw a word from him. The other, five years old, has had also convulsions from his first dentition; from the age of three, following measles, he is subject to nocturnal terrors, he dreams himself into arising, and once awake, continues to see animals, black bears, who walk round his bed and disappear only when a strong light is made. It is since this time that one has come to perceive that he cannot tolerate, without manifesting an extreme terror, any insect or moving animal whatever. He has fallen several times into syncope particularly at the sight of caterpillars although he was not at all exposed to contact with them."

The fear of animals is met with frequently in individuals affected with different forms of doubt madness.

Toxophobia is met with frequently in neurasthenics. It holds an important place in certain forms of doubt madness. It is a fear of poisoning which can manifest itself during a long time at least without any illusion or hallucination of odour or taste. These individuals are incessantly pre-occupied with the chances of intoxication by aliments, drinks, tissues which are in contact with their body. When their doubt comes to impose itself, they experience an inexpressible anguish which reproduces itself by fits, even when one has demonstrated the absurdity of their fears which reproduce themselves frequently under one form or another.

The fears of infection by microbic ailments come actually to place themselves alongside Toxophobia.

The fear of maladies, Nosophobia, Pathophobia presents itself under very diverse forms.

One of the most interesting is the syphilitic or pox mania, Syphiophobia (Chambard), Syphiliphobia (Ricord). It presents itself under very diverse degrees. Sometimes it is only the exaggeration of very natural fears in an infected individual: sometimes it constitutes the evident manifestation, a morbid emotivity in subjects free of every symptom of infection, but who believe themselves affected against every admissible chance. Sometimes the morbid fear makes its departure by a generalised hypochondriacal delirium, but it can present itself under the form of systematic emotivity.

OBSERVATION XXXIV.

Syphilophobia—Suicide.

"In 1877 a commercial employée frequented almost all the consulting rooms of the Hôpital du Midi. He was 38 years of age and had been attacked by a balanoposthitis and it left him with an extreme sensibility of the prepuce and the gland, a sensibility which he soothed by repeated washings sometimes as often as 20 times daily.

"This person, into whose neuropathic antecedents I did not then make sufficient inquiry appeared of sound and vigorous constitution; he was almost always completely imberbe and his genital organs were slightly developed. Since his infancy he had been given up to masturbation, and he had continued his manœuvres up to within a few months; because, from the age when he had been able to see women, he feared infection so much that he had never been able to make himself run the risks. Eight days prior to his presenting himself for consultation for the first time he had passed the

Rubicon, thanks to the complaisance of the mistress of one of his friends, by whom he was often chaffed about his fears and who pressed him to marry as being the only way of avoiding every risk. The assurance of the husband had encouraged B. The following day he was in despair when he found a local and superficial inflammation which had not yet been so intense as to provoke pain. B. believed himself afflicted by syphilis and saw himself attacked by all the lesions which he had seen figured in the anatomical museums. At his first visit we told him that he had only a slight affection, that he could not have syphilis after a single connection so recent as two days, etc. It ended by his seeming convinced, and he added, 'Moreover she was a married and virtuous woman.' But during more than three months he returned at least once a week to consult one or other of the physicians to the Midi, or the house surgeons whom he could take into the passage, and only left after a full dress argument and never failing to reassure himself by saying, 'Moreover she was a married woman and virtuous.' One day he came back to the consulting room of M. S. who had been away and whom he had not seen before. The same argumentation ending in the same acquiescent reassurance was gone through. But the unhappy B. had scarcely ended his formula when M. S. who rarely let pass the opportunity of a joke said to him laughing: 'You believe yourself now, fine boy, that you are convinced that an honest woman has not made a mistake only with you.' On this simple remark B. became pale and trembled all over. One had well to explain to him the joke; it did not matter, he had been convinced by a coup that his security was not legitimate. He was sure that he had syphilis and that he would die. Some weeks after we learnt that B. had hanged himself."

The syphilitic infection, moreover, can determine morbid fear of contaminating others after the disappearance of all contagious lesions, the fear of being impotent, and the fear of marrying and being unfit (d'être impropre au mariage).

Lyssophobia, one of the morbid fears which is induced most frequently, is transitory, as it was with the house surgeon and chief of clinic to Trousseau, who experienced dysphagia at the sight of water; or brilliant objects, during one or two hours only after having made the post-mortem examination of an individual attacked with hydrophobia. Sometimes these phenomena last a much longer time and entail a delirious anguish, as we have already remarked. Hydrophobia can hold a predominant place in accesses determined in aliens, such as the case of Mesnet;* but it is then a symptom which is not necessarily in relation with the idea of hydrophobia, and has nothing to do with the morbid emotivity which consists exclusively in an agonising fear of rabic infection.

* Ménerd. *Art. Hydrophobia Dict Encyc. des Sc. Méd.*

Contrarily to most other forms of morbid emotivity, Lyssophophia presents itself often as a fit which yields when one can succeed in reassuring the patient, and, in general, the crises do not renew themselves, when the subject is not placed in relation with an animal capable of giving the disease (hydrophobia). Trousseau has cited an example of this. Barbentine has cited a young man who, six hours after having been bitten by his dog, which he believed mad, was seized by a furious agitation, refused to eat and drink: when one was able to show him the dog, all these symptoms disappeared. M. Raymond has cited the case of a veterinary who, after having been bitten by an enraged dog, was taken with hydrophobic crises: his attendants substituted for the dog who had bitten him, a similar dog, a sane animal, and the accidents disappeared. The issue is not always so favourable as, witness the case of Nocard, of a man bitten by a dog whom he believed very mad, and who died in a furious delirium at the end of 48 hours.

Nevertheless the fear of hydrophobia can return a long time after the danger has disappeared. It was thus in the following case:—

OBSERVATION XXXV.

Fit of hydrophobia reproducing itself several years after the bite of a dog —not mad.

"July 3, 1882, M. Charcot charged me to see one M. A. S. said to be attacked with madness.

"M. A. S. was an ancient cavalry officer of high stature, strong constitution and having all the appearances of health. He was since morning in an extraordinary state of excitement, pretending that he was incapable of swallowing anything whatever, feeling an insupportable oppression. He was going to die surely, said he. All these accidents were superventions in the wake of his reading a journal article concerning a child bitten by a mad dog and which had agitated him. M. A. S. had had his hand pressed but not excoriated by a dog—not mad: in the wake of this accident he had had hydrophobic troubles of the same kind. Many times in the interval he had experienced considerable anguish, whether on reading or on hearing the account of dog bites enraged or otherwise. This last fit, which lasted still two days had been more intense than the others, perhaps by reason of the fatigues to which the patient came to be submitted."

Rabiophobia does not manifest itself always by the fear of being infected by the rage, but sometimes by the fear of having to be in the future. This is what came to pass with a young girl cited by Marce, who, after having been frightened by the account of the ravages of a mad dog, remained struck by the idea that she might

obtain the disease from another dog who had been bitten, but had not become ill. Afterwards she avoided with care the suspected animal, then she came to hold in horror all objects which she thought might have been in contact with it. The cords which served to hang the linen having been thrown near the kennel of the dog, she did not dare touch either the cords or the linen. The fear of the "rage" was in this case the point of origin of a true suspicion madness.

Other maladies may, moreover, figure in this form of morbid emotivity. Phthisiomania well merits a mention.

The fear of death (thanatophobia) (Rush) can impose itself in the wake of a passing danger to the point of becoming constant and definitive. Such is the case reported by Pleindoux of an individual in whom fear installed itself in the wake of a provocation in duel. This fear can be hereditary. Laycock cites the case of the physician Brewster who had all his life a strange fear of being wounded, a fear which manifests itself in several of his descendants, even those who are too young to know of the others having had it.

Alongside the fear of death, it is needful to cite the case of morbid fear of dead bodies (necrophobia), to which one has wrongly attributed the *rôle* of cause in several neuroses.

It is not without interest to mention that this morbid fear is not exclusive of suicide.

Demonophobia and Theophobia are forms of emotivity of morbid kind much less frequent to-day than they have been heretofore when religious beliefs were more general and more profound. The changes which produce themselves in this relation are well calculated to point the influence of education and environment upon the form of morbid emotivity. If the demonopathies of the middle ages developed themselves especially in quarters where physiological misery could be accused, and amongst hysterios; if amongst those who persecuted them, there was found a great number of interested men, it is not less certain that others, sane of body and mind apparently, were seized by a morbid emotivity of which one finds now only the most modest traces.

The fear of being interred alive (Taphephobia, Morselli) is a chimerical fear which is nowise motived by the frequency of the accident. With some degenerates it is so intense that it becomes the

object of their constant pre-occupation, which manifests itself, for example, as in a case within my knowledge, by the patient reading all the works treating of real and apparent death, and by the editing of long memoirs on the precautions to be taken upon their decease. Amongst these precautions there are, moreover, the most bizarre and useless; but their invention, their editing, and the reflexions they provoke, are only capable of soothing the constant anguish which oppresses him, possessed as he is by the idea that it is only putrefaction which constitutes a certain sign of death.

The fear of being deformed (Dysmorphobia), indicated by Morselli, is not perhaps an exceptional form of morbid emotivity, but I have not yet had occasion to meet with a case.

The fear of improper contacts, Misophobia, applies itself sometimes to objects or substances which are really absurd. Trélat cites the case of a female who had a morbid horror of tallow, and all the articles which could contain any of it.

The fear of contacts does not manifest itself only under the form of repugnance to touch unpleasant bodies, or those susceptible of decomposition, or of sweat. Patients cannot touch velvets, peaches or silk. Baillarger cites the case of a female who was afraid of contamination by consecrated wafers. I have observed one patient of the same kind, who ended by not being able to live without having constantly the mouth and nostrils closed by a band of tissue intended to exclude bundles of wafers, which might be contained in the atmosphere, from penetrating into her body, whilst she was not in a state of grace.*

Morselli cites the case of fear of contact with pieces of glass (Jalophobia). Sometimes the morbid emotivity expresses itself by a fear of contact with metallic objects, more often coppers or brilliant objects, pins and needles. It is likely that a more profound study would discover in these different forms of fear of contacts troubles of tactile sensibility. Marcé has described a complete insensibility of the skin of the hand in a woman tormented by the fear of seeing pins, needles, or other bodies of small volume adhering to her fingers.

* N.B.—"Wafer" is the best translation I can find for the French word "hostie." The sentence seems absurd, but the meaning is plain enough.—Translator.

Observation XXXVI.

Fear of Contamination by Sperm.

Madame T., 36 years of age, knows of no nervous family antecedents, but her mother had to suffer a prolonged list of torments during her pregnancy, the father being threatened with a failure which happened indeed some months before the birth of her infant. She was difficult to bring up but had never characteristic troubles. Some time before her first communion she was struck by a sermon in which figured a comparison between every sinner renewing the pains of Christ and an assassin. From this date for several years she was subject to religious scruples. Before communing, she returned several times to her confessor, and whilst she had some cause for sorrow, he easily removed her fears of making a bad communion. These fears seem to have disappeared completely towards the age of 17 years, when she began to fret less, being altogether more useful to her family. She married at 18, was very happy in her menage and lost her husband six years later. She had an infant whose birth had not evoked any nervous troubles. When about 32 years of age she had no mental trouble, her life had become easy, she had no cause of chagrin. Her son took then typhoid fever and she was compelled to make long vigils by his bedside. The child was convalescent, when one of the trustees of her husband (deceased) who had already made her propositions of marriage, which had been definitely refused, came to see her and on leaving kissed her hand. She was much hurt by this boldness, she became quite pale, covered with a cold sweat and was obliged to sit down. It seemed to her that there remained a moist touch on the skin. She hurried to wash it off, which she thought absurd; but nevertheless it was indispensable to quell her anguish. The idea of being soiled persisted and at the end of some days she set herself to reflect upon the circumstances under which the scene had been produced. She considered that it was done that night when her cousin was leaving, that the door of the apartment was open, that she had not seen him hang his head in order to kiss her hand, she doubted whether the humid touch she had seen on her hand was really saliva, she came soon to be convinced that it was sperm. Since then she was not able any more to feel any liquid in contact with the skin of her hands, without the idea entering her mind that it must be sperm and the fear that it was so determined a real anguish. About a year after the beginning of these troubles of which she was ashamed to complain, she was one evening in an omnibus, somewhat squeezed between two men when there came to her the idea that she might be contaminated by sperm. Since then fear imposes itself each time that she finds herself in contact with a man in an omnibus, in a reunion hall, in a crowd. When she cannot reassure herself by examination the fear becomes agonizing. Several times when she could not avoid the neighbourhood quick enough it has occurred to her to see a virile member in erection, objectifying the danger.

When I saw Madame T. for the first time in the month of June, 1884, she was very thin, anemic and dyspeptic, without appetite. She slept badly, not because of her morbid fear which was only induced under determined circumstances, but tormented by the consciousness of her malady which she had never dared to reveal. She did not present any hysterical stigma. She

seemed to have no other trouble of the intelligence, besides she did not fail to fulfil her functions properly. Under the influence of hydrotherapy and a tonic treatment, she has regained flesh, her anguishes have diminished considerably, she had no more hallucinations, but in the month of April 1886 the same ideas were always awakened by the same circumstances. I have heard since that this patient was accidentally killed.

The fear of pain (Algophobia, Odynephobia) is one of the most frequent morbid fears: it manifests itself equally well a propos of a moral pain as of a physical. The least danger, the least hurt, or the least pain determines an insupportable anguish, and all the most lively reactions of pain. This form of morbid emotivity can appear, in some cases, with a defective education, but it is very often independent thereof. Very often with infants and with women it is an invincible obstacle to all therapeusis.

The fear of ruin, which figures in a great number of Melancholias, can present itself alone, and constitute a form of morbid emotivity which goes back to the earliest years.

OBSERVATION XXXVII.

Locomotor Ataxia with Melancholia and ideas of ruin, dating from infancy.

"M. J., aged 48 years, has made a fairly round fortune in the leather trade where he had succeeded his father who had left his affairs very embarrassed and committed suicide as a wind up to an ill-regulated life. No nervous antecedents known in the family. The only brother of J., after having been his associate for several years, left him very suddenly to go and try his fortune in Brazil where he died of yellow fever. J. himself married at 28 years a woman who appeared well-behaved and who bore him four infants, all of whom died at an early age of convulsions. There was no good reason to suspect either syphilis or alcoholism.

"When J. married in 1871 he complained then of pains which seized him suddenly and quitted him similarly and affected the skin of the lower limbs. It was a sensation of burning which extended itself in the form of spots, contact or friction of which by clothing was extremely painful. Much intent on his affairs and leaving nothing to hazard, he was profoundly affected when an accident occurred to interfere with his operations: the least loss, entirely unimportant though it was in his situation, determined fits of anguish during which he beheld ruin menacing him. When his brother wished to separate himself from him, he could not escape from the idea of an approaching disaster, although this separation was in reality to his advantage. He was incapable of arranging the liquidation, which his friends did for him; during the several weeks it lasted he was in a very painful state of anxiety, incapable of exercising himself with anything whatever, and moreover was become useless by reason that he was going to be ruined. Nevertheless J. is not avaricious and when he is exempt from all uneasiness he shews himself often generous. But the ideas of ruin take hold of him in the midst of the most complete satisfaction, reappearing suddenly upon

the slightest accident. One day he went to assist at the marriage contract of a young girl to whom he had promised a good round sum. He forgot his cane in the railway carriage, was seized with anxiety at it, it was impossible to make him go to the Notary: he was going to be ruined, he could not give anything more. The lost object was not found, the anxiety endured two days without sleep, then all returned into order and he executed his promise spontaneously. He made himself at this time fully aware of the absurdity of his fears and he narrated that he had always been subject, from the age of six or seven years, going to the infant school, to these anguishes which produced themselves when he lost an object, blotted a book; although the fear of being beaten was not in question, he already passed entirely sleepless nights of which the fear of being lost was the sole cause. He attributed to his 'toquade,' as he called his emotivity, a large part of his exactitude professionally and his success.

"Up to the age of 42 years J. had not presented any other mental troubles than these specific anxieties. During this time the tabetic troubles multiplied themselves and became aggravated. The fulminating pains became apparent, he has had several times diplopia, ptosis, vesical crises with polyuria, then loss of genetic function and incoordination. All these troubles are apparent, have been subject to recrudescences without evoking ideas of ruin. For the past six years motor incoordination has become more marked without, however, rendering walking impossible, and J. had to continue his affairs. In 1887 J. had had, in the month of June, an apoplectiform crisis in the wake of which supervened a very important modification of the mental state. His affairs have ceased to interest him, he has become apathetic, indifferent to all that is passing around him, even his wife whom he was wont to love, only suffices to arouse him from his torpor: he is not delirious, does not complain of anyone, has no hallucination. Dating from this depression it is noted that he is no longer haunted by ideas of ruin. When, two years ago, it was necessary he should decide to give up business he listened to the propositions made to him without emotion, had no wish to occupy himself with anything but gave practical counsels which showed well that his intelligence and memory were not profoundly affected. Since this time the physical and mental state is scarcely modified."

This observation is not without interest for it shows that madness does not alter *only* normal emotivity, but that it affects even morbid emotivity.

The fear of having fear (Phobophobia) is a common phenomenon in neurasthenia (Beard). One patient who could, moreover, never have been exposed to fear lived in a permanent apprehension of this emotion, and its possible physical effects: it came to be that he was incapable of issuing from his chamber without being accompanied, so possessed is he by the hypothesis of some accident. Phobophobia entails consequences very analogous to those of panophobia inwhich the patient comes to be unable to budge because all that surrounds him causes him fear.

Alongside the fear of an emotion it is requisite to cite the fear of a representation of an idea (Phronemophobia). A neurasthenic, for example, is seized suddenly with anxiety, on thinking that an idea comes to impose itself on his mind, and that he cannot any more get rid of it, that he comes to have an idea that he ought not to eat such and such aliments, that he ought not to caress his infants, and so on.

Alongside those morbid fears which are accompanied by conditions of physical depression, and which, from the psychical point of view, distinguish themselves by their passive character; it is convenient to range *morbid jealousy* which consists in an unmotived fear of being dispossessed of an object whose enjoyment is a right, or by the spite of being surpassed in the pursuit of an end. Morbid jealousy is not only in relation with the sexual function. In infants especially, jealousy presents itself under the most varied circumstances. Love jealousy does not take place exclusively "in one who possesses or wills to possess exclusively," but in individuals who have no right to possession, nor even any reasonable hope of possessing.

Amongst the different forms of morbid fear, jealousy is perhaps that which can present the greatest variety in its intensity: from suspicion to terror one can find all the intermediaries accompany themselves by the most diverse somatic phenomena, from the most profound depression to the exaltation of fury. The jealous person can present himself under the aspect of inert stupidity or the most dangerous rage: his moral pain can express itself by the most profound exhaustion, or by most violent reactions: likewise jealousy itself can be distinguished in passive and active form. This last is the most interesting from the medico-legal point of view, just as it may conduce to suicide, homicide, or incendiarism.

Frequently morbid jealousy which scarcely manifests itself with out degeneracy or in virtue of hereditary transmission is produced apropos of a cause of general depression, but of the physical or moral order: domestic chagrins, loss of money, etc., hemorrhages, anemias, puerperality, grave fevers, alcoholism, etc. It is on a foundation of depression and sadness that the tendency develops itself to maladroit interpretation of the most simple acts, an interpretation which realises itself in the direction of habitual pre-occu-

pations. When the association of the sentiment of jealousy with the state of depression becomes once established, it is not possible to destroy it, without the physical state itself being modified: if it is not modifiable, the sentiment persists indefinitely, but it is no less secondary to it, symbolic as it were.

All these morbid fears accompany themselves with the ordinary physiological conditions of the normal emotions: precardiac anxiety, extreme frequency of heart beats or suspension and syncopes, pallor, respiratory troubles, muscular relaxation, etc. An Agaraphobic cited by Legrand du Saulle felt that the pavement under his feet was soft and moveable: another observed by Westphal had the sensation that his steps in proportion became shorter as he advanced. Often he produced in himself a feeling of sudden cooling with shivering.

The patients, incessantly agitated by morbid fears, and being conscious of the absurdity of their emotion are in a state of hesitation; which well merits the name of dubitation madness, which Falret has given it.

The influence of a state of somatic depression on the development of other forms of morbid fear is not less evident. Beard has well shown that most psychical states can be met with in neurasthenia. But frequently the specialisation of morbid fear is determined by an accident which provokes a painful emotion in a special circumstance whose representation associates itself definitely to the emotion. When an individual, predisposed by heredity or degenerescence, happily prepared by a state of physical depression, experiences a painful emotion in the midst of a place, this circumstance of place associates itself so definitely to the painful emotion, that the sight, the representation of this place, can bring back constantly and definitely the emotion. The affected individual has well comprehended that the sight or the representation of the place does not imply any emotion; the latter is reproduced in a reflex manner.

The *rôle* of association in the evolution of a morbid emotivity appears to me clearly demonstrated in the following fact:—

OBSERVATION XXXVIII.

Fear of the Void—Neuralgia of the Trigeminal.

M. P., 43 years old, is attacked by a trigeminal neuralgia, lasting for

two years, and presents itself in the form of an abscess occupying the lower jaw and especially the mental nerve area, where one observes, at the moment of seizure, a red spot produced about, in size, that of a franc piece. In proportion as the pain augments, the spots extend themselves, unite and end by forming a red tendril spot. These seizures which last for half an hour or an hour reproduce themselves two or three times daily and are separated by tolerable intervals during which there exists only one sensation of pressure around the points of emergence.

This neuralgia which has resisted for the most part the most usual treatments, ended by yielding to refrigerations of chloride of methyl, which have not been repeated less than 42 times. The perseverance of the patient may be taken as a measure of his pains. He moreover conducts himself like a man of decision who has made a large fortune in hazardous commerce.

This neuralgia which he attributes to the action of cold, must be referred to an hereditary predisposition. His mother who has had nervous attacks, has a facial neuralgia which ended by accompaniment of local convulsions. One of his brothers is dead of a state of epilepsy mal: three of his four infants have had convulsions, and the fourth has nocturnal terrors and fits of somnambulism.

M. P. has, moreover, had convulsions in his infancy, and although big and vigorous, he presents signs of degenerescence, he is almost beardless, and bedridden, and besides, he is subject to a morbid terror which dates back to infancy. He had been brought up on his father's farm and gave himself freely to the most violent exercises: he was in the habit of accompanying the workmen, and loved to climb up the trees, and battlements, and machines. Whilst they were preparing for a roofing, he mounted with the roofer quite to the top of the parapet and remained on the rhone without being in the least afraid: he was then eight years old. He had repeated this exercise a number of times, and he found himself one evening on the top of a ladder when he heard a cry and on turning himself he saw the flames of a rick of forage burning near the farm. He was greatly terrified and descended rapidly. Scarcely arrived at the foot of the ladder his limbs bent under him, he fell and lost consciousness. This syncope lasted a short time and he recovered himself rapidly. The next day when he returned towards the workers, he wished to mount again, but, after the first steps, he was seized by an extraordinary anxiety and had not time to jump down. He had a fresh syncope. Since this time it has been entirely impossible for him to maintain himself in any elevated place when he is not preserved by a thick and opaque balustrade. He has never been able to maintain himself on a balcony even on a first floor, nor to mount into an uncovered machine. When he passes over a bridge having a stone parapet and open, he carries himself instinctively on the side of the pathway nearest the carriageway and walks with hurried steps. He would be incapable of trusting himself on a bridge of wood in which there was a wide gap. He has never been able to set his foot on a boat, he has been obliged to stop an excursion when it was necessary to pass over a suspension bridge. When he travels by rail, he maintains himself in the middle of the waggon for fear of seeing the void in traversing a ravine or bridge. It has happened to him

several times in his travels that, at the sight of a void, he has been seized with a pang which took his breath and ended in syncope.

M. P. has no other morbid fear than that of elevated places; he has travelled on plains and public places, he fears no crowd, he is capable of speaking before a numerous public, and, a remarkable thing, he has no fear of fire. He gives to this circumstance an explanation which is probably right. It is that in the wake of his great fear of the fire, he has been more than 20 years without having occasion to view a conflagration.

A Swiss churchman, cited by Morel, found he had a genuine terror every time when he must take his halbert in his hand. During more than five years, he had had the same fear relatively for knives. This morbid terror supervened in the wake of a chance when he had failed to make *un couteau à la main.*

Legrand du Saulle has cited, after M. Blanche, the observation of a young girl, in the wake of a lively fright caused by a violent storm, without having experienced any effect direct or indirect of the thunder, who believed she saw phosphorus all around her. She spent days incessantly brushing herself and avoided every contact.

M. Gros cites a young girl who was so moved on learning that her father had hanged himself on a tree that she could not see large trees any more, especially moved by the wind, without being terrified and rendered incapable of advancing.

The influence of the association of a painful emotional state shows itself in an observation of M. Roger. "The patient narrates that one day waiting the visit of a friend, she was briskly disappointed that the latter wished a call from her. Impatient, she set out to the meeting: but hardly was she in the street, than all of a sudden she was forced to arrest herself in consequence of a most painful sensation of anguish. She compares the sensation she felt to that of a cord or an iron wire which had fixed the thorax behind. Since this time the same symptoms, the same phenomena, reproduced themselves invariably, and indicate the beginning of a fit."

"For the rest, in order to supply here in few words all that can be added thereto touching the diverse causes of the passions, I will content myself by repeating the principle all that I have written is applied to; viz., know that there is such an understanding or harmony between our soul and body, that when we have once joined a certain bodily act to a certain thought one of the two never presents itself to us again without the other also, and that they are not always the same acts which are joined to the same thoughts:

for that suffices to account for all that each one can remark particularly in himself or others, touching this matter which has not been explained. And, for instance, it is easy to think that the strange aversions of some, who confess themselves to suffer from the odour of roses, or the presence of a cat, or like things, only comes to this, that at the beginning of their life they have been offended by some like objects, or that they have suffered with or through their mother, who being pregnant, has been so annoyed: for it is certain that there has been a relation between all the movements of the mother and those of the infant who is in her belly of such kind that what is contrary to the one is hurtful to the other. And the odour of roses may have caused a sore headache to an infant when it was as yet in the bassinette, or well may a cat have terrified it without anyone having taken notice or afterwards kept memory, although the idea of aversion which it had then for those roses or that cat remains imprinted on its brain even to the end of its life" (Descartes).

Cullen has known a pregnant woman who being obliged to maintain herself erect in order to try on a dress was taken with a vomiting to which she was subject. She admitted the party next day, and the vomiting returned. The same thing happened five or six days in succession: so that during the whole time of her pregnancy she was unable to put on the same dress without vomiting.

Observation XXXIX.

Repugnance to food consecutive to a fright during a repast—Paralysis Agitans.

Madame Ch. aged 44 years has never known of nervous maladies in her ascendants or collaterals, but she has always been easily emotional. She is the widow of a man who died of a pulmonary fluxion and had never had nervous troubles and was not a drinker. Nevertheless, she has lost three infants dead at a tender age of convulsions: there remained to her a girl of 19 years, married, who died eight months ago of puerperal eclampsia.

This unheard-of loss was announced to her in the middle of a meal. She experienced a very violent emotion and vomited all that she had eaten.

A few days after, there supervened a trembling limited to the right thumb, and at the end of some weeks the same movements were exhibited in the other hand. When she presents herself for consultation 9th February, 1885, she offers a trembling characteristic of paralysis agitans, ceasing in voluntary movements. She exhibits the classic symptom of ball rolling mainly on the right hand.

Since the emotion which has provoked the motor troubles Mdme. Ch. experiences an invincible repugnance for fried fish which previously was her favoured aliment. She cannot bear either to see or taste it or smell it. She avoids passing any restaurant where possibly she might either see or smell it. It has happened to her more than once to be taken with vomitings suddenly with extremely painful anxiety, in consequence of having felt this odour afar off in the street. The bare idea that she can be exposed to the odour of fried fish gives her a cold sweat with precordial anxiety, a sensation of suffocation, exaggeration of trembling.

When one had announced to her the death of her child, she lunched with fried fish, *du merlan*, but her morbid distaste extends itself to all fried fish. The odour of frying and the sight of other fried aliments do not produce the same effect upon her: she can eat fried beans.

Billod* has pointed out among the insane two associations which express themselves by subjective phenomena of the same kind: one patient refused to carry a chocolate coloured robe, because at the sight thereof she had feelings of nausea as if she had eaten chocolate: another patient pretended that blue coloured objects gave him colic.

It is certain that diverse morbid fears show themselves in several members of the same family. But, with man, these facts are not capable of proving the hereditary nature of morbid emotivity, because it is hardly possible to establish that the narration of these accidents has not provoked special associations in the young. Frequently the heredity of morbid fear appears proved by observations among animals.† Dr. Huggins has placed on record the history of an entire family of dogs affected by a morbid fear of butchers and butcheries, which manifested itself in an animal so possessed from the first time that it saw a butcher's shop before which it was impossible to make it pass.

The fear of acts, which might be contrasted with madness of acts, (action madness of Brierre de Boismont), can manifest itself equally well in relation to acts to be accomplished as apropos of accomplished acts.

OBSERVATION XL.

Systematic Emotivity—Fear of compromising oneself by writing.

M. D., aged 42 years, is accompanied by his father aged 70 years, who has never presented any nervous trouble except stuttering, which still affects him. His mother is 62 years and is well, but one of her brothers succumbed to a nervous malady, the outcome of a fear. M. D. has an elder sister,

* *De la lésion de l'association des idées* (*Ann. Méd. Psych.*, 3rd ser., t. iii., p. 540).

† Romanes. "Mental Evolution in Animals." 1884, p. 184.

mother of two infants, who are well. Himself had no neuropathic trouble when young, he has three children up to the present none of whom present any abnormality.

M. D. has always been of sombre character, but he frequented society with sufficient ease, until about seven or eight years ago, when he began to follow solitary habits, he did not go out nor see the world more than was required by his business. This modification of his kind of life was not associated with any other kind of trouble: he neither feared crowds nor spaces. Without being very rash, he journeyed at night by all modes. At the end of September, 1886, it happened to him, on the occasion of a walking tour to sign his name to a blank cheque. Although he had absolute confidence in the person with whom the contract was made, confidence which to-day even is not the subject of the slightest dubiety, and which, moreover, was never betrayed nor is likely to be, he fell into a state of anguish, which it was not possible for him to master. His doubts appeared to him so absurd that just at the moment when he could by a fortuitous circumstance at the end of a month, see in order the document which was an object to him, he could not muster courage to go and demand the verification. During all this time the fear of having compromised his interests imposed itself upon him in an irresistible manner: he felt that this fear which gave him acute anguish crises with palpitations was bad for him and he complained to his wife.

When he had been assured of the vanity of his suspicions he calmed himself and for some months he offered no further symptoms. Little by little it was observed that he had a great repugnance to write letters: the fact is he feared to compromise himself by writing and that frequently he remained for a long time preoccupied with what he had written; he re-read his letters several times, took them from their envelopes, was anxious when he had mailed them. The fear augmenting always, it happened to him to have crises of anxiety with precordial anguish, congestion of the face, sweat, so much so that he would not consent to write anything more, except when he was in presence of his father, of his mother or his wife, who could assure him he was running no risk. He satisfied himself that these fears were perfectly absurd, but he could not resist the anguish which they induced. For six months past, things have come to such a point with him, that he is incapable of writing even under certain supervision, and cannot bear to touch or see writing materials. When he sees in the street or elsewhere a morsel of paper he is seized with an anguish crisis, then discusses still a long time whether he might not have written something compromising on this paper. The fear of being compromised is always the predominant fact. Actually he could not go out or return home without one of three persons with him who have his confidence, in order that he may be sure of writing nothing. Frequently, in the redoublings of his fears, the person on whom he relies is obliged to keep in contact with him.

At the visit he was accompanied by his father and his wife. I asked him if he would not write a line on a piece of blank paper. His physiognomy assumed an expression of fright; the palms of his hands became immediately endued with perspiration. Nevertheless, he realised so well the absurdity of his fear that he approached my bureau, seated himself, then

after a hesitation seized a pen and sheet of paper, and asked me, in the attitude of a man who fulfils a duty not without pain, what it was that I wished him to write. I asked if he would reckon himself compromised by writing the forenames of his three children. He replied that certainly he could in no wise be so compromised, that he felt very keenly the ridiculousness of his strange hesitation, but that he was not sure of being able to write them. Nevertheless he quickly arranged his paper and pen and wrote the first name, then the second with a hesitation, then the third. He was covered with sweat, his heart beat with violence, his pulse numbered 140 per minute, he was in an extreme state of anxiety, his eyes did not leave the paper. When he came to speak it was to beseech that what he had written might be cut off and burned. He cut the strip of paper himself with care and burned it in the fireplace. When he raised himself, his person (figure) brightened and he felt solaced. But scarcely was he seated when, says he, "Do you think that I have any call to fear that I may become mad?"

Baillarger has recorded an analogous case in which the fear of everything which could serve to write with had begun by an uneasiness in regard of orthographic errors.

The fear of certain acts reposes sometimes on the false representation which the patient has made of them relatively to the danger which they might otherwise involve. Morel has cited the case of a father who dared not embrace his child for fear of choking it. It is possible that an emotivity of this kind reposes on a trouble of sensation of movement of the muscular sense.

The scruples, morbid remorse, present themselves in general under the form of hesitating emotivity in which the patients live in the fear of an unfortunate eventuality, of a responsibility, of some inconvenience. The patients are incessantly oppressed by the fear of having done evil, of being on the point of running, or being made to run some risk: such as a fear of being wrong in their accounts, of being wrong in the future, and of bringing prejudice on themselves or others: or such as having committed a mistake in correspondence, in an address of a letter, of having said injurious things to one, of having hurt or being in danger of hurting someone. The religious, or conjugal, etc., duties figure very often in this form of morbid emotivity.*

The Jesuit Lefebure† thus describes religious scruples of which he recognised truly the morbid character: "In this unhappy state, and which ought frequently to end in fits of intermittent madness,

* The religious author of a "Treatise upon Scruples" (2nd ed. 1718) relates amongst the conditions of reproduction, feebleness of mind, smallness of mind, confused mind, an ill-regulated imagination.

† *De la folie en la matière de réligion*, in 8vo, 1866, p. 225.

a poor Christian is not able to distinguish between the temptation and the sin: sometimes even he cannot even discern any more between what is good and what is evil, what is allowed and what is forbidden. He becomes frightened at the sight of what he regards as a duty, a holy obligation, and he never believes he has satisfied the law of God or the precepts of the Church. They are the poor '*scrupuleux*,' who repeat all their prayers, who make ten or twenty signs of the cross at the commencement and at the end of their meals: the meal they never believe to have done them any good, they return it and make more evil still, without speaking ridiculous 'gestes' and a thousand grimaces, which make them recognised at once. They bow the head violently with the sign of resistance, or perhaps they hang it with affectation. All those who see these bizarre manners and this agitation cannot fail to believe that they are mad: they do not deceive themselves entirely, for there are signs of mental alienation at times; and, I do not fear to say it, if these poor ailing 'scrupuleux' (malades de scruples) do not take the strongest resolutions to do all their doctor says and prescribes exactly, that is to say, the father of their soul (le père de leur âme), they will not be long delayed in becoming really mad, in losing their reason entirely, as that is unhappily proven by experience, and as I have myself seen several times.

"In fact, from scruples the mind (l'esprit) passes very easily and almost imperceptibly into illusion even, and the habitual state of illusion is one veritable madness."

OBSERVATION XLI.

Conjugal Scruples—Morbid Remorse.

Madame B., 33 years of age, whose father appears to have died of progressive general paralysis, has a sister *hystérique à grands attaques*. She herself has always had very good health up to the age of 31 years. Two months after the birth of her last infant she had a fall from a ladder, which caused a small wound on the front part of the left leg. This wound was the point of departure of an erysipelas which entailed suppression of the lacteal secretion. Subsequent to this erysipelas she had malnutrition and wasted. In less than a month she lost 8 lbs. weight. It was then July, 1883; she left for the seaside. A few days after her arrival she met on the shore a gentleman who looked like a cousin of her husband. She was much struck by this resemblance, and became possessed by the memory of her cousin. She sought for the meaning of this obsession. She remembered in her reverie certain forehappenings which had not previously struck her: she remembered that one day they had passed through a tunnel together in complete darkness, the

wagon not being lighted. This event took her back to the time of the conception of her last infant: her husband was not the father of her infant. Being unable to support this situation she wrote to her husband telling him her remorse, how she was overcome suddenly, recounting the circumstances of her default, and proposing to leave him. The husband was much surprised, but could not have doubt for an instant: he had never quitted his wife except to go on a sea voyage: the journey by rail, where he was placed between his wife and his cousin, had taken place when his wife was already advanced six months in pregnancy. He believed his wife to be mad, and went to her at once. He found her in tears, and submitting herself to his discretion. He had great trouble to demonstrate the exactness of his proper memory, and the absurdity of her remorse. He brought her home, where she resumed her ordinary ways: but her nutrition remained defective, in spite of the pains taken to aliment her. At the end of some days Mme. B. commenced to ask her husband about all the men who came to the house: she did not fail to ask her husband if they had ever remained alone with her. When her husband was not there to reassure her, she entered into a state of extreme agitation, which ended frequently in a fit of weeping. She then had remorse, and then it did not suffice only to give a simple affirmation, a regular demonstration was necessary. In the early days, when Madame B. had been reassured about a given person, she spoke no more of it, and it was only another man who could awaken new scruples. But gradually the success of the demonstrations became ephemeral, every time that she avoided a man whom she recognised, although she had been already reassured several times in the day, à son endroit, it was needful to commence again: and besides she could not any longer sleep at night without scruples appearing. Madame B. could not recover her repose until she quitted the town where she lived along with her husband, and was able to isolate herself absolutely from people whom she knew. She was at Paris for six days before having experienced anything, and without wishing to consult a doctor, ashamed of her suspicions which she found perfectly ridiculous. Moreover, she had not encountered anyone but persons whom she had not seen since a period anterior to her marriage. She did not occasion suspicion of any mental trouble. On February 12th, 1888, I was able to see her unexpectedly, and she allowed examination with good grace.

Madame B. is very thin and pale, her lips and eyelids are discoloured, she is breathless upon the least effort, and the least emotion provokes in her palpitations, anemic souffle. She complains not of any pain except sometimes a sensation of intrathoracic weight, subscapular. No point painful to pressure. No troubles of general or special sensibility, no hysterical stigmata. Besides the suspicions, of which she has perfect consciousness, she has no mental trouble, her memory is perfect, her affective sentiments appear intact. In short, when she is in the house and not possessed by suspicions she gives all her time and pains to her husband, to her infants, and to the management of her house, which she governs with firmness and perfect order: she exhibits no trace of neurasthenic indecision. She relates how her suspicions arose by a feeling of vague uneasiness at the sight of a man, she sought to reassure herself as to the impossibility of contact, but, frequently, her ideas became confused, she experienced a feeling of shame which dominated her

and brought anguish. The memory of an individual provoked by any circumstance, suffices, for some months, alone, when she has nocturnal crises. In general these representations only arrive to provoke anguish when they occur during the day. When she left her town these memories had no effect either night or day.

The conditions in which these suspicions were apparent indicate the necessity for an organic restoration, which could only be undertaken in the house of the patient, as the presence of the husband was indispensable. It was arranged that she should be entirely isolated in her house under the care of two religieuses, who would never leave her chamber, and that she should see no one except her husband who was to be called whenever the suspicions came back. Madame B. was to be submitted to the Weir Mitchell treatment, to which was added inhalations of oxygen (30 litres twice daily before the two principal meals). This régime was rigorously followed. Madame B. having accepted the idea that she would be cured by encouragement and sharpened by desire to return to her infants, herself exercised her ingenuity to find the most suitable aliments. During the first few days the noises of the house and the street, the objects which surrounded her, provoked certain crises which called for the intervention of the husband, but gradually these became seldom and less. The physical effects of the treatment were, moreover, rapid. The treatment had been commenced on February 17th when she weighed 52 kilogrammes. On the 28th she weighed 54 kilogrammes 200. On March 10th 57 kilogrammes. Since March 2nd the assistance of her husband had not been called for to overcome her suspicions. On the 12th she began to rise for two hours, and to receive her children in her chamber without any recrudescence. March 25th, weight 59 kilogrammes. Madame B. has then commenced to leave her room, and take charge of her house, but without any communication with the exterior; she says her troubles are no longer reproduced since the 16th. Isolation has been continued up to April 30th. Madame B. has again gained 2 kilogrammes. She went out with hesitation for some days, but the sight of a man did not reproduce suspicions. The cousin whom she saw again two months later was also wholly inoffensive. In 1889 Madame B. had a pleasant confinement, which was not followed by any trouble.

Observation XLII.

Scruples Relative to the Suspicion of Sexual Morality.

Madame V., 28 years, is the subject of ichthyosis, very marked, especially on the limbs,* and which is hereditary in the family: her mother and her maternal grandmother were attacked with it: she has two aunts subject to it, and one sister also. The mother and one of the aunts were attacked by chorea. The father died of accidental injuries, and nothing precise is known regarding the paternal heredity.

She has always been nervous, irritable, emotional, but she has never had any defined illness. She has been married since her 23rd year, and she was arrived at her third accouchement when she began to experience her first

* Ichthyosis, which several authors regard as an anomaly of development, appears bound to the neuropathic family: it may, moreover, form part of the trophic troubles of general paralysis, as I have cited an example thereof. (*Nouveau Iconographie de la Salpêtrière*, t. ii. 1889, p. 156.)

mental troubles. Madame V. lives in a western city, where her husband is a merchant, and her house is very near a street where are gathered together the principal houses of prostitution. Just up to the period of her confinement she did not bother herself about this proximity. One evening on returning home she saw a man who suddenly left a girl and followed her right up to the door of her house. The man had not sought to attract her attention: she did not think anything more about it. She had been fatigued by several attacks of diarrhœa during two weeks so that she did not suckle her infant, and she slept badly, but followed her avocations, complained none, and had not wasted strikingly. It was only on the third night which followed the encounter with the man that the memory of him returned to her when she was agitated during sleeplessness. After having dwelt upon this rencontre for a long time, it came to her to think that perhaps her dress or her toilette might have left a doubt to the man, which was put at rest only because she entered into her house. Dating from this moment she began to search for everything in her toilet or dress which could attract attention to her, and make her resemble 'une fille.' After some weeks these scruples presented a curious extension. She imagined that she might be compromised by the neighbourhood of the girls: it resulted therefrom that she could not go out alone any more, nor return home by the end of the street which touched on the ill-famed street, making considerable detours in order to return by the other side. Then she feared contact with women of light morals: when she met or encountered in the street a woman in eccentric guise, she feared this woman was not honest, and that people believed that she had relations with her: she had sometimes need to be reassured of the morality of those who provoked her doubts. When she was in a public place, in an omnibus with other females, she was tormented by a doubt of their morality: but if she could see their nuptial ring she was assured: she sought to recognise its presence through the gloves. When she was in company of persons whom she knew, if her husband had previously assured her as to the entire correctness of her toilet, she presented no further mental concern. In her house she was gaily affectionate, occupying herself actively. Alone, her scruples reproduced themselves rapidly, especially at night. The insomnia persisting the husband finally became uneasy and brought her to Paris, where she was immediately placed in a hydropathic: it was then just eight months after her trouble began. She was pale and anemic, but had not grown thin. The change of environment quickly brought about a lessening of the personal scruples: but the fear of compromising contacts persisted. Madame V. briskly crossed the street in order to avoid meeting a woman about whom she was dubious, who was advancing on the same pavement; she continued to scrutinise the hands of persons near whom she travelled in the omnibus, and she was obliged to descend several times when her doubts became accentuated. The personal scruples disappeared at the end of about

2½ months, but the doubts relative to other women, which, however, seemed to be grafted upon the scruples, have persisted much longer. They had, nevertheless, completely disappeared when she returned home after five months' absence. She had been treated uniformly by cold douches, iron, and arsenic. At the time of her departure she had regained her colour, but had not increased in weight.

We find again in the facts which precede the main characteristics of doubt madness, a vague emotivity to commence with, then fits of anxiety, the necessity of an outside assurance which at first satisfies the patient; then gradually the number of persons capable of a reassuring function narrows itself; then at last nothing any more can prevail against the emotivity, which exasperates itself.

When the attention has been for a long time concentrated on the quality of the act, it happens that the patient comes to doubt and to deny that he has executed it, there is induced a kind of exhaustion of the image. More often the idea transforms itself into subjective sensation, into veritable hallucination.

I have several times observed in hysterical females scruples relative to the satisfaction of natural needs, to the action of chewing, eating, micturition, defæcation, which have all come to be regarded as revolting acts, which must be dissembled like crimes. These Physiophobias have been provoked by accidental circumstances: an hysteric sees, in passing along the Boulevards, a soup-purveying establishment, full of consumers. She becomes arrested mechanically to look on, suddenly she remarks quite loudly that all these people eat improperly. Returned home to dine it appears to her that everyone eats after a disgusting fashion, that one ought not to eat in presence of anyone: and from that moment she refuses, in fact, to eat otherwise than alone in her chamber. At the time when she has become the victim of this mental trouble, this patient came to the end of a prolonged lactation: she was not cured till after eight months restorative treatment.

Another refuses every kind of aliment because she is followed by the fear that they might provoke a vomiting, and she affirms that she would not survive the shame that would result to her therefrom. The same imagines extraordinary stratagems in order to dissemble her evacuations. If the scruples, the morbid remorses, remain often isolated, it is not always thus: they may be the pre-

lude to a state of melancholy. It is a fact which has already been noted by Reid.

J. Falret has described under the head of moral hypochondria, a state more frequently described since under the name of melancholy with conscience (or conscientious melancholy), in which the patient is dominated by a vague inquietude, sinister presentiments, believing herself and family always under the shadow of a catastrophe. These patients attacked by diffuse terrors, by Panophobia (Sauvages), have the aspect of anxious melancholics, although they have no delirium, and although they recognise the vanity of their fears.

CHAPTER XV.

Morbid Emotivity *(continued)*.

Summary—Morbid Love—L'amour Synecdochique—Influence of the Tactile, Auditive, Olfactive, Visual Sensations—Satyriasis, Nymphomania—Inversion of the Genital Sense—Nymphomania Paradoxical—Masochisme, Algophily — Obsessions — Onotomania—Impulsions—Dipsomania—Sitéomania—Kleptomania—Homicidal Impulsions—Aboulia—Precocity.

They are not the painful emotions only which can be recalled by an outward impression which has been once associated with them. The same fact can be put in evidence in other forms of morbid emotivity, and especially in diverse forms of morbid love. But in these cases still, the congenital or pathological predisposition is the basis: morbid love, in fact, is often associated to other forms of morbid emotivity, and even to anatomical peculiarities. The exceptions are rare in which the morbid emotivity under a certain form coincides with a perfect state of health.

Morbid love manifests itself under two main forms, the ideal and the sensual. In the ideal, the emotion can consist in a conjugal tendency without mixture of sensual ideas and without reaction (gamomania): or in a desire for moral possession, personal or impersonal, of a member of the other sex. (Erotomania, Esquirol.)

These diverse specialisations of morbid love are perhaps susceptible of a general explanation.

In the rhetorical figure named synecdoche one names a part to designate a whole: a sail for a ship. There exists a morbid form of love in which the emotivity is set in action by a part of the body or a garment, by a moral or intellectual quality, by an act, and takes the name of synecdochic love. This love evoked by a single peculiarity, is rarely satisfied by this peculiarity alone. A lover of this kind associates to a peculiarity an entire series of qualities, which, for him, constitute perfection, and when he does find the speciality which he wants he expects that the other qualities which he associates in his ideal will come to join themselves to it. It

results from that that the object of his flame becomes his victim: he cannot abandon her pursuit, because he is attached to her by a special bond, but he never pardons her for the lack of the other qualities which make part of the ideal conception.

OBSERVATION XLIII.

Neuropathic Heredity—Synecdochic Love.

M. D., 45 years of age, I have had occasion to see regarding fits of false angina of the lung provoked by excess in use of tobacco. He is of an arthritic and nervous family, his father was asthmatic, a paternal uncle was melancholic, his mother has had syncopal attacks, a maternal aunt is diabetic. He has two brothers, one died of paraplegia at 32 years: the other, crack-brained, died of fever in Cochin China, where he was sent to repair his fortune at 28 years.

M. D. does not appear to have had nervous troubles in his infancy: he appears regularly constituted. Towards the age of 14 years he commenced to have what he himself called bizarre ideas. Endowed generally with a firm will, he was capable of application in certain directions, he has had success at college in geography and history, but in respect of other sciences he was incapable even of an attempt. He has not altered since, and if he has been capable of bringing several enterprises to a successful issue, il T'est attiré d'étranges déboires. The first bizarre idea which struck him at college was the impossibility of putting himself to certain studies, especially languages, and encouragement and punishment were alike of no avail: he was able to apprehend mathematics, geometry, but neither ancient nor modern languages could find a place in his mind, even on the level of an elementary notion. When he agitated himself with studies, it was an absolute incapacity which checked him, the incapacity of the initiative. Besides he had doubts, scruples, which surprised him, he was haunted by the fear of having broken or spoilt something: and made frequently motiveless excuses to his comrades. But that which had affected him in the highest degree was the impossibility of bearing the possession of a certain denomination of money—a two franc piece to wit: if anyone gave him such a coin he had no peace before obtaining change for it.

His studies, directed exclusively towards commerce by reason of this disposition of mind, once ended, he was taken by his father at the age of 18 years on a voyage to America. The voyage had the most beneficial effect upon his mind, all his intellectual bizarreries disappearing. In two years he learnt sufficient to be able to speak three languages: English, Spanish, and German. Up to the age of 26 years most of his time was spent voyaging in Europe and America. A brilliant future opened itself up before him, when all at once his life changed. Without abandoning affairs, he renounced brusquely voyages from which he expected the greatest advantages, and he took it into his head to exploit agriculture. He became seized of a strange passion.

He went one day into the country to visit one of his relations whose infants were reared under the direction of a governess who had been with them for eight years. This girl was 32 years old, she was tall but thin, and without any physical excellence, her voice was hard, and her lines little

agreeable; she fulfilled her functions with regularity and devotion on occasion, but was inanimate and taciturn: she never did anything to attract the attention of anyone, and she appeared resigned to her lot, if not satisfied. She knew no other family except one sister who was in easy circumstances. She never showed any desire to change her situation. Further M.D. himself recognised that she had done nothing to attract his attention.

During his visit to his relative, one of the infants injured himself by getting his finger caught in a door lintel. There was a profuse flow of blood. The dressing was effected in the most simple way in the world by Mademoiselle B. This act so simple was for D. a thunderclap, he remained the prey of a constant obsession: this simplicity could only be the act of a high-toned soul. Dating from this moment M. D. had no repose till he had found means to establish himself in the neighbourhood. He would have, it would now appear, undertaken any business, no matter how opposed to his tastes, in order to be near her whom he loved, as he thought, madly: and the result proved that he was right at least so far as the latter is concerned.

M. D. made of the woman an indivisible ideal: all the qualities which he had associated in his mind came to be inseparable. He thought he perceived in Mdlle. B. certain faults—it was only his own faulty observation—such faults could not exist. Mdlle. B. accepted his overtures badly, but he was not discouraged: all his intellectual activity was directed towards this end: it eventuated that, at the end of two years, she agreed to marry him. The satisfaction he experienced was such as one experiences on the completion of an enterprise painfully pursued: he had been conqueror in a struggle, but he was not satisfied. From the morrow of the marriage he must have established the fact that his wife did not possess all the qualities which he had grouped in his scheme. He experienced a sentiment of revolt. He ventured to constrain his wife to conduct herself as if she had possessed all the sentiments which he had thought in her. This was an hourly struggle to which she could only resist. At the end of five months she quitted the conjugal domicile: a friendly separation has been brought about, and the spouses will never see one another again.

M. D. understands all the absurdity of his conduct: and he attributes to himself all the torments which he has experienced since, as a just consequence. He declares that he loves his wife always, and that he has done materially everything that he possibly could do for her: but that he could not have conducted himself otherwise than he had done; he could not tolerate that she could not experience such a sentiment under such a circumstance; a sentiment which he had associated with others which they experienced really, and which had determined his affection.

In sensual love (cythéromania, gynomania, andromania, satyriasis, nymphomania) one can find the same phenomenon of psychological synecdoche.

If we put on one side erotomania which forms a separate group, love presents itself with characters of a morbid emotivity, under very diverse forms, of which one can make a classification based on the functional anomalies of the special excitabilities of the

different senses, and in particular, vision, touch, odour, and audition.

The emotion of love can be provoked by a special morbid sensibility of touch. The following appears to be a very exact illustration of this:—

OBSERVATION XLIV.

Cranial Injury—Morbid Emotivity—Ultimate Mental Alienation.

"A pupil of Salpetrière, of whose heredity I have no precise knowledge, but who had suffered in his infancy a cranial injury which had left a deep cicatrix, and had been followed by an intellectual obtuseness which lasted some months, indicated to me one day a singular emotion which he came to experience. There was in the ward so-called St. Alexander an old chronic rheumatic female with considerable deformities of hands and feet, and who was incapable of awakening, even in a vigorous young man (which even was not the case), any æsthetic sentiments. This woman had an atrophy of the skin which gave to the skin, of the hands mainly, an extreme softness, a velvety consistence, which is not rare with invalids of this kind completely reduced to inaction. The simple contact of these hands provoked erection in this young man: several times he had, not without astonishment repeated the experience, and the advice which he made me was provoked by the following circumstance. Under the influence of the prolonged contact he induced upon himself an ejaculation with all its emotional belonging. This young man had hardly taken his degree when he had to be sequestered for an attack of acute melancholia: and he died in an asylum several years ago."

This form of tactile emotivity, which is, in fact, only a variety of tactile delirium, holds an important place in the morbid emotivity which makes certain individuals finger women's hair, or certain objects of their toilet, cut locks of hair, to steal their handkerchiefs in crowds.

The sense of odour has very varied relations with the genetic functions. A great number of animals are provided with glands whose special secretion produces at the times of rut a very intense odour, whose specific action is very clear. If it is frequently the male who furnishes the most penetrating secretions, the females are none the less provided with it, and we know the *rôle* scent plays in the sexual hunt in most domestic animals themselves. A great number of physiologists, and especially Tiedemann, have noted that these odours are more intense at the moment of rut. The odour of the products of animal secretion is not without effect in man. Musk especially plays in many individuals very efficiently the *rôle* of a genetic excitant. Among some, odours of vegetable origin induce analogous effects; a lady, cited by Mantegazza, said, "I feel

so much pleasure in smelling a flower that it appears to me I commit a sin." It is not, moreover, without interest to note that whatever may be the odour which provokes a sensation of agreeable kind, the mimetic movements of the nose and the upper lip especially recall those which accompany genetic excitation.

If the excitations of odour are retained easily by the genital sense, inversely, excitations of the genital organs are capable of being retained on the organ of olfaction: excitations of the genital organs are capable of provoking analogous phenomena to those which are normally products of the direct excitation of the olfactory mucous membrane; we have seen epistaxis, fits of sneezing produced in consequence of physiological activity or pathological lesions of the genital organs. Romberg cites the case of a young man who sneezed every time he had an erotic idea. Mackenzie has obtained a passing rheum, or permanent inflammatory lesions as the result of venereal excesses.

We may admit now that excitations of the genital sense, or of the olfactive, are capable of provoking identical general effects; and consequently a like emotion; there is induced an equivalence of excitations comparable to that which produces itself in coloured audition, and which does not necessitate an inevitable association. The influence of odoriferous excitations on the genetic function ought to be reckoned as normal, and by so much a stronger reason the odours of the human body. But, in certain individuals the *rôle* of the odour becomes very predominant to such a point that in the absence of the excitations of this sense the genetic activity is nil, or the excitations of odour determine irresistible impulsions. This olfactive emotivity explains momentary or definitive mesalliances, which one is astonished to see men of an elevated culture make, but who are in reality off the equilibrium. It enables comprehension of how one may sing Elvira and the Lake, and not disdain the tavern girls. "There are persons so blind in their concupiscence that they love not less Hecuba than Helen, or Thersites than Achilles."

The excitation is not provoked only by the odour of the secretions annexed to the organs of generation, but by the cutaneous secretions in general and sometimes by a local secretion. These elective sensibilities are at the foundation of pathology.

OBSERVATION XLV.

"Twenty years ago I had occasion frequently to hunt with a man already aged near 60 years, of robust health, without apparent defects, and whose family, nearly all of whom I knew, did not present any gross neuropathic faults. This man had the habit of teasing girls or women, sometimes even very old, in a fashion which surprised me very much. He only attacked women who worked in the fields, in chemise and bare arms and he approached them so as he would come to put his hand into their armpit. When he had attained his end, which his victims did not seem at all to understand, he went away satisfied with himself, but for a long time he carried his contaminated hand to his nose with an evident expression of pleasure. After great hesitation I finally asked him for an explanation which he gave me as the most natural thing in the world: 'It is an odour which revives me, which makes me get over the ground:' and he told me that when he was younger the women who had a strong odorous secretion were capable of making him do extraordinary things, and that in these last years it was they only who could obtain anything from him. He pretended to be able to recognise continents, and the most auspicious moment *pour l'attaque à fond*, through nothing else than the qualities of the odour. Being an infant he loved this odour without knowing why. All his life coryza accompanied in him a persistent genital excitation."

I will compare to this observation the following fact which appears to show that the exciting action of the odours of the body is not necessarily bound to the association of a sexual emotion. Some years ago I lived opposite a laundry where the women worked often in midsummer in scant vestments and with bare arms. An aged woman who had her post opposite the window struck me all at once by reason of the memory of my hunting companion. Very often, and especially towards the end of the day, when the gesture was not five minutes without reproducing itself, she introduced her right hand into her armpit under her arm then lifted it to her nose to take a sniff. Evidently this manœuvre could only have for an end an agreeable excitation, and the opposite sex could have nothing to do with it. Moreover I learn from one of my colleagues, who has frequently occasion to visit workshops where men and women work in an appropriate garb, that this gesture is not uncommon, and that it is common to both sexes.

The exciting action of the perfumes in general from the genetic point of view has not escaped philosophers.

"The sweet perfume of a toilet shop," says Jean Jacques Rousseau, "is not so feeble a decoy as one thinks: and I do not know whether to felicitate or condole with the man, wise but little sensible, whom

the odours of the flowers which his mistress wears at her bosom, could not make palpitate."

The most active perfumes are those which come nearest to the odour of the sexual secretions or which derive therefrom, like musk.

The odour of the cutaneous secretions vary much according to the individuals, the red have often a most penetrating odour. These differences are not without influence on the elective emotivity. This is a fact which has been noted from all time. "Alexander was loved by the ladies more than others, princes, because his sweat was more odouriferous."

The thunder clap can have the effect of an olfactory impression: "In 1572 was celebrated the marriage of the King of Navarre with Margaret of Valois, at the Louvre, and that of the Prince of Condé with Mary of Clèves, endowed (says l'Etoile, Journal de Henry III., au 1574), with singular beauty and goodness, and aged 16 only. After having danced a long time, and finding herself somewhat incommoded by the heat of the ball, this princess passed into a cloak room where one of the chambermaids of the Queen Mother caused her to change her chemise. She was about to issue when the Duc d'Anjou (Henri III.) entered there in order to brush his hair, and by mistake wiped his face with the chemise she came to leave. From that moment the prince conceived for her the most violent passion."

We have remarked the special repugnance of the impotent for sexual odours.

A special sensibility of hearing is of itself capable of evoking love. M. A. Dumas has observed a most interesting case* thereof. It is certain that some individuals are particularly sensitive to such or such a timbre of voice, to such and such an accent even, but there exists no regular observation, to my relative knowledge, of a genital excitation manifesting itself sharply by objective characters sufficiently exact to be considered as morbid under the sole influence of the sound of the human voice or of a musical instrument. The genetic excitations which could accompany the æsthetic emotions provoked by music result from conditions so complex that it is impossible to disentangle the value of such a sound or such a timbre in particular.

* Binet. *Etudes de psychologie expérimentale*, 1888, p. 30

Certain pathological conditions, however, momentarily put in evidence a passing auditive emotivity. When I was an interne at the Hôpital du Midi I observed a young man suffering from an acute blennorrhagia who complained much of having a painful erection recrudescent every time that he heard the voice, very agreeable at all times, across the door, of the superintendent of the linen whom he could not see. This effect disappeared when the acute stage of the ailment had passed.

This fact has nothing in it to cause surprise.

We have observed often enough sexual perversions bound to irritative lesions of the genital organs and especially of their teguments.

Gout, which itself participates in the orgies of luxury madness, can now also be subject to functional anomalies which entail morbid emotivity. Peyer has observed enfeeblement of the gustative sensations and perversion of taste in sexual neurasthenia.

But it is undoubtedly vision which plays the greatest *rôle* in the determination of the morbid emotivities relative to love. Diverse forms of erotomania are in direct relation with a special impressionability of the sense of sight: M. Ball has observed a patient who was moved exclusively by the eyes. M. Binet cites another of the same whose emotivity was especially excited by the sight of the hands.

The circumstances which have coincided with the first emotions of a sexual kind can become later a condition *sine quâ non* of their renewal. Howe cites an individual who, having had, at first, relations with a woman who was entirely dressed, was become impotent under any other circumstance.

OBSERVATION XLVI.

Morbid Emotivity—Love of Red Women.

M. B., a diabetic, aged 60 years, is an hereditary neuropathic. He presents several anatomical anomalies, and has been migrainous for 30 years. His peculiarity consists in the fact that every time he meets in the street or elsewhere, a red woman, he seeks to come near her, and pushes the adventure to its end, if the circumstances allow of that; be the woman beautiful or plain, young or old, elegant or ill-mannered, matters little. It has come to him often to give way to these pursuits, which he judges at their value, even in the neighbourhood of his residence: meeting with his own wife he contrives a subterfuge for the continuance of the expedition. The impulsion produces itself even when the object is at a considerable

distance. It is difficult to believe that odour contributes to the determinations. M. B. has perfect consciousness of the inconvenience of these tramps: he has had, moreover, several times occasion to bear the material and moral consequences, but it is impossible for him to resist equally since his genital organs have become enfeebled by age and disease, as previously when he was full of vigour. It is a red woman who will have his last caress. M. B. explains his special emotivity by this circumstance, that the first woman he had loved and possessed at the age of 18 years was a red woman.

Satyriasis, known to Coelius Aurelianus and Aretæus, and Nymphomania constitute forms of morbid emotivity which coincide generally with a certain degree of sexual excitation, and they are not special to man. It can happen that the genital organs may be affected with anatomical or functional anomalies such that the satisfaction of desire will be incomplete or even altogether impossible.

The inversion of the genital sense, contrary sexual sense, characterised by an invisible attraction towards an individual of the same sex with or without satisfaction of the desire appears to be able to coincide with an intelligence sufficiently developed and isolated from every other gross moral anomaly, but more frequently it is kin to other emotional perversions.

The inverted is characterised by absence of longing, and even frequently by a feeling of repulsion for individuals of the other sex, in general without anatomical anomaly of the genital organs. The character and conduct, the habits, are in keeping with the sexual sentiments. The physiognomy, voice, external habit, have sometimes undergone a parallel modification. Morbid emotivity can besides manifest itself under the platonic form or under the sensual form. Krafft-Ebing, who has made a special study of these morbid emotional anomalies divides them into three groups which he forms under names sufficiently indicative; viz., psychical hermaphroditism, homo-sexual instinct: effeminacy or virginity.

Lombroso has described under the name of paradoxical nymphomania, a case of morbid emotivity in an hérèditaire: and which consists in an ardent desire for venereal pleasures without being able to realise physically all that she conceives in imagination.

A good number of women at the time of the menopause, and after this crisis, experience this supplice de tantalus: *elles épuisent et rebutent les partenaires les plus décidés.*

Certain perversions of genital emotivity, like those of the sanguinaries (Ball), necrophiles, or vampires, can only explain themselves by excitation provoked by painful emotion.

We have seen that on the physiological level moderate pain can play the *rôle* of an excitant. In certain individuals painful excitations become a necessity: pain becomes a condition necessary to the perception of certain sensations, and especially genetic sensations. Special sensibility is so defective in these individuals that sensation is only possible when the nervous system is prepared for it by an extreme tension. Physical pain can have its place taken by a painful emotion to a feeble degree, as that which results from the danger of being surprised. Certain persons, entirely impotent under all other circumstances, recover their virility, for instance, when they put it to proof in a public place; others find an agreeable excitation by the exhibition of their genital organs (exhibitionistes).

There is described under the term masochisme from the name of the romancer Sacher Masoch, who has put in view persons attacked with this anomaly, an affection of emotivity consisting in the research for painful manœuvres practised upon them by members of the other sex in order to provoke satisfaction of their venereal appetites. The physiological act is not even attempted; there is brought about, in fact, a sort of sexual algophily: these individuals find no pleasure except in painful or shameful acts: they make themselves fonetter, pincer, frapper, pietiner by the object of their passion, lui lechent les pieds, etc. Hammond reports the case of a person ordinarily of exemplary morality and a good father, who from time to time went to a house of ill fame, undressed himself to his belt, saving his pants and boots, and se faisait piétiner lapoitrine by three girls copiously.

The ancients had already noted the influence of pain in certain regions upon the genetic functions, and especially hot applications or caustics to the lumbar region. This influence is admitted by a great number of authors. Acton recommends *not* beating infants on the buttocks for fear of exciting them: but, happily, the danger only exists when the infants are endowed with the morbid emotivity of Jean Jacques Rousseau.

The acts of these individuals repeat themselves so much the more frequently as their morbid emotivity remains quick and their nervous system fails to experience its physiological discharges. "Desires are ideal states of consciousness, which spring into being when the states of actual consciousness have not been experienced for some time." Amongst the abnormal the states of real consciousness are never experienced in their plenitude.

This algophily can be explained by the circumstance that the habit of the excitations ends by necessitating excessive excitations. The authors of the Compendium of Medicine cite the case of a prostitute who experienced an exquisite pleasure when she had some vegetations of the vulva cut.

Algophily manifests itself more in the manœuvres of religious sects who provoke by physical pain a sort of nervous exhaustion leading on to ecstasy. The flaggellants, the Aissiona, may serve as examples.

Excitations which awaken in normal individuals the representation of a pain, do not provoke pain in the abnormal. These facts do not serve to support the opinion of Mantegazza that there are agreeable pains: defloration, which this author cites as an example, is a pain supported by a necessity; but when it is accompanied by a frank expression of joy it can only be by reason of emotional association.

These diverse forms of morbid emotivity can explain themselves by the dissolution of the complex sentiment of love and its expression towards automatism. "Love is nothing else than the thirst for this joy in a desired subject, nor Venus anything else than the pleasure of discharging its vessels" (Montaigne). Among individuals whose representations are few and associations rare the desire associates itself easily to the first external circumstance which has accompanied the pleasure, and this association fixes itself by repetition of the act. These anomalies of the love sentiment, the inversions of the sexual sense, can hardly be comprehended in the state of isolation: the difficulty of discovering intellectual troubles has allowed their denial: but one has not proved that an individual is of sane mind absolutely when one has said that he is capable of fulfilling his important functions, of being a professor, etc.

One of the facts best adapted to show that sexual inversions are not bound to an accidental circumstance which has been able to determine a vicious emotional association is that of Mary Goetlich, an hermaphrodite, who after having shown a very great distaste for commerce with men, passed, by the fact of the descent of the testicles, to tastes entirely opposed, and in relation with her true sex. This hermaphroditic fault furnishes an experimental demonstration in some sort of the organic basis of psychic modification.

Changes of environment can occasion considerable changes in the affective conditions. We know that a great number of animals before reproducing themselves, or when they have given birth to little ones, destroy them. This instinctive perversion, which is found in man, cannot be attributed to heredity. The instinctive perversions resulting from a morbid emotivity can be created by an accidental trouble in the satisfaction of normal desires. The perversion of the genetic sense manifests itself frequently in individuals who have made venereal excesses, and especially who have sought to multiply the variety of its pleasures. These modifications of instinct can be found again with animals in different but analogous conditions. Darwin has left in his manuscript notes the following fact: "We have a young cat which still suckles from its mother: when it was a month old, it was conveyed from X to Y, where it suckled from another cat, then to Z, where it suckled from two others; this crossed its instinct, for it essayed several times to suckle three or four other young cats of its own age, which none, that I know, ever did to another young cat."

Romanes cites the following fact: "A white fan-tailed pigeon lived with her family in the pigeonry attached to the Court of Equity. She and her family came from Sussex: they had lived much admired and respected by everyone, in order to see their last young ones, when all at once it became the subject of the madness which I proceed to relate.

"We remarked no eccentricity on its part up to the day it happened that I threw something into the garden, a little beer jug greyish brown like all the jugs. I threw it into the court and it fell on the pigeonry. Immediately the pigeon flew to the ground, and, to my astonishment, commenced a series of genuflexions, evidently rendering worship to the jug. It turned and

returned round about: making courtesies, advancing and receding, coo-cooing and effecting the most ridiculous ceremonies that I have ever seen effected by an enamoured pigeon. It did not cease until the jug had been withdrawn; and what demonstrated that this singular aberration of instinct had become a fixed idea, every time that the jug was thrown or placed in the court, whether lying or standing mattered little, the pigeon arrived in flight. This would last for hours, the other members of her family regarding her manœuvres with contemptuous indifference, and paying no attention to the jug."

The love of approbation presents itself often under morbid forms, and expresses itself sometimes by an unhappy prodigality, by the most diverse eccentricities for which the individual has no direct propensity. These propensities find themselves favoured by this circumstance that the desire of approbation attracts approbation with so much the more intensity that the desire objectifies itself better by the attitude: every visitor to an asylum placed in presence of a satisfied general paralytic or of a megalomaniac persecuté adjusted himself instinctively by a compliment adapted to his attitude. The desire of the praise attracts the praise which directs itself instinctively to the sensitive point.

The need of sympathy which is extremely developed in hysterios, is not peculiar to them: when it is developed to a pathological degree, it is also the point of departure of strange perversions of conduct.

The luxury of pity which holds an important place amongst the altruistic sentiments presents itself very often under a morbid form. It does not apply itself only to the most interesting forms of calamities which can assail man, but also to the least worthy victims. It is not rare to see it seeking the beasts.

In opposition to morbid zoophobia it is necessary to place zoophily or exaggerated love of beasts, which expresses itself by testaments in favour of diverse animals; by the creation of hospitals or refuges for the preferred beasts. This form of morbid emotivity accompanies itself in general by other intellectual and moral troubles which one finds, for instance, among a number of decidedly mad anti-vivisectionists, and who present, among other anomalies, an aversion, not less morbid may be, for members of their own family,

may be for the whole human race, justifying the proverb franc-comtois: A friend of beasts, an enemy of men.

There exists no mental activity unaccompanied by sentiment of some kind: at the basis of every philosophical speculation, howsoever abstract it may be, there lies an agreeable or painful emotional state. The need of knowing which expresses itself by the most diverse manifestations of curiosity is accompanied by all the somatic phenomena of desire in general, and it can constitute a very truly unhappy state which differs, in fact, in nothing from diverse forms of morbid emotivity which we have been passing in review. The extractors of quintessence, the searchers for perpetual movement, are emotionnaires. This speculative emotivity expresses itself under different forms, the search for causes, the search for relations, the search for names and words (onomatomania), and numbers (arithmomania), the search du pourquoi (Griesinger). It accompanies itself by an anxiety more or less intense of which one may find again the trace in the normal mind.

Azam relates that he has seen a domestic in contemplation before a press which she had no right to open. "How now," said he, "do you regard this press?" "Ah, monsieur, it is stronger than I, I am pained not to know what it contains"!

We have confounded under the term Onomatomania several very different troubles classed in five varieties. 1. The anguishing search for a word: 2. Obsession by the word and irresistible desire to repeat it: 3. A specially sad meaning attached, attributed to certain words pronounced in conversation; 4. Preservative influence of certain words, pressing for their pronunciation; 5. Impulsion to reject, as after efforts at expectoration, a word become a veritable foreign body charging the stomach.

M. Séglas thinks that the intensity of the mental images, sometimes enfeebled, sometimes exaggerated, commands the pathogeny of these obsessions. There is hardly room for discussing if the representation of an act plays a *rôle* in its production. We understand well that the impulsive ejaculation of a word cannot produce itself without an intense image: and that the search for a name has no reason for existence except in the absence of the mental image of this name.

But the forgetting of an image or its very intense representation exists very often without constituting obsession. What is indispensable to the production of obsession is a special aptitude for the fixation of mental attitudes, attention.

The fixity of mental attitudes is found again in all states of depression being often well manifest in the prodromic period of madness. Forbes Winslow cites the case of a man who at the beginning of his madness repeated during an hour and a half a bizarre name which he had seen on a poster, and this repetition only ceased on supervention of muscle fatigue.

"When we walk along the road," says Grant Allen, "we amuse ourselves sometimes by touching each side, stepping on every second paving stone, striking with our cane every réverbère. If for a certain reason, we are obliged to interrupt the series, or to give up this exercise, in default of the objects in question, we feel a slight void, and a disagreeable depression. The nervous system is put into a state of expectation, and is prepared for an appropriate discharge at a given moment. If the occasion of the discharge is lacking, the gathered energy must disperse itself by other routes, which entails a certain struggle and loss." In some individuals this need of rhythm, imposes itself in an imperious fashion, and, if it is not satisfied, there ensues an extremely painful sensation of anguish. This rhythmomania scarcely differs from the state of consciousness of rhythmic spasms so frequent in several forms of neuropathies.

The most diverse obsession ideas can present themselves in neurasthenics, in hysterical persons, and in the beginning of most insanities. Among alcoholiques they present themselves frequently with a remarkable intensity, and they transform themselves frequently into fixed hallucinations. Besides betwixt the obsession idea and the hallucination there is but a degree of difference. If a large number of obsessed never arrive at hallucination, it is that, in reality, their intelligence, congenitally weak, is incapable of strong representations. With them a feeble representation is capable of fixing the attention just as a visceral sensation of small intensity is capable of fixing that of an hypochondriac. For the rest hallucination is met with in a great number of cases of obsession contrary to the opinion of J. Falret. Jamburini, Stefani, and Séglas

have cited examples thereof which must not be reckoned as rarities.

Obsessions have often an outside groundwork, and some are liable to be confounded with Pathophobia, as one sees it in imaginary ulcers of the tongue, in dental obsession, in utero-ovarian obsessions, which force women continually to seek medical or surgical aid (gynecological madness), in those who are provoked by urethral sensations, by seminal losses, etc. Phaneromania, for instance, is an obsession which can be provoked by all the striking manifestations to the surface of the skin or accessible cavities: it expresses itself by an incessant need, to scratch a fleshy or horny appendage, to draw or pull a lock of hair, and to scratch, bite, or pull the free border of the nails. Phaneromania is especially frequent in idiots and imbeciles. When this kind of obsession is provoked by a considerable malformation, it emerges sometimes in a more or less profound state of melancholia. This is what is seen sometimes, for instance, in women with beards, and who get better after epilation.

A reprehensible act can provoke this kind of obsession under the same category as physical deformity. A patient addressed by Dr. Laurand had utilised for his personal benefit a certain number of timber posts where he had been employed. Seized with remorse, he had restored them some time after, but he remained in doubt of the discretion of a colleague who had had cognisance of his fault and his restitution. Apropos of a reproach relative to an inexactitude which had been done to him some three years later by another patron he became haunted by the idea that he was, in fact, a bad employé, that he was a thief: then another obsession supervened relative to other faults dating back to infancy: he could not chase from his mind the remembrance of his aunt having caught him in the very act of masturbation. Gradually these obsessing memories became more close and permanent. Finally about 18 months after the emotion which had provoked these oppressive reminiscences he began to hear voices which said to him, "Cochon, Salop, voleur, filou." He has changed several times his occupations and his domicile in order to evade these persecutors: but he never expressed against them any idea of reaction, he recognised the justice of these accusations, and accuses himself of being a miserable. He pre-

serves the attitude of humility which M. Ballet has indicated amongst persécutés from physical defects.

The impulsive obsessions which accompany a state of anguish, replaced, once the act is accomplished, by a feeling of satisfaction, awaken necessarily in the spirit of him who is subject to it, the consciousness more or less exact of a morbid state. In the reasoning madness, in moral madness, in criminality the less intense and less rapid processes do not accompany themselves with the same anæsthetic changes, and produce themselves without provoking the same state of consciousness: but they are none the less essentially the same.

It is not the less evident that at the base of every physical activity there lies an emotional state in relation with a local or general excitation, be it perceived or not. The impulsions termed irresistible, which are sometimes termed, wrongly, automatic, are always in relation to a morbid emotivity, in consequence of which an irritation, perceived or not, determines a discharge which, following its greater or less rapidity, is unconscious or conscious. The distinction betwixt spasmodic emotivity and epileptic impulsions it is not easy to determine the real existence of, for in the two cases the discharge has for its condition a momentary trouble of brain nutrition, a trouble of nutrition which can be induced equally well by a peripheral irritation as by a central irritation under dependence of a brain (cortical) lesion.

Just as under the influence of physical pleasure or pain, attention is carried to the organ affected, and cannot be distracted therefrom, weakening and attenuating receptivity and activity in all their forms; so under influence of moral pleasure or pain, attention is exclusively taken up with agreeable or painful representations, fixes itself there weakening the soul activity in its entirety. The fixed ideas have their origin in morbid emotivity, but though they may originate an agreeable or a disagreeable representation, they end almost always by becoming painful by reason of their fixity and their duration.

Nostalgia, "that fixed idea of the heart," according to the expression of Fonssaguives, is constituted by the exclusive love of places where we have been born, to which our first memories and affections cling. They manifest themselves in individuals of small

intelligence: transported in spite of themselves into a country where nothing attracts them and beguiles them into forgetfulness, or into an occupation in which they take no interest. The idea of the country takes a predominant place in the absence of sufficient excitations and representations; it ends by becoming exclusive and predominant (oppressive).

Pain and repulsion, pleasure and attraction, are inseparable, and never exist without expressing themselves by appropriate acts, movements of flight or defence, or movements of prehension. These acts are characteristic of emotion and express themselves in their wake. *Volition* is a phenomenon of consciousness which accompanies movements adapted to the research of pleasure or pain, but which is no more *free* than impulsion, and only differs therefrom by its rapidity and intensity. All the acts of impulsion which we reckon abnormal are thus in reality the objectification of a morbid emotivity which can be passing or permanent, and become passion, madness of character.

The need of strong liquor manifests itself after a fashion sufficiently different to necessitate the formulation of different words to designate them. Dipsomania has been described separately from drunkenness. "Drunkards are men who intoxicate themselves when they find occasion to drink: dipsomaniacs are patients who intoxicate themselves every time the fit seizes them," says Trélat. This distinction is not so fundamental as one might seem to believe it: the drunkard is driven to drink by a need of excitement: the dipsomaniac does not let himself go to his fit except after a period of melancholic depression which is, in fact, the physiological condition of an ardent desire, an impulsive desire. M. Magnan was conversant with this when he said: "One can say of dipsomaniacs that they are not continuously delirious, they hold constantly one foot in the domain of madness, and if dipsomania is a paroxysmal madness it is still rather remittent than frankly intermittent."

The limit between the systematic emotivities and the vices is impossible to trace: dipsomania, oinomania, and drunkenness, kleptomania and theft continue without line of demarcation.

Sitéomania or morbid longing for nourishment is much less frequent than dipsomania. It is also characterised by an irresistible desire to eat large quantities of aliments, or even of substances not

alimentary, or improper (malacia, pica, geophagie, coprophagie) manifesting itself frequently by fits, but also sometimes in a continuous manner. The Grenadier Tarare, one of the most celebrated gluttons, remains accused of anthropophagy. Some patients have a morbid taste for a special aliment (Opsomania).

Kleptomania consists apparently most frequently in a desire of possession purely metaphysical; for the thieves most frequently have no need of recourse to theft in order to procure the objects of their covetousness, and it is frequent to see them accumulate them without their ever being of any use. The cases cited by Marc are sufficiently characteristic:* 1. "An employée of the Government, at Vienna, has the singular habit of only stealing utensils de ménage: he has two chambers to put them in, he sells nothing, and makes use of nothing. 2. It is known that Victor-Amédée, King of Sardinia, took especially objects of little importance. 3. The wife of the celebrated Gaubius has so great a liking for robbery that when she bought anything she sought always to rob something. 4. Lavater speaks of a doctor who never left a patient's room without stealing something. 5. I have known," adds Marc, "a learned doctor, whose mania consisted in stealing table covers: it did not extend to the abstraction of other things."

Certain physiological conditions accompanied by depression favour this form of morbid emotivity, in particular the puerperal state and morphinism. It can also be put into activity by external circumstances. Perhaps more than in other forms of morbid emotivity heredity plays a part in kleptomania.

The need of change of place is a phenomenon which associates itself with a great number of mental troubles. It can be the logical consequence of claustrophobia, oicophobia, dipsomania, erotomania, delirious ideas, religious or reformatory, ideas of persecution, hallucinations of various senses. Flights are also met with and associated also to other troubles in the history of imbeciles, dements, idiots, general paralytics, alcoholiques, epileptiques, hysteriques. But Ecdemomania, the necessity of quitting the house upon the slightest pretext, the need of changing residence (migrateurs de Foville), or of going far without any motive, can be found in an apparent state of isolation.

Certain individuals show themselves of an extreme sensibility

* *De la folie considérée dans ses rapports avec les questions médico-judiciaires*, 1840.

for every thing that touches their interests. They feel unhappily every opposition in this regard, frequently in the wake of a dispute, they are driven to raise actions (processifs querulents). This delirium of chicane, which develops itself after every hallucination, touches very near the persecution delirium: but it can be near passing organic troubles, and be itself transient.

Oniomania, the purchasing mania, can manifest itself under the continued or paroxysmal forms. The collectors buy systematically certain objects susceptible of acquiring a value from an art point of view, of science or curiosity; or buy impulsively without deriving any pleasure from the objects they buy, and sometimes compromising their existence by them: they accumulate pictures or books, of which they do not themselves know the number, in places where they are inaccessible, and, moreover, the idea comes not to the collector to look at them, or make use of them. Others buy the most odd things, which they accumulate without possible end. Both one and other find an inexplicable need to *hide* the products of their impulsive purchases. They appear to have a vague consciousness that they make a criminal subtraction from their social fortune. They are kleptomaniacs who *pay*.

Pyromania (Marc) or impulsive incendiarism, can stand alone, but it is often found associated with theftuous tendencies, to suicide, to excessive religious manifestations (Marro), to disorders of the sexual functions (Giraud, Rousseau). It manifests itself frequently at the period of puberty, in badly developed infants (Henke), in imbeciles and epileptics (Lasègue, Tardieu). It is often influenced by an alcoholic tendency.

Homicidal ideas present themselves in a feeble state, or static, (these are obsessions): or in a strong and dynamic state, (these are impulsions). One finds examples of them in Felix Plater, but they have also been studied since Pinel by Esquirol (monomanie homicide), Georget, Marc, Calmeil. Impulsions to murder manifest themselves at all ages, and in both sexes. They are accompanied often by a very intense anxiety which ceases after the act. These impulsions can coincide with habitual ideas of hate or vengeance, but frequently they manifest themselves against individuals for whom the subject has never experienced any but affectionate sentiments, and provoke a sentiment of revolt. Sometimes the senti-

ment of reprobation and fear provoked by these impulsions is such that the patients claim for themselves sequestration or some amount of coercion.

Very often these impulsions have for their origin a moral contagion. The sight of an execution, the account of an assassination, of a suicide, the sight of instruments capable of causing death, can provoke it. Spurzheim cites the case of a melancholic who having seen at Vienna the execution of a criminal experienced a strong emotion, and all at once felt an irresistible desire to kill (instantaneous madness of Boileau de Castelnau).

Barbier d'Amiens has reported the history of a girl, who, subsequent to the then comparatively recent case of the Cordier girl, had for several weeks an impulsion to kill her infant, and other facts of the same kind were produced at the same time. Carlo Livi and Aubly have placed other instances on record.

Murderous impulsions sometimes specialise themselves and address themselves solely towards progeny (Misopèdie). These specialisations are not peculiar to man: they are found among some domestic animals: rabbits and pigs eat their little ones.

Coprolalomania, which must be distinguished from spasmodic coprolalie, the spasmodic exclamations of the tiqueurs, is constituted by an impulsion to pronounce blasphemies (manie blasphematoire de Verga), or to maintain filthy or obscene propositions. The mania for obscene propositions has nothing to do with genetic impulsions; although one meets it very often in neurasthenia and in senile excitation.

The intensity of the desires varies with the impressionability and the emotivity: the power of resisting impulsions varies in an inverse sense to the number and intensity of the representations. The diverse forms of morbid impulsions are only, in short, a consequence, the manifestation of a morbid emotivity, which cannot coincide with a normal sensibility. Insatiable needs hold in general to masked defects of sensibility by an exclusive sensibility: the impossibility of control derives from absence of motives of compensation, and not from a special paralysis due to a so-called function of arrest. They do not merit the title of inhibitory madness (H. Tuke), or of inhibitory neuroses, which have been given to them (Clouston).

If emotion, a state of consciousness proceeding from an inward causation or origin, exacts necessarily the intervention of intelligence, (without which the representations which are the basis of the emotional state would be in default); all the perversions of emotivity, necessarily underlying, entail a trouble of intelligence, diminution, or perversion. This deduction is opposed to the opinion of most psychiatrists, who admit the existence of a moral madness, but it imposes itself upon me none the less. Moreover, at a recent meeting of the Medico-Psychological Association (British), held at Bristol, the native town of Prichard, and where he set himself to glorify the godfather of moral madness (the instinctive madness of Pinel, folie des actes, action madness of Brierre de Boismont), several orators had to recognise that moral madness ended in dementia in most cases, *a fact which establishes peremptorily that intellectual trouble was not wanting. Moral madness does not exist:* all emotional troubles are necessarily associated with intellectual troubles which dominate them. If these troubles cannot always be put in evidence, we can only conclude one thing therefrom, which is, that we are badly armed for the research of signs which characterise them. What we can say of transitory moral troubles one can say of the permanent ones. The necessary relation which exists between morality and intelligence has not escaped moralists. "If poverty is the mother of crime," says La Bruyère, "intellectual defect is their father. It is hard for a determinedly dishonest man to be right intellectually: a genius which is right and acute conducts at last to probity and virtue. There is lacking sense and penetration to him who plumes himself upon the evil and the false."

Moreau de Tours reports, from Renaudin, an observation of sensory troubles coinciding with fits of moral madness.

Excessive emotivity, which is the indispensable emotivity of morbid fears or the impulsions which are passing under review, is not the only trouble of morbid emotivity.

In a large number of degenerates sensibility presents an entirely different alteration which is in some sort the antithesis of the preceding. These individuals are insensible to all external excitations, or to some, and they are inaccessible to the emotions, or at least to some. A partial inirritability can coincide with a partial hyper-excitability. Just as to hyper-excitability corresponds a

reflex pathological over-action, so to inirritability corresponds a morbid inactivity. To the abnormal impulsions are opposed impotences which have been described under the denomination of aboulies. The coincidence in the same subject of impulsions and veritable aboulie expresses well the morbid character of these anomalies. Marc cites the case of a chemist pursued by homicidal impulsions who resisted the temptation simply by tying together his two thumbs with a ribbon.

Aboulia has been sometimes regarded as a psychic trouble isolated and independent of every physical condition. The muscular system and the organs of movement will be intact and the intelligence will be perfect. But, in reality, aboulia is a symptom which is met with in well known morbid states, and in which neither movement nor intelligence are intact. It is thus that enfeeblement of the will is, so to say, a constant symptom of neurasthenia, in certain forms of melancholy without delirium, in several intoxications, in chronic alcoholism, in morphinism. Aboulia can only spring from a foundation of depression which objectifies itself by a muscular enfeeblement, and a relaxation of nutritional function.

To this physical depression corresponds a diminution of emotivity which displays itself or betrays itself in the confessions of the patients: they recognise that their sensations are too feeble, that they no longer experience joy or pain, that they have only indifference for all and every one. It is to this defect of emotivity that is due the indecision of neurasthenics, their difficulty of fixing their thoughts (aprosexia).

In senile regression we observe voluntary activity relax itself in the order of the retrograde evolution of sentiments. Before losing definitely æsthetic sentiments, moral sentiments, social sentiments, the old man presents often a truly aboulic state relatively to the expression of these sentiments.

The special difficulty which certain aboulics have for executing acts *new* for them, for seizing unknown objects, is further adapted to show the influence of the sentiments. This influence is further put in evidence by the possibility which certain aboulics have of overcoming their inertia under the influence of an emotion. It is thus that one of Billod's patients, seeing a woman in danger of

being crushed by a mailcart in which he was travelling, found himself to be the first traveller to descend to her rescue.

Aboulia and dysboulia manifest themselves by rendering painful or impossible the most diverse acts. Such a patient cannot rise from bed, from the carriage (anastasia de Régis), cannot walk (abasia de Blocq), cannot mount a ladder (anabasia de Régis). Another is incapable of dressing himself (anesthie de Régis): Reid cites the case of an individual who remained in bed all day being incapable of choosing a pair of trousers. Another cannot make up her mind to pass the gate.

The doubt madness which Legrand du Saulle considered necessarily bound to touch delirium, which, according to this author, ended by manifesting itself sooner or later, comprises in reality several categories of facts. In one the situation is dominated by a morbid fear which is often, in fact, a fear of contacts: in others it is aboulia, that is to say, in fact, *a defect of emotivity which presides over the development of the troubles to which affection has given its special cachet.* One may object to this last interpretation, that individuals attacked by doubt madness are not necessarily impotent. Lombroso, in fact, says that doubt madness is frequent among men of genius, and he thinks that their irresolution derives from the fact that they follow out a fixed idea: it brings about in them a deuteropathic aboulia.

The default of the sexual emotions can be met with in individuals apparently perfectly formed: sometimes it is congenital, and can coincide with the possibility of provoked erection, as in the case of Hammond, or this erection may coincide with an absolute disgust for the female.

Frequently anaphrodisia is acquired: it can be attached to excessive intellectual labours: it is said that Newton never had the sexual orgasm.*

Strong emotions, especially the painful, can induce the same effect: but it is not rare for an excessive desire to induce the same.

At other times it is a perversion of emotivity by reason of which attention is called towards objects which, in a state of health, are not regarded: the patients ask themselves why there are not

* *Translator's Note.*—The names of other prominent men besides Newton will suggest themselves to many readers. Most medical men engaged, like myself, in special practice will be familiar with cases of anaphrodisia induced by strong emotion.

several moons, wherefore it rains (réalistes of Ball), wherefore there is only one God and not two (metaphysicians of Ball), whether something is not going to fall on their head, whether they will not have palpitations (timides of Ball): at other times they must know the number of buttons on the waistcoat of their interlocutor (compteurs).

Amongst the pathological forms of emotivity it is requisite to indicate the need to provoke emotion by abnormal excitations, by the sight of pain. It is not due to a refinement of emotivity in that case, but, on the contrary, to a defect which manifests itself by the need of bloody spectacles, and in which the pain of the victim plays the most important part. This perversion of emotivity which is met with, to a certain degree, in a great number of infants, and expresses itself by a tendency or impulsion to torment inoffensive animals, is especially marked in vicious or neuropathic infants who frequently give themselves up to acts of brutality and cruelty without any provocation and for pleasure. We find it in a great number of women who seek with marked predilection bull-fights, executions, etc. It is characteristic, lastly, of a large number of criminals, who from this point of view recall the savages. In certain individuals the spectacle of pain appears to have a certain relation with sexual excitation: it is thus that we see certain perverted people associate with their amours painful manœuvres in order to sustain these: and, on the other hand, we see murders which have only theft for motive, followed by violence (Sanguinaires de Ball).

The satisfaction found in these conditions appears to have for its base the sensation of personal power evoked by the suffering and powerlessness of the victim.

Morbid emotivity can be the consequence of a traumatic shock under the same title as all neurasthenic symptoms. Handfield Jones reports the example of a person who has the habit of marching without fear on elevated scaffoldings, and who, sequent to a fall upon his head, was incapable of approaching one without discomfort, even guarded by a warder.

Ought we to consider as real, and attribute to a highly normal condition, or to a pathological state, those facts of telepathic emotivity in which a sudden emotional shock, without apparent rela-

tion with the external conditions, produces itself apropos of a grave event, or the death of another person living at a great distance and inaccessible, so far as one can judge of it, to the sense of the individual affected?

If it is permissible to remain in Socratic doubt it is necessary always to remember that we know nothing, or almost nothing, of the variations of sensibility under the influence of variations of the organic state: we ought to recognise only, after the facts cited, that these variations of sensibility are considerable. We know, moreover, that, in the races, sensorial acuity varies in a large proportion for the different senses.

I will recall upon this point an observation of Gratiolet, who relates that "if imaginary ideas can be considered as feeble sensations, reciprocally very feeble sensations can be taken for imaginary sensations."

"I was one day," says he, "occupied in transcribing MSS. One of my friends, a distinguished musician, and gifted with very subtle audition, wrote by my side. 'Hollo! how singular it is,' said I to him; 'I have just this moment in spirit heard an air which I heard long ago; and I am, in spite of myself, pre-occupied by it in a fatiguing manner!' My friend heard nothing of it. All at once a slight wind sprang up and brought us distinct sounds. The air which I thought to imagine was played in reality by a distant orchestra. My friend affirmed to me anew that previously he had heard nothing. It must be remarked that this air was to him previously unknown." We could cite a large number of unconscious sensations of the same kind which give rise to acts very wrongly called automatic, spontaneous, or instinctive. In reality there is nothing in them except more or less compound reflex acts.

Emotivity does not take on a morbid character only by its intensity or by the defect of co-ordination of causes which provoke it. It is also morbid when it develops itself at an age when it does not exist physiologically. It is thus that the amorous passion which develops itself in infants, as we have seen in Dante, Alfieri, Byron, J. J. Rousseau, etc., constitutes a veritable erotomania, even if it is not accompanied by any *vesanic* trouble. Genetic precocity is often hereditary.

In certain emotionals, the sight of a certain object excites imme-

diately the fear of being the victim of it, or the desire of being served by it. Sweetser cites the case of a woman who seeing water boiling on the fire, and knowing the risks her infant ran of falling into it, was seized by desire to throw it into it.

The description of systematic emotivities may appear a return to the ancient doctrine of monomanias. It is, however, nothing of this: for us all the systematically emotised present troubles of sensibility, and consequently general troubles of intelligence: be they degenerates, neurasthenics, or subjects debilitated by a general malady, etc., and they cannot escape this law. On this bottom of debility systematic emotivity only appears as an episode comparable to the dysæsthesias, or to the systematic anæsthesias, to the sensorial intolerances. Certain individuals have an invincible intolerance for certain odours, certain savours, etc.; their sensibility in general is also in default.

CHAPTER XVI.

The Organs of the Emotions.

Summary—Ancient Theories—Modern Theories—The Brain and the Great Sympathetic—Congestion and Anemia of the Brain.

By reason of the predominant *rôle* which it plays in the physiology and pathology of the emotions, the heart has been considered as their essential organ, not always to the detriment of the other organs: "Splene rident, felle irascuntur, jecore amant, pulmone jactantur, corde sapiunt," said the ancients. To the stomach also has been attributed a considerable influence upon the emotions.

The history of the encephalic localisations of the emotions confound themselves with that of the seat of the soul, which writers have for the most part placed in the median and unique organs of the encephalon, like the pineal gland (Descartes), the corpus callosum (Bounet, Lapeyronie), the septum lucidum (Digby), the bridge of Varolius (Haller), the spinal cord (moelle allongée) (Boerhaave). Platner, however, has placed the soul in the corpora quadrigemina. Lallemand attributes positively the passions to the vibrations of the corpus callosum.

The localisation in the hemispheres which Gall proposed only retarded the evolution of the question of cerebral localisation, considered from the more strict point of view; but one cannot reproach him, however, with having misunderstood the *rôle* of the brain.

Several physiologists have related since in their experiences, or in their observations, some circumstances which have led them to localise the emotions elsewhere than in the hemispheres of the brain. Vulpian having remarked that rats, from whom the cerebral hemispheres had been removed, still emitted prolonged cries entirely different from the reflex cry which can be provoked by unperceived excitations of the same animals whose encephalon had been destroyed as far as the bulb, deduced from that that the medulla was the seat of the emotions. Pontoppidan has reported

facts in which an unhappy emotivity found itself in relation with lesions of the medulla (protuberance) : but a similar emotivity can be associated again with a quite differently localised lesion.

Huschka under the impression that he had remarked in woman a more developed condition of the temporo-parietal region than in man whose emotivity is much less, has concluded therefrom a localisation of emotivity in this region. This theory has been revived since.

Letourneau, founding on some facts of comparative anatomy and physiology, formulates the following conclusions:— 1. The vigour of nutritional thoughts (penchants nutritifs) is in relation to the predominant development of the occipital lobes whence results usually the prominence of the occipital, the flattening of the forehead, a tendency to prognathism, thick lips, etc. 2. Inversely the energy of intellectual ideation is in relation to the amplitude of the frontal lobes, and consequently the frontal is proportionally vaster, more rounded, and higher. 3. By exclusion, and thereby taking count of the development of the parietal lobes or the parietal cerebral regions, for there the lobe is badly defined ; reckoning also the relatively great development of this region in the negro of Africa and the European female, one is led to measure the moral or affective thoughts according to the development of the lateral regions of the brain. No one has adopted this conjecture. When the researches of Fritsch and Hitzig, of Ferrier, and others had demonstrated the existence of motor centres in the parietal region, and of sensitive centres in the temporo-occipital region, one was also led to admit by exclusion that the frontal lobes were the seat of emotions : but, the deduction by exclusion does not constitute a process of scientific discovery, and when one studies the facts nearer we find that lesions of some kind, or any kind, which attack the anterior lobes do not change the emotivity.

On the other hand Luys, thinking he had remarked that left hemiplegics present frequently an abnormal emotivity, whether under the influence of external excitations, or otherwise spontaneously, concludes that this mental state was in relation with lesions of the upper part of the right temporal circumvolution situate at the bottom of the fissure of Sylvius. From a study of localisation, doubtful, moreover, of lesions in dementia, M. Mairet deduced also

too easily that the lesions which determine the expansive emotions were seated on the convexity of the cerebral hemispheres, whilst those which are in relation with the depressing emotions were seated below the fissure of Sylvius.

Goltz observed that dogs of an amiable temper became aggressive after ablation of the forebrain, whilst intractable dogs became even tempered after ablation of the hindbrain. He remarked, moreover, that whilst the first have a marked tendency to grow lean, the last tend to grow fat. This last circumstance, even, *if it is not in relation with the cerebral lesion, is truly sufficient of itself alone to explain the change of character.*

M. Magnan has proposed a classification of subjects attacked with sexual anomalies which he distinguishes into spinal, posterior cerebro-spinal, anterior cerebro-spinal, and anterior cerebral or psychic. "This classification," says he, "is based on anatomy and physiology." It is on this head that I find myself obliged to indicate it in order to refute it. We know well that the author gives no anatomical argument relative to man, and, moreover, we know well, (Claud Bernard has insisted upon the point), that it is not right to deduce functions from anatomical dispositions, if this deduction can be legitimate in some exceptional cases, it is not surely for nervous centres. Well this classification has nothing to do with anatomy. It does not appear to me to have anything either with experimental physiology. One could not compare an idiot to anencephalous, who would truly be a spinal. Furthermore the idiot cited as an example possesses so much brain as to be capable of choice, since he refuses aliments offered him with the hand, and accepts those offered on a plate; he cannot then serve to illustrate that habitual masturbation is a reflex action which has no connection with a certain emotional state, and that the brain takes no part in its production. So much for the localisation of instinctive perversions, and intellectual perversions in the posterior part: and, in the anterior part of the brain, it rests on no observation; we know, on the contrary, that these regions may be destroyed without evident intellectual or instinctive troubles ensuing therefrom. Although we have not, up to date, been able to recognise any distinct motor or sensorial function in the zones termed latent, it does not follow that one may be right to attribute to them indis-

tinct psychic or instinctive functions, or motor or sensorial functions: nothing authorises one to see anything else than the organs of sensibility, *and movement in the brain, whose elements are only the seat of reflex phenomena, or otherwise, transformations of forces more or less complex.* The unjustifiable classification leaves entire the question of the localisation of the emotions.

Finally, quite recently, M. Courmont has framed a theory previously declared by Jessen d'Erfurt, which consists in attributing to the cerebellum emotional sensibility. The argumentation presented by M. Courmont doesn't stand even a superficial examination: the experiences, which he gives without adequate detail, indicate that animals submitted to ablation of the cerebellum are apathetic: they would be so after any other operation of similar importance: the observations which he makes with systematic partiality have only the mark of badly-defined emotional troubles; and especially he only found in most of his autopsies tumours capable of acting at a distance and badly-defined ancient lesions. The theory of Jessen, rejuvenated by Courmont, is incapable of clearing up the physiology of the emotions, and it leaves also altogether obscure the functions of the cerebellum.

Setchénoff reports the following experience of Bérézine: "If, after having kept during some hours a frog at the temperature of the apartment, one then plunges its hind feet into ice water, it withdraws them quickly; now the frog feels the cold, it is disagreeable to it, and in the end it makes to avoid a painful sensation: it must be noted now that this movement is very strong, that the animal is frightened. But if we repeat this operation on the animal after having first extirpated his hemispheres he remains tranquil. Another thing happens when one induces the cold on a large extent of skin, for instance, submerging the hinder half of the trunk. Then the frog deprived of its hemispheres moves its feet. Is it not evident that in the production of movements caused by the cooling of the skin, the hemispheres act exactly in the same manner as the extension of the cooled surface? But, all the world knows that this last circumstance augments in general the sensitive effect of cold: by consequence the hemispheres themselves act also in a fashion augmented so far as concerns the effect of the refrigeration, viz., movement."

If the hemispheres are indispensable to the production of sensation, a state of consciousness of external origin; they are much more indispensable still to the production of emotion, a state of consciousness necessitating representations which can only pass themselves into the grey matter of the brain.

If the grey matter of the brain must be reckoned the central organ of the emotions it is still impossible to localise them.

But the grey matter of the cerebral hemispheres is not the only nervous organ indispensable to the production of the emotions.

Cabanis, Bichat, Virey have already understood the *rôle* which the great sympathetic nerve plays in the physiology of the emotions.

Morel adds to the term "emotional delirium" that of "neurosis of the ganglionic nervous system," and he gives for the complete definition thereof: "The visceral ganglionic nervous system represents, in fact, according to the just observation of Dr. Cerise, the general conditions of the organism, the needs, the desires (penchants), which constitute the affective element." One is stupefied to see a positive spirit like Morel content himself with the authority of a Cerise, when for a quarter of a century the discovery of Claud Bernard has thrown a full light on the great sympathetic. If he had taken account of the beautiful experiments of Claud Bernard and Brown Séquard on the section and electrisation of the great sympathetic in the neck, he might have constructed a theory more true to the emotions and emotional delirium.

The observations and experiments which we have previously reported relatively to the physical accompaniments of the emotions, to the state of circulation, forces, sensibility, etc., show that, in short, the physiological conditions of the sthenic emotions reproduce most of the effects of section of the great sympathetic in the neck. One sees, in fact, sequent to this operation simultaneously manifest themselves an exaltation of circulation and nutrition and an augmentation of muscular tonicity and sensibility. The physiological conditions of the asthenic emotions, on the contrary, reproduce most of the effects of galvanisation of the same nerve, that is to say, the very opposite phenomena. The great sympathetic seems to be the peripherical organ of the emotions.

This theory can accomodate itself to the demonstration of the

general existence of the vaso-dilator nerves whose functioning permits to subsist the antagonism of the peripherical vessels and the visceral vessels.

One appears authorised to say that it is the great sympathetic which presides over the exteriorisation of the emotions. But we have no right to presume the emotions without their external signs: experience shows us, in fact, that each time that necessity or education weakens the expression of emotion, the emotion itself is weakened. If the emotion cannot be dissociated from its expression we are brought to admit that the emotion is essentially a generalised reflex phenomenon, whose centrifugal path is mainly the system of the great sympathetic.

One might take, in support of this theory, a fact of Bannister in which one sees supervene in sequence to a wound of the neck a change of character at the same time as physical troubles proper to section of the sympathetic: this change of character consisted in an irritability such as one had never hitherto known in this individual, and which was at the end of a short time followed by madness.

The study of the facts has shown us that the tonic emotions have, in general, a happy influence on the development and evolution of infectious maladies. But we have seen also that the physical conditions of the sthenic emotions are locally realised by section of the sympathetic in the neck.

The analogy of the physiological conditions of the tonic emotions to the effects of section of the sympathetic permits an interpretation of the curative effects of the emotions in perfect accord with theory. After having cut the sympathetic of one side in a rabbit Samuel cut the two auricular nerves of the opposite side. The vasomotor paralysis of the side on which the sympathetic has been divided, entails congestion of that side, and indirectly, anemia of the opposite side. This anemia augments by section of the sensitive nerves which suppress the reflex action on the intact sympathetic. When he dips the two ears into hot water the ear on the side where the sympathetic is cut becomes congested and inflamed, but rapidly becomes normal: the anæsthetic ear, on the contrary, is the seat of a stasis which ends only in gangrene. Even when he only cut the auricular nerves the same action of hot water

induced lesions whose cure was retarded on the side of the section. Roger likewise has seen section of the auricular nerves in the rabbit augment the gravity of erysipelas, whose progress, on the contrary, section of the sympathetic renders more benign.

It is by an analogous mechanism that the vaso-dilator emotions can influence the progress of an inflammation, whether it be provoked by a microbe or by any other cause of irritation. We have seen, moreover, that nervous shocks act on the composition of the blood: it is not very rash to admit that they can also act on the phagocytic reaction by modifying the chimiotactic sensibility of the cellular elements.

On the other hand, Ochotine,* Dache, and Malvoz† have observed that the extirpation of the superior cervical ganglion, or the section of the sympathetic in the neck, determines an augmentation of local reaction, a condition favourable to immunity. Frenkel‡ has also observed that the section of the sympathetic in the neck retards death from anthrax.

The centre of reflexion of this phenomenon appears very fit by the encephalic nervous system, and in particular by its superior nervous centres. Experience proves, as a matter of fact, that the lower down destruction of the nervous centres takes place the more reactions tend to localise themselves. Emotion, which is only realised by modifications which bear on all the functions of being, cannot produce itself, except when the nerve centres are intact, *i.e.*, when they exert their functions in their plenitude.

Normal emotivity necessitates the integrity of the centripetal tracts, that is to say, of the sensitive and sensorial nerves, the integrity of the centres, and the integrity of the centrifugal paths, that is to say, summarily, a normal adaption of external relations to the internal relations.

The malady of tics, echolalia, coprolalia, frequently associated to the co-ordinated tics,§ and so the imitation of gestures (echokinésie), co-exist sometimes, in the same individual, with irresistible impulsions and morbid emotivities. This association can

* *Arch. de Méd. Exp.*, March, 1892.

† *Ann. de l'institut Pasteur*, 1892, p. 538.

‡ *C. R. de Biologie*, 1892, p. 702.

§ *Gilles de la Tourette, Arch. de Neurol.*, 1885, t. ix., p. 19, 159. Chauvreau, th. Bord., 1888. Breitmann th., 1888.

be cited in support of the doctrine of cerebral and cortical origin of the emotivities. The following observation is perhaps not without interest in this relation.

Observation XLVII.

Tics, Coprolalia, and Irresistible Impulsions.

A. C., 18 years of age, first seen May 12th, 1891. One of a family of sailors, and born at Dieppe; and whose family was entirely free of nervous maladies. His father and mother are both well, but he himself is the youngest of seven. The grandmother died of small-pox at the beginning of the last pregnancy of his mother. The other infants are quite well, have never had convulsions, and were born at due time. The last pregnancy of the mother was disturbed by painful emotions: besides the death of her eldest son, she had had to fear that of her husband, who had been ship-wrecked, and after having been miraculously recovered from the sea, had failed to die of a pulmonary flux. The young A. C. has had convulsions several times during lactation, and he had them still up to six or seven years. He hardly spoke till he was two, and wet the bed till he was twelve. He had always been small, lean, pale. He learnt with difficulty at school, had bad memory, was absent minded. At 14 he was apprenticed to a harness maker, and lodged with his patron. It was observed in the workshop that he had peculiar movements of the lower limbs, which suddenly straightened out, or threw themselves out to one side. By and bye the same movements took place in the upper limbs and in the face: he closed his eyes, put out his tongue, and from time to time repeated in a loud voice, "Yes, yes!" sometimes more than twenty times together. The workmen mocked him, called him "le ressort:" but the master reprimanded him severely, when he began to throw his tools, or manufactured objects, and threatened him that he would leave him. Every time that he committed an act of this kind, he excused himself, and said he could not help it. But, little by little, these acts were accompanied by grosser words—"cochon, vache, morue"—which he repeated always in the same order. When he lived in the fear of being dismissed, and his father threatened not to take him back, he had taken the precaution when his arm stretched itself, to think that he might be going to throw something: but one day he threw a chopper at a window and wounded a workman. He was discharged. Ten months had passed since the accidents began. Returned to the house things went from bad to worse; the spasms of his legs augmented so that he began to fall. Several times he hurt himself severely. When the father was convinced that he had a malady to deal with, he treated him less harshly: the energy of the spasms diminished, and he could occupy himself with various handicrafts. He was always in the same state, and continued to merit his soubriquet "le ressort," when a sister of his mother who lived at Thiais, offered to take him with her to be cared for and cured if that was possible, and she brought him to la Bicêtre.

A. C. is thin and pale, 1m. 58 high, but his skeleton is little developed: there is hardly any trace of hair, not only on the face, but in the armpits, and on the pubis: his testicles are very small, his voice feeble, he has all the

characters of infantism: no trace of hysterical stigmata, nor anæsthesia, nor painful points. During the ten minutes or quarter of an hour required for his physical examination, he did nothing abnormal: but a little time after being seated "je vais taper," and, in fact, gave his knee a blow with his fist, at the same time ejaculating his usual words, "cochon, vache, morue:" then at short intervals, he projected his tongue, shut his eyes, emitted a sigh, groaning, and threw his legs and arms. He explains to us that always when he finds himself face to face with persons whom he does not know, he is some time without making a movement, and that he always feels a slight tension in his muscles, an appreciable time before making a movement: when he is impelled by a co-ordinated movement he feels perfectly what he is about to do, but he will be not only incapable to arrest the movement, nor to make it deviate otherwise than by changing briskly the position of the whole body, turning it on the heel, for example. When he has incoordinated movements he feels the same tension but does not know what is going to happen. Yesterday on walking out with his little cousin, he repulsed her suddenly, feeling that he was going to bite her: it was the first time that he had this impulsion.

When we sought if the great crises with falls which he had had at other times did not accompany themselves with loss of consciousness or other mental troubles, he relates that when he had co-ordinated shocks or incoordination of the two limbs, he had usually at the same time an extremely painful fear of eternal damnation, feeling himself menaced by hell and all its torments. This fear, which is not associated to any hallucinatory perception, endures sometimes six minutes after he is relieved, and leaves him in a state of anguish. The patient has received a religious education, but it is little thought of in his environment, and he had never any pre-occupations of this kind.

A. C. has been submitted to a bromide treatment, to hydrotherapy, and to a tonic régimen. The alimentation provided for him at his aunt's was very superior to what he had in his own family. He put on flesh quickly: from May till the end of October he increased in weight 20 kilogrammes, from 51 to 71: it was only then that the marks of infantility began to disappear; hair began to appear on the pubis, the armpits, and even on the chin; the voice completely changed after some weeks; the testicles are not developed.

Just at this time the tics had only diminished in intensity and frequency, but he never passed a day without some movement and some exclamation. In the course of November all traces of spasm and morbid fear completely disappeared.

The observations made on man in cases of traumatic or pathological destruction of the cranial bones have shown that under the influences of peripherical excitations, or even of representations (dreams), the volume of the brain augments: from this one can deduce that the emotions have for their physiological condition a congestion of brain. Apathy, on the contrary, has anemia for its condition. The symptomatic analogies between moral and trau-

matic concussion indicate an analogy of anatomical conditions of the central organ. But, to-day, anemia of the brain under traumatic concussion appears to be experimentally demonstrated.

Chronic anemia, or defective irrigation by blood, unfit to maintain nutrition, can explain persistent apathy and the morbid emotivities which, in fact, entail a state of irritable feebleness.

If the coincidence of troubles of emotivity and the motor troubles which one attaches to the cerebral cortex permits of the attribution also to the cerebral cortex of troubles of emotivity: then one can ask oneself also if the coincidence of vaso-motor troubles which are observed sometimes associated with morbid emotivity are not really the physiological condition of their exteriorisation. In an epileptic affected by morbid fears and diffuse emotivity we have observed permanent vaso-motor troubles (local asphyxia of the extremities), and paroxysmal troubles (roseola) of the most striking character.

The different forms of emotivity—do they concord in different individuals with the pre-existent and permanent somatic characters distinct from those which are the consequence of the expression of the emotions? Individuals gifted with a special kind of emotivity do they present special anthropological characters?

Phrenology and its proceedings have been judged long ago. Anthropology comes to establish a pretention to distinguish by morphological characters not only criminals but even different categories of criminals, but it has not been able, up to the present, to establish that these characters differ from those of degenerates in general.* One might have been able to learn from this that a group which distinguishes itself by a very special kind of emotivity would be able to make itself remarkable by well-defined anthropological characters: but experience shows that prostitutes do not present a special morphology.†

The ancients knew perfectly that there was a relation betwixt the physical behaviour and the moral seemliness. Valmiki, in the Ramayana, (Manthara shows us), the evil counsellor, drank and forged: Homer makes Thersites, a ridiculous monster: actors

* Ch. Féré. *Dég. et crim.*, 1888.

† P. Tarnowsky. *Et. anthrop. sur les pros. et voleuses*, 1889.

of all times have given to crime the mask of ugliness: anthropology has only added systematic description of details.*

The study of certain deformities which it is possible to put sometimes into relation with alterations of the brain, and which are frequent among aliens, such as facial asymetries,† might perhaps show the path, not perhaps of localisation of morbid emotion, but, at least, the seat of the lesions which can, by preference, provoke them.

* E. Lefort. *Physion. de criminel, d'après les savants et les artistes*, th., Lyon, 1892.
† J. Turner. *Jl. of Mental Science*, 1892, pp. 18 et 199.

CHAPTER XVII.

The Individual Conditions of Morbid Emotivity.

Summary—Individual Resistance—Heredity—Degenerescence—Sex—Age—Organic Maladies—Neurasthenia—Hysteria, Fatigue, Emotional Intoxications—Physical Conditions—Hallucinations of Sentiment.

It is a well-established notion that all subjects do not offer the same susceptibility to the action of medicaments and poisons. In respect of alcohol, Laségue has specially insisted upon the differences of aptitude for intoxication: he remarked that if there are insusceptibles to alcohol there are also those, on the contrary, who are extremely susceptible to it, and suffer very rapidly its sad effects; they are the alcoholisable. And one may add that the alcoholisable offer different organic predispositions, presiding over the localisation of functional troubles which can bear, it may be on the liver, it may be on the kidneys, it may be on the nervous system.

In the nervous system even all the parts are not always attacked in the same subject: at least with the same intensity: some offer peripherical troubles, paralyses, anæsthesias, troubles of co-ordination: these others, on the contrary, cerebral troubles, psychopathic affections.

In a certain number of cases one can establish in a very exact fashion the existence of the predisposition which explains the special localisation of morbid manifestations: I have encountered for some years in the consulting room of M. Vulpian, assisted by my friend, M. Déjerine, a person attacked by alcoholic paralysis, affecting mainly the lower limbs: amongst his neuropathic antecedents one found, in his infancy, violent angers during which it came to pass that his limbs bent, and several times he was completely overcome. Among alcoholics with cerebral manifestations we find also frequently troubles affecting the forebrain in some form or other.

The same variety of individual aptitudes is notable apropos of the

emotions. The specific energy or force of resistance is in relation to the quantity of nervous tissue and the intensity of nutritive changes. These aptitudes are now frequently congenital and even hereditary: we have already had occasion to relate, on several occasions, this last circumstance: but they can also be acquired.

Diffuse emotivity, under its diverse forms, is sometimes due to hereditary conditions more or less easy to recognise. Morel cites the case of two brothers become melancholic, the one sequent upon the burning of a manufactory, and the other after a row.

Aristotle and Plutarch understood the hereditariness of drunkenness and the possibility of its transformation. Plutarch reports that Diogenes, seeing a young man impudent and rude, said, addressing him, "Young man, thy father begat thee when drunk!"

Systematic emotivity must also acknowledge an hereditary origin. One attributes the invincible fear of James the First for naked swords to this circumstance that whilst Mary Stuart carried him in her womb she saw her friend Rizzio pierced by a sword blow at her side.

Sometimes morbid emotivity manifests itself through a whole family under the same form. I have cited families of hematophobes. Magnan one of onomatomania and touch delirium. It is thus especially that one may ask himself if it is not really the result of a contagion? But it may also happen that excessive emotivity manifests itself in the members of one family by an identical physiological trouble. Suckling cites a family of which all the members were affected by emotional over-sweating.

J. Falret, who maintains the heredity of conscious obsessions, concludes nevertheless that "each of us, in certain moments of fatigue or over-excitement of the nervous system, has observed, in himself, this phenomenon, which one also observes equally during dreaming. One is possessed, in spite of oneself, by a word, a phrase, or an idea, which recurs constantly to the thought, which one cannot succeed in chasing away, and which engrosses us in spite of ourselves, etc."

Sex has a great influence upon emotivity and upon the intensity of its diverse manifestations. They are not only the tender or sad affections which show the woman in grand array: "Muliebre est,

furere in ira," says Seneca.* Because women more frequently present emotional troubles of a pathological sort, it is not necessary therefrom to conclude that they have a higher emotivity; *they have a defective emotivity in relation to their sensibility.* General and special sensibility is less in the feminine sex. This is a fact known and many times verified. Their so-called perfected emotivity puts them, most frequently, into incapacity for the accomplishing of the act which lies at their hand.

The faculty of discernment is less developed in women than in men. One finds a practical proof of this inferiority in this circumstance that the professions which demand the greatest development of the discerning faculty are exercised by men who are piano tuners, tasters, assortisseurs de fils, etc. (Galton). In women attacked by nervous debility, the *sensibility* is still more striking: and it is they who are most subject to pathological emotions and to the pathology of the emotions.

In enfeebled individuals, the emotional reactions are modified: and there results therefrom an enfeeblement of the will which presents several varieties. Sometimes the reactions are as rapid as the representations, the acquired ideas have not time to modify them; the reaction is only a cerebral reflex to which even the conscious accompaniment can be wanting. Sometimes the individual is so subject to all external excitations that no one of them is adequate to determine a discharge in any particular direction. Sometimes the individual is so infected by one idea that in some way the reactions from every external source are diminished in intensity. In the woman exhaustion phenomena are more marked because there exists in her a congenital exhaustibility, because the irritability or abnormal inirritability is the consequence of a native feebleness.

The duration of the emotions is not so great in woman. Mantegazza says that suicide is rarer in her by reason of her minor sensibility to pain. The moral pains are often in women the origin, by the exhaustion they provoke, of sensorial troubles which weaken the remote consequences of the primitive event.

The emotions vary according to age, according to sex, according to race; but these variations of emotivity have for their conditions

* *De Clementiâ*, lib. i., v. c.

physical variations which have been well noted before physiological experiments were devised to furnish a more exact demonstration thereof. In infants and women the movements of the respiratory and circulatory organs suffer enormous variations under the slightest influences: redness of visage or pallor appears on the least irritation. The old man, on the contrary, is dull even to violent excitations, his visage neither reddens nor pales, in him the vascular reflexes are in general less marked. It is thus in the experiment of Gubler, where one sees contraction and relaxation succeed one another in shock of the veins on the back of the hand, restored less well in old than in young folks. The younger Péron has reported that in savages, the physical effects of emotions, and especially of fear, are more marked than in Europeans: but Plutarch had already recorded that barbarians gave way more readily to pain than the Greeks. Certain physiological conditions favour the emotions in an evident manner; such are menstruation, fatness, etc., all the conditions which determine a momentary or permanent enfeeblement. All the states of congenital debility, or acquired debility, entail an excessive irritability simultaneously with an abnormal exhaustibility.

The different ages are specially subject to certain morbid forms of the emotions which it would be interesting to specify. If they are more frequent in the adult and in old age, they are not unknown in infancy.*

Moral madness,† the diffuse or systematic morbid emotivities, are far from being rare in senile dementia; one meets with them also in senile precocities, described by Charpentier.‡

Andral has cited cases of infants dead of grief and jealousy by reason of having seen the prodigal caressing of other infants.§ I know an individual who in his infancy went into furious rages when his parents failed to disguise the fact of their using the same chamber, and he has remained an eccentric. But morbid jealousy is not the only morbid emotivity of infants,‖ one finds also there pyromania, kleptomania, homicide, etc.¶

* Aucaigne. *De l'influence du moral sur le physique*, th., 1835, p. 15.

† Anstie. On Certain Affections of Old Persons (*Fl. of Mental Science*, t. xvi. p. 1).

‡ Charpentier. *Des troubles ment. dans la senilité précoce et rapide* (*Ann. Méd. Psych.*, 1885, t i., p. 276.)

§ P. M. Roux. *Des passions suivant les âges*, Marseilles in 8vo, 1819.

‖ P. Moreau de Tours. *La folie chez les enfants.* ¶ *Ibid. De l'homicide chez les enfants*, 1882.

Bucknill and Tuke have related an interesting fact, to the effect that so far as one can rely upon medical statistics, in England and America physical causes dominate the etiology of mental maladies: in France, it is moral causes.*

The capacity for experiencing emotions, or agreeable or disagreeable sensations, is not the same for a given individual in all physiological conditions. Agreeable sentiments are specially felt when the nervous system is in possession of the totality of its activities. The disagreeable sentiments develop themselves especially in the inverse condition. The age, the state of health, the surroundings, the ingesta influence the sentiments; the same holds good likewise of repose and fatigue. In the hunt after pleasure one exerts ingenuity to associate excitations of all the senses in the satisfaction of the appetites, to the intellectual enjoyments.

Galen had already observed the influence of the temperaments on the passions. Emotivity, like reflex excitability in general, is greater in the infant than in the adult, it is greater in the female than in the male. It is also greater in primitive man than in cultured man: but it takes anew a marked predominance in neuropathic degenerates to whatever class they belong. The somatic manifestations provoked by the physical or moral agents are in relation with this excitability, and it is the same in respect of their morbid effects. "In proportion as one ascends or one descends in the animal scale," says Claud Bernard,† "one meets with animals more or less sensitive to the action of the poisons which act on the nervous system:" it is thus that greyhounds and race horses show a remarkable susceptibility. "One of the greatest distinctions betwixt human beings," says Bain, "lies in the fact of the greater or lesser impressionability by environment."‡

It is a certainty that there are individuals designated under the general term "degenerate," distinguished in the highest degree by their impressionability to physical or moral agents: "one ray of the sun enlivens them, a cloud dulls them, an electric state of atmosphere torments them, excites them, or overpowers them: the happy or gay affections, equally with the sad or more lively,

* Bucknill and Tuke. *Manual of Psych. Med.*, 4th ed., 1879, p. 104.

† *Leçons de pathologie expérimentale*, p. 4.

‡ *Les émotions et la volonté*, p. 111.

finds them eminently accessible."* This impressionability, the condition of mental instability, is one of the first consequences of morbid heredity.† It must be remarked always that in a great number of degenerates emotivity, in place of being increased or perverted, is annulled: this last fact is not observed only in the category of criminals: Socrates, who had been under hallucination all his life, braved cold as well as hunger and thirst, the dangers of war as well as the invectives of Xantippe, the cries of the Athenian populace as well as the menaces of the Thirty tyrants.

The individuals who are most subject to experience the physical effects of the emotions are also, in general, very sensible to sensorial excitations. Females attacked by painful hysteria, who tear their hair at the least sound, swoon under the impression of an odour, who are subject to spasmodic troubles under the influence of local irritations (coughs, sneezings, blepharo-spasms, etc.), are also easily affected by moral shocks. There proceeds from that a morbid irritability which entails an enfeeblement of the nervous system capable of being provoked by an excessive functioning. Réveillé-Parise‡ says with reason that the more the nervous system is excited the more it is enfeebled, and that the more it is enfeebled the more it is disposed to excitation.

I do not think that perversions of emotivity can exist without perversions of sensibility. One finds often amongst emotionals anesthesias of general or special sensibility—general or systematic dysesthesias.

Certain subjects are of such a susceptibility that the least current of air is painful to them; and is capable of provoking faintings or terrible accesses of anxiety: it is a veritable aërophobia. Portal, Pomme, Alibert, Boyle, Prosper Lucas have cited cases of this kind. Others are affected by the hygrometric, others by the electric condition of the atmosphere.

Certain individuals offer a sensorial excitability such that they are incapable of supporting excitations even which ordinarily pass for agreeable. It is thus that Grétry was incommoded by the odour of roses. A female thought the same of the odour of violets which

* Sandras. *Traité pratique des maladies nerveuses*, t. i., p. 22.

† Morel. *Traité de Médicine légale des aliénés*, 1886, p. 21.

‡ Réveillé-Parise. *Phys. et hygiène des hommes livrés aux travaux de l'esprit.*

she could perceive at a great distance. Natalis Guillot has cited from Bouchut* the case of a member of the Institute who fell into a feebleness at the odour of linseed. Cullen refers to the wife of an apothecary who fell into a faint at the odour of freshly powdered ipecacuanha.

We have cited the case of a religieux who recognised people by their odour, and who had distinguished chaste people from unchaste.†

Hippocrates speaks of one Nicanor who effaced himself at the sound of a flute.

Wolfgang Mozart is a remarkable example of this coincidence of sensorial hyper-excitability and affective hyper-excitability. Whilst an infant, his sensibility was so great that the sound of a trumpet gave him convulsions, and at each instant of the day he was saying to the persons who surrounded him, "Do you love me well?" and a negative reply afflicted him much. His extremely mobile physiognomy, never at rest, expressed incessantly pain or pleasure.‡ The affective hyper-excitability finds itself again often enough in artists of every order for whom one can believe it to be a condition of their art.

Louis the Thirteenth, from his infancy, had given proof of cruelty towards animals. Henry the Fourth had to punish him for having broken the head of a sparrow: he showed later, under several circumstances, the same cruelty towards men, and he could not dissemble a great aversion for women, and an affection, strange at least, for those who were at least suspected of sexual inversion.§

The special susceptibility to colours has been remarked for a long time (Chroophobie de Laycock).‖

Schook is the author of a treatise, "De aversione casei," relating to a family all the members of whom were incapable of supporting the smell of cheese: evoking, in general, syncope.¶ Prosper Lucas cites similar cases.**

* Bouchut. *Du nervosisme*, 2nd ed., 1877, p. 203.

† *Le Cat Traité*, etc., 1767, t. ii., p. 255.

‡ Letourneau. *Phys. des passions*, 2nd ed., 1878, p. p. 27.

§ Max Simon. *Les maladies de l'esprit*, 1892, p. 95.

‖ Laycock. *Treatise on Diseases of the Nervous System of Women*, 1840, p. 341.

¶ *Dict. Sci. Méd. Art. Odorat.*

** P. Lucas. *Traité*, t. i., p. 389.

R. Whytt speaks of individuals to whom the odour of cheese caused bleeding at the nose. Boyle cites the case of a man to whom tansy gave syncopes: in one woman honey induced the same effect. We have cited also cases of similar effects produced by the odour of fur.

Affinities and intolerances of the same kind manifest themselves in respect of taste, and they are sometimes hereditary.*

The vision is not less affected; certain neuropaths cannot support any very bright light, the reverberation even of the sun, the sight of bright colours, etc.

The susceptibility to tickling coincides frequently with diverse morbid emotivities.

The relation which exists betwixt sensorial and moral perversions is found again in a large number of degenerates, but, especially in hysterical persons who are so subject to all sorts of depravations of taste. It is met with again in pregnancy.

The degenerates who are more subject to delirium under the influence of a sensorial irritation, or a moral shock, even slight, present often a peculiarly sharp mode of invasion which gives to their delirium the name of emblematic delirium.†

"Is it not a thing well worthy the meditation of physiologists and practitioners," says Trousseau, "that this perpetual antagonism between the blood and the nerves, between the predominance of the force of assimilation and the predominance of nervous phenomena, antagonism whence there results that the more the sanguineous system, the more the nervous system and the acts that emanate therefrom, are fixed, silent, regular, co-ordinated: that, reciprocally, the more the nutritive system and the vegetable phenomena are poor and languishing, the more the quantity of the blood is diminished, the more this liquid is deprived of its organisable parts, the more also are the nervous phenomena mobile, exalted, and irregular."

"The emotions, like the sensations," says Spencer,‡ "can increase and decrease in intensity if we alter the quantity or quality of the blood. Although it may be hardly certain that a general abun-

* P. Lucas. *Loc. cit.*, t. i., p. 389.

† Legrain. *Du délire chez les dégénérés*, th., 1886.

‡ H. Spencer. *Principes de Psychologie*, t.. p. 120

dance of blood causes an exaltation of the emotions, one cannot easily prove it." It is certain that morbid exaltation of emotivity is due to an alteration of the blood.

The chlorosis fever, or icterus of lovers, has been for a long time attributed to thwarted or dissembled love. The Ovidian verse:—

"Palleat omnis amans: hic est color aptus amandi,"

is a double entente; and one cannot reject the cases of Rousseau, Pidoux, Botkin, etc., in which chlorosis appears to have had a sharp commencement in the wake of moral emotions: it appears to us, however, that chlorosis, a malady of evolution, is a condition of morbid emotivity which expresses itself, moreover, by permanent morbid moroseness and irritability.

Morel admits that madness, like passion, is not only "the symptomatic expression of abnormal relations which establish themselves between the intelligence and its ailing instrument," the body.* It is more exact to say that the one and the other are the result of parallel changes in the mind and the body: the mind cannot change without the body being affected. Although one can, in general, say that madness is a malady, it is very often a deformity.†

The lively emotions only produce themselves in individuals predisposed specially: fear, for instance, which varies in intensity from suspicion to terror, scarcely shows itself in extreme degrees except in subjects whose physical feebleness‡ traces itself from infancy by a special susceptibility: certain individuals never experience the paralytic phenomena of fear howsoever dramatic may be the events they pass through. By reason of the activities which constitute the physiological conditions of the asthenic emotions they become each time that they reproduce themselves a new cause of exhaustion which only accentuates the phenomena of organic degeneracy and emotional predisposition. It is farther by reason of the same physiological conditions that the most lively emotions are the least durable, and are followed by more intense depressions, which correspond to asthenic emotional states, by so much the more prolonged and accentuated as they are more often repro-

* *Traité des maladies mentales*, 1860, p. 6.

† *Physical Basis of Mind. Forum*, Feb., 1891, p. 655.

‡ Descuret. *La médicine des passions*, 3rd ed., 1860, t. ii., p. 62.

duced, and can only be withstood by more and more energetic excitations.

Each individual presents special emotional susceptibilities which, by the repetition of their play, induce special phenomena of depression. These phenomena merit being compared with other facts brought in view by experiences of another order.

Hitzig had already observed that under the influence of anæsthetics the excitation of the motor zone of the cerebral cortex does not disappear from all the points in the same time; and Luciano and Tamburini have recognised since that those who lose most quickly their excitability, that is to say, who are most easily exhausted, are precisely those who are the most excitable in the normal state.

All the physiological modifications which are produced under the influence of the peripherical excitations, and accompany each change of emotional state, vary, however, with the extent of the excitation; that is to say, that every irritation which produces an exaltation of the vital processes, when it is moderate, can, if it is very strong, determine a discharge expressing itself, it may be by movements, it may be by secretion, it may be by an augmentation of heat, it may be by some psycho-physiological phenomenon: and this discharge will be followed by a diminution of the same vital processes.

But this difference in the effect produced does not alone exist by reason of the intensity of the irritation and by reason of the variable constitutional irritability of the subject, it is further in relation with the actual condition of the latter. "The influence of the motor nerves," says Claud Bernard,* "places the muscles always in a state opposed to that in which they are at the moment of excitation." One can say as much of the influence of the nervous system in general upon the entire organism. We have an example of this in the phenomenon which we have described for the first time with M. Binet under the name of "Psychic Polarisation."† and have met with frequently since.‡ The action of a certain excitant determines in certain subjects a change in the tonality of

* *Léçons*, t. i., p. 374.

† *Rév. Philosoph.* April, 1885.

‡ *Bianchi et Sommer. Archivis di psichiatria*, 1886, t. vii., fasc. iv., p. 387.

the organism entailing such a modification of sensibility; that a colour can be felt as its complementary, and an emotion can be transformed into its opposite. The reality of these sensations and these complementary emotions can be objectified by the study of the physiological conditions which we have passed in review.* I have already determined experimentally the modifications of voluntary activity which accompanies the change of emotional state: and the study of the reflex movements, of the muscular tonicity, of the circulation, of the respiration, only confirms the results of any previous researches. The consecutive effects of the lively emotions have not escaped philosophers who content themselves with introspection; "and frequently," says Descartes,† "after having laughed much one feels naturally inclined towards sadness."

They are met with again more markedly in the pathological states of the mind. To maniacal accesses sometimes succeeds a period of prostration with stupidity (Renaudin).‡ "In the convalescence of melancholy," says Guislain,§ "sadness yields place sometimes to a state of exaltation and gaiety, recalling almost the elementary maniacal form. Only excite melancholy convalescents and they exhibit a tendency to laugh, and to laugh in fits. They love to deck themselves out, to talk: their figure expresses a mobility which contrasts with their previous state, etc."

Certain people, besides bearing themselves well in appearance at least, present a true intolerance for certain emotions, as others possess an elective intolerance for certain fermented drinks. We find sufficiently often in individuals whose malady has been provoked by a moral or physical shock, a previous pathological emotivity: the following observation, interesting in more than one respect, is an example of this.

Observation XLVIII.

Paralysis Agitans—Unilateral Rigidity of the Tongue—Anterior Unilateral Rheumatism.‖

M. R., æt. 54 years, belongs to a nervous family, in whom arthritism is not rare. His mother has had attacks of hysteria at the menstrual and meno-

* *Sensation et mouvement*, p. 51.

† *Des passions art 126.*

‡ Sauze. *De la stupidité*, th., 1852.

§ Guislain. *Leçons orales*, 2nd ed., 1880, t. i., p. 117.

‖ This observation has already been utilised by M. Lacoste *(Contribution to the Study of the Malady of Parkinson)*, th., 1887, p. 25.

pause periods. A maternal aunt had an access of puerperal madness, and succumbed to a subsequent pregnancy, sequent to puerperal convulsions.

The father was rheumatismal, had had several acute attacks, and succumbed to an affection of the heart: the paternal aunt was migrainous.

Himself wet the bed till eight years of age, and was subject to nocturnal terrors. Actually still he is incapable of remaining in the dark without experiencing an extraordinary anguish.

One day he went to St. Germain in a dark waggon; he was seized with so great anxiety, in the tunnel, that he would have thrown himself out of the door if he had not been kept back. He has had two attacks of sub-acute rheumatism, the one at 22 years, the other at 28: they have each kept him about 15 days in bed, and have presented for their special character confinement to the right side, of which all the joints, large and small, appear to have been attacked. He has had five or six attacks of eczema on his right wrist and on the back of his right hand. M. R. is of a lively character, easily emotionalised, but has never had any neuropathic manifestation up to the age of 49 years.

In the month of September, 1882, having gone to visit a ruined fortification, a ladder step yielded under his foot, and he fell to the foot of it from a height of three or four metres. He did not experience any injury in his fall, but remained all a tremble throughout the day. Some days after he discovered that the thumb of his right hand was animated by certain lateral movements when he required to use the hand at any time, say to write, or simply to hold an object in his hand, his staff, for instance. Gradually the trembling became more marked, and invaded the other fingers: the hand has taken the writing pose, the fingers put themselves to "rolling the boulette" as soon as they are at rest.

The trembling has always had for its character self-exaggeration under the influence of emotion, but cessation during voluntary movements: it still maintains this character.

The writing is profoundly altered. M. R. has besides a large and heavy writing: to-day he writes extremely small and his letters present characteristic tremulousnes.

It is only towards the commencement of the year 1886 that he commenced to experience rigidity in the neck and shoulder of the right side: then in the lower member also: the nuca is outstanding.

Since June, 1886, M. R. experienced a certain difficulty in expressing words, his speech became more and more embarrassed, it appeared to him as if his mouth was full of food. Then he came to bite his tongue on the right side.

M. R. has remarked for some months only a tendency to deviate to the right when he walked. This tendency has considerably augmented since. No propulsion or tendency to recoil.

Further than an inconvenient sensation of nocturnal heat and a permanent necessity for change of place M. R. presents no other trouble.

The digestive functions accomplish themselves well: no trouble of respira-

tion: there is a slight souffle at the apex and with the first sound, but the circulation presents no notable alteration.

Actual state (February 4th, 1887).—When M. R. is erect his body is inclined to the right. He holds his lower limb in a slight flexion of all its segments. The right side of the neck is drawn towards the body, the shoulder falling a little, the hand is brought forward over the front of the body in a classic attitude as if he held a pen to write, and his fingers "roll the ball." The face is somewhat turned to the left, and is set in that direction. The head is, as it were, soldered to the vertebral column, but one feels that the muscles of the nucha are more rigid and outstanding on the right side.

The face presents a singular expression; whilst it preserves its mobility almost normal on the left side it is, as it were, rigid on the right: the furrows of the nasogenien region are almost completely effaced on this side, and this part of the face takes no part in the numerous movements of the whole. The right eyebrow is notably more raised than the left, and the transverse folds of the forehead are much more marked on the right. The look is fixed and directed towards the antero-posterior plane of the head in a sense.

Whilst the members of the right side are rigid and lend themselves with difficulty to effect passive movement the members of the left side are supple: nevertheless this side is not entirely intact, the thumb is involved in slight trembles.

Speech is much altered: one hears almost nothing but a confused babblement, there is not a single consonant which he articulates easily; the lips, the tongue, the pharynx, all are involved; it is absolutely necessary for M. R.'s attendant to translate the words which are incomprehensible to those who are not familiarised with the sounds which he utters.

The mouth opens with difficulty. When one has forced open the dental arches one perceives the left border of the tongue turned directly upwards: the point is deviated to the right and below, behind the lower row. The right half of the tongue reclining on the floor of the mouth presents a much harder consistence than the other half. When one proceeds to redress the organ and to expose its upper face one finds superficial longitudinal folds on the right side which likewise appears diminished in volume.

The patient hardly makes any voluntary movements from the spot, and appears to make them entirely on the right side. He is incapable of getting clear of the point in any sense.

For a month the condition of M. R. appeared to ameliorate a little under the influence of hydrotherapy: but the malady soon resumed its invading march: the troubles of deglutition, which existed almost from the month of February, are become such that the ingestion of liquids is almost impossible.

The character of M. R. has undergone a considerable alteration: he has become moody and seeks isolation.

He succumbed on the 10th June last to a pneumonia of the right side contracted in the wake of an accidental (?) immersion in a reservoir.

When an animal has resisted the tetanising influence of strychnine he may remain during several days in such a state of excita-

bility that one might provoke a tetanic access even by a slight touch, or a sudden sound, or by a luminous excitation, or by a lively emotion. Emotional people, tetanised in some sort by their morbid heredity, or by some trouble of evolution, are in an analogous state; they react tetanically, so to speak, to the lightest excitations, this excitability, moreover, entailing no idea of perfection of sensibility.

If certain hereditary or organic conditions favour the irritability and energy of the reactions to physical excitations and emotions, other conditions act in an inverse sense. The irritability of the nervous centres is diminished under the influence of developmental arrests, or of certain destructive lesions of the brain supervening upon a precocious period of evolution: irritability is but little developed in idiots who are little sensitive to physical irritants: in them also the emotions are almost nil. Burgess has remarked with truth that they rarely blush: the fact being that they present hardly any sign of emotion except anger. This absence of irritability entails the absence of attention, and consequently the normal manifestations of intelligence and will: in imbeciles irritability is also diminished and perverted: alterations of emotivity follow which consequently modify attention and other intellectual phenomena.

In imbeciles and especially in idiots emotivity is weakened or altered contemporaneously with intellectual activity and sensibility. Idiots, insensible to the hand which pats them or slaps them, are not susceptible of any sentiment of recognition or vengeance (Ferrus): wherefore does their physiognomy express no desire (Dubois, d'Amiens): their affective passions are also nil like their intelligence (Calmeil). Haindorf reports that an idiot, upon whom it was desired to experiment in order to find how far fright would affect him, was placed near an hospital inmate who assumed death: seeing that he made some movements, the idiot furnished himself with a hatchet, and cut the victim's foot, and, with a second blow, his head, in spite of his cries. The accesses of violence that one observes often in imbeciles does not indicate a great emotional sensibility; but, on the contrary, a regressive perversion of emotivity which tends towards automatism, and expresses itself by the reactions of reflex character.

M. Sollier* affirms, without appearing to be free himself for any systematic observations, that the sensibility is normal in imbeciles, and M. Guibert† is not less affirmative without more proofs, moreover, as to what concerns the vision. In all the imbeciles whom I have examined I have found troubles of general and special sensibility: and particularly every time that I have made an examination functionally of the eye: acuity of vision, vision of colours, visual field, etc.: and Messrs. A. Marie and J. Bonnet‡ have published recently observations which come to the support of mine. The defects of attention which dominate their intellectual feebleness are the consequences of their defective irritability to physical agents. It is not admissible to-day to affirm that psychic troubles can exist apart from any trouble of sensibility. If these last are difficult to put in evidence, recourse must be had to processes of a more perfect kind, to the study of the perceptible minimum, for example, which ought to become part of psychiatic clinique.§

In senile alteration of the brain and analogous conditions of the brain characterised by dementia, the sentiments and emotions efface themselves in presence of troubles of an intellectual order. The retrograde dissolution of the affective phenomena is the consequence of the intellectual failure. Emotion is always subordinated to representation.

Sensorial intolerance it is very important to consider from the point of view of diagnosis of character. An individual who is hurt by a light which affects no other, by an odour, by a sound, by a temperature of which no one else complains, is necessarily affected in the same degree by representations of every order: one can say, of a surety, that his character is equally intolerable as intolerant. It is a fact not lacking practical interest, for many individuals are capable of containing in a certain measure the reactions of their representations and emotions, and are powerless to moderate the reactions to the sensorial excitations to which they are exposed suddenly.

* *Psychologie de l'idiot et de l'imbécile*, 1891, pp. 49 and 55 *et suiv.*

† *La vision chez les idiots et chez les imbéciles*, th., 1891, p. 82.

‡ Mairie et Bonnet. *La vision chez les idiots et les imbéciles*, in 8vo, 1892.

§ Ch. Féré, P. Batigne et P. Ouvrey. *Récherches sur le minimum perceptible de l'olfaction et de la gustation chez les épileptiques (Mém. de la Soc. de Biologie*, 1892, p. 259).

The relation which exists betwixt emotivity and irritability in general is signally appropriate for showing the physical origin of mind troubles and their degenerate nature. The vitality of living tissues, in general, is in relation with their independence of exterior phenomena. All the excessive reactions to exterior excitations or their representations are, in fact, manifestations of defective vitality.

The abnormal sensibility to sensorial excitations is not a mark of perfection, even when it appears augmented: this excessive sensibility cannot pertain to other than one particular form of attention, to a defect in representations, to a state of mono-ideaism. This so-called super-excitability is no more a perfection of sensibility than contracture is a perfection of movement. Abnormal emotivity is not any the more a perfect emotivity. Normal emotion provokes efficacious reflexes, it provokes useful acts. Excessive emotion, anger or terror, passion, only produces reactions hurtful to the individual or the species, and its effects are always out of proportion to the exciting cause.

The systematisation of emotivity and mono-ideaism can hardly produce themselves except when there exists a certain degree of apathy relatively to the representations of another order.

If certain individuals present invincible sensorial susceptibilities, others, on the contrary, appear refractory to the excitations generally painful or disagreeable.

Some distinguished men presented these perversions of sensibility: Laplace ate spiders,* Monge drank water saturated with sulphuretted hydrogen,† but talent and genius are not so much as they might be exclusively intellectual and emotional anomalies.

The individual predisposition does not make itself felt only by the intensity of the reactions to physical or moral shocks. It exhibits itself further in a special manner on some certain organs or certain parts of the body originally feeble. This is a point to which we will have to return.

The well-constituted man and absolutely in good health is incapable of experiencing violent emotions.

"In these conditions," says Moreau (de Tours),‡ "man can be

* Ch. Richet. *Essai sur les causes du dégoût. Rév. des Deux mondes*, 1877, t. 22, p. 647.
† *Léçons sur les effets*, p. 57.
‡ *La psychologie morbide*, p. 468.

dowered by a right sense, more or less certain judgment, a certain imagination: his passions are serious—moderate; always master of himself: he will practice better than anyone the doctrine of good intention: he will never be a great criminal, but neither will he ever be a great man." He will conserve a level character, a calm visage; and a long life for him is reserved.*

Charles the Fifth, dying of the fright which the ceremonial of his funeral obsequies caused him, which he had ordained before his death, is a good instance of predisposition to pathological effects of emotion.

We know, on the other hand, that habituation to small doses of medicaments renders the subjects refractory to their actions: it is thus, for example, in regard to morphia. Kauffmann has established facts of the same kind in respect of poisons.

The same holds good in respect of physical excitations: the repetition of moral excitations can engender a diminution of sensibility and reactions. The habit of painful excitations can bring about a condition of mithridatisation of such sort that emotivity is partially or completely suppressed.

Repeated emotions and the complete absence of all security end frequently by determining a state of indifference and apathy. This is what one observes, for instance, at the time of the Terror; viz., the most unfeeling scenes of gaiety, or the maddest debauch on the most terrible days of massacre.

But the more the emotions produce themselves, the organism which suffers them benefits nothing by the custom. The effects of successive shocks accumulate themselves to induce, progressively, exhaustion of the nervous system: one may say that the prolonged chagrins, the simple desires of life are, in general, more efficacious for the production of nervous troubles than the very intense but less durable things whose effects appear, however, much more dramatic.

It is not necessary to dwell further on the differences of resistances which exist in man and in woman.†

Amongst the organic conditions which most influence the emo-

* Wiedmann. *De facie sibi semper simili longaevitatis indice. Diss. Inaug. Helmstadii*, 1858.

† Roussell. *Syst. phys. et moral de la femme suivi d'un fragment du système physique et moral de l'homme*, 7th ed., 1820. Virey. *De la femme*, 2nd ed., 1825. Benech. *Considerations sur les rapports du physique et du moral du femme*. 8vo, 1819.

tional state it is requisite to mention the development of the genital organs: the troubles of sexual evolution are often accompanied by emotional and instructive perversions. Incomplete development, infantilism, coincide frequently with an infantile excitability, there exists a veritable moral infantilism. Femininity and masculinity entail analogous perversions. The accidental or surgical lesions, castration, equally in man* or woman, can have the same consequences.

The influence of the physical constitution on emotivity is well placed in evidence by the modifications which supervene upon puberty in the two sexes, at the menopause in woman, in man apropos of the loss of the genital organs, in women who have lost both ovaries. In these last conditions of sexual death men assume a feminine character and women become subject to the inverse modifications (feminisme, gynecomastie). Certain physiological conditions, like menstruation, pregnancy, lactation, act on the emotivity and on the character: it is the same in the matter of digestion, especially when it is effected under abnormal conditions.

But it is especially the different manifestations of the sexual functions which express themselves by remarkable emotional manifestations. But the rhythmical phenomena of the sexual life of the woman are especially accompanied by emotional troubles which may commence before the apparition of the menstrual flux and continue, always under the same periodic form, long after it has disappeared.† Menstruation, gestation, lactation entail the most varied modifications of the instincts.

As a general rule gestation and lactation suppress emotions of the genetic order: but it is not always thus with them. We know instances of women who have not experienced desire until after a first accouchement; and others only during pregnancy exclusively. Pregnancy, in nervous women particularly, predisposes to the different forms of morbid emotivity which expresses itself by a special criminality. The ancient authors thought that the life of the infant even could have an influence on these troubles, but modern researches do not confirm this opinion.

* Weiss. *Nervöse und psychische Strainger nack Extirpation beiden Hoden* (*Wien. Med. Press*, nos. 22 and 25).

† Berthier. *Des névroses menstruelles*, in 8vo, 1874. Icard. *La femme pendant la période menstruelle*, in 8vo, 1890.

The menopause gives also place to troubles of emotivity. Gueneau de Mussy has insisted upon erotism during the menopause.

All the irregularities of the genital function can entail troubles of emotivity.

Incomplete coitus, matrimonial frauds, are frequently in man and woman equally, but especially in the last, the determining cause of a nervous excitability which expresses itself by the most diverse forms of morbid emotivities.

Seminal losses entail a feeling of uneasiness, impotence, discouragement, which degenerates often into hypochondria, into melancholia with tendency to suicide.

Excessive emotivity can be, by itself, alone at once the predisposing and the efficient cause of madness. L. Meyer has remarked that certain individuals, struck with what they call their "peculiar cerebral anomaly," pre-occupy themselves so much therewith that they end by becoming deranged. Comparing these deliriums with intentional trembling, he designates them under the title intentional psychoses.

Certain pathological or accidental conditions favour the physical effects of the excitations. Such are most of the acute or chronic affections, and especially those which are accompanied by pain and intense nervous depression. Experimentation on animals explains this hyper-excitability. Tarschanoff has observed that in the normal state the impressions induced upon the intestines of the frog do not exercise any influence on the heart; when the digestive tube, or a part of this tube, is inflamed, the slightest touch arrests the heart.

Emotivity is modified by most maladies, and especially by chronic maladies. In some, the affective troubles can manifest themselves apparently in the wake of gross bodily troubles: it is this particularly we see in rheumatics, in the gouty. They are rather then in relation with the modifications of general nutrition than with pain, as we can see further in consumptives, and in the secondary period of syphilis. Certain accidental affections can bring about a change of emotivity by exaggerating it or diminishing it; traumatisms, for instance, and especially traumatisms of the head.

In general acute maladies entail rather a diminution of emotivity. However there exist exceptions which are not even special to man: in the epidemics of the deer of the parks of Richmond and Ickworth there has been observed an impulsion to bite.

Most of the authors who have treated of the paralyses of cerebral origin have noted the frequency of the morbid emotivity which accompanies them. The most calm and placid subjects become more irritable. I have observed a case of systematic emotivity in the course of cerebral syphilis.

The diffuse or systematic schleroses of the nervous system are frequently accompanied by morbid emotivity; spotted sclerosis, the malady of Little, etc.

The maladies, and in particular the diseases, which are most accompanied by morbid emotivities are those which are most often provoked by emotion of the sort which it is difficult to say in what proportion this emotivity plays the *rôle* of cause, and in what proportion it is an effect.

All the physiological conditions, or pathological, which are capable of provoking neurasthenia constitute a condition of morbid emotivity; puberty, pregnancy, lactation, menopause, traumatisms, general affections, rheumatism, gout, diatheses, anemia, chlorosis, visceral affections, and especially maladies of the stomach and genital organs, etc. The same irritable feebleness is found again frequently in the convalescence of acute maladies.

The bradytrophies are not distinguished by an augmentation of emotivity but by perversions. The gouty are irritable, especially in the preparoxysmal stage, but there ensues very plainly a morbid irritability. One can say this also of hysterios who are often apathetic after their periods of excitation. The scrofulous, the rachitic are apathetic, and sad, etc. Candidates for phthisis have sometimes a remarkable intellectual and emotional excitation: one says of them that they have too much spirit to live long.

The general paralytics distinguish themselves often by a regression of emotivity, loss of æsthetic sentiments, altruistic sentiments, and even egoistic sentiments; they thus arrive at an automatic existence, like dements. It is consequent to these alterations of emotivity that we see them give themselves up to anti-social acts like theft, violence against persons, guardians of morals.

Cranial traumatisms have frequently in their wake a morbid emotivity. Lasègue has imposed the name of "brainy" upon patients attacked by these troubles which can present themselves under very diverse forms: sexual perversions have been recorded as supervening in the wake of these shocks.

Apart from every antecedent malady of the nervous system morbid emotivity can manifest itself not only in the wake of a traumatic shock, in the wake of a certain organic malady, in certain physiological conditions, such as the menstrual period, gestation, lactation, etc.: but in some subjects, a violent or prolonged exercise, an intellectual toil, produce accidentally a passing emotivity which varies according as the excitation supervenes upon the exercise or is immediately followed by depression.

Neurasthenia, which is often provoked by painful emotions, but not always, (as one affirmed lately without adducing valid proofs) (Théroux, Contrib. à l'étude de la Neurasthénie, Th., 1892, p. 11), constitutes one of the pathological conditions most favourable to morbid emotivity. This emotivity of neurasthenia manifests itself especially under the form of morbid fears and irresistible desires for certain excitants, such as alcohol, ether, tobacco, coffee, etc. Moreover, it is not rare to see neurasthenics present a considerable perversion of the sensibility of various special senses.

"Hysteria," says Rosenthal, "is only a feebleness of resistance, congenital or acquired, of the vaso-motor centres." It is in every case a state of irritable feebleness which reunites the most favourable conditions of morbid emotivities; also frequently one finds them in the physical signs proper to all the categories of emotional persons.

Acute fatigue, like neurasthenia and hysteria, (chronic fatigues), accompany themselves sometimes by a morbid emotivity and even by a systematic emotivity of the morbid kind.

The huntsmen of the New World who are most accustomed to traverse the forests, are subject, without doubt, under the influence of fatigue or hunger, to a momentary loss of the sense of direction which is associated with a special anxiety which can be compared to an accidental agoraphobia.

Under the influence of the different causes of exhaustion emotivity develops itself after a very intense manner at which there is

no ground for surprise, for we have seen that fatigue provokes an irritable feebleness very analogous to hysteria.

If the modifications acquired by the nervous energy considered in general can reproduce the conditions of congenital debility, the acquired debility of certain organs can also reproduce the defective congenital functional conditions of these same organs.

In fact, the different forms of morbid emotivity which ought to be considered as the syndromata analogous to epileptic syndromata can develop themselves in such very diverse conditions, that it is important to determine them when one would wish to establish a very exact diagnosis, a probable prognosis, and a rational therapeusis.

Epileptics present a great number of explosive manifestations reckoned automatic: but they are subject also to diverse emotivities which contribute to give a very particular mark to their character. These troubles of emotivity can precede all other manifestations.

OBSERVATION XLIX.

Epilepsy preceded by Troubles of Emotivity.

M. P., æt. 54 years, has for four years attacks of epilepsy, generally nocturnal, thus characterised: He rises automatically from his bed, dresses himself, makes certain movements of deglutition, turns his head to the right, straightens himself, his limbs become slightly tremulous, then he regains self-possession. He sometimes bites his tongue, and he sometimes micturates during the fits of which he had no consciousness. He has, besides, vertigos in which he remains for an instant motionless: sometimes it happens to him to let some object, held in his hand, fall to the ground without consciousness thereof: one day he was surprised suddenly to find that he had no cane in his hand: he had had time to make ten steps since he had let it fall without perceiving it. This man, who presents a slight facial paresis of the right side, and a sensation of coldness in all the corresponding side of the body, has sometimes numbness, tremblings, or pulsations in his arm. He presents no physical sign of degenerescence, and no antecedent hereditary taint is known to him. These two circumstances concord well with the tardy *début* of the neurosis.

Always this tardy onset has been preceded by modifications of character which are not without interest. This man, who appears to have managed his estate well, had always been of a calm character, bearing with sangfroid the annoyances of family life and those of business, had changed gradually in character five or six years before the onset of his convulsive fits: he has become easily emotional: a material loss of slight importance, a discussion with a client or an employée, put him out of his ordinary; and his emotions so easily provoked, accompanied themselves further by physical ailments which

were unknown to him before, such as oppression, tumultuous heart beatings with extremely painful precordial anguish, without trace of organic lesion. The emotional crises which persist have preceded the other troubles by several years.

Emotivity is modified by a large number of toxic or medicinal substances. Alcoholism constitutes a condition of morbid emotivity. The abuse of alcohol makes part of the preliminary of a great number of crimes; Lombroso says that nine-tenths of crimes are committed under its influence. Whatever may be the exaggeration of this proportion the fact is undoubted; alcohol, in strong doses, has a suspensive action upon the brain, and gives free play to the most violent reactions. So one sees alcoholism associated for the most part to vices. It is by breaking the associations that alcohol deadens the voice of conscience. Morphia, choral, ether, tobacco, in a certain measure, can have analogous effects. Many stimulating substances, which one believes in general to have for effect the provocation of intellectual excitation, have, in reality, that of modifying emotional tonality. A great number of individuals would bear patiently intellectual atony from which they suffer, not because they ignore it: but they seek remedies against the asthenic emotions which are always painful to a certain degree.

In the process of physiological dissolution of old age, and in certain pathological processes, they are the last acquired emotions which first disappear. But it is not always thus. A. Hill relates the history of a pasteur who, seeing his only daughter in danger of drowning, and although a good swimmer, could not bring himself to her help, because he was bereft of his bathing dress (Caleçon).

The influence of environment upon emotivity has not escaped the philosophers nor medical men. Montesquieu and Herder have insisted upon geographical influences.

Under the influence of extreme fatigue, emotivity, in place of exaggerating itself, attenuates. In states of nervous exhaustion consecutive to intense shocks, sensory insensibility, sensorial and intellectual abatement, entail a complete absence of emotivity, absolute apathy. This is what is seen, for instance, after traumatic shocks or violent emotions, after forced labour, after epileptic discharges, etc. In neuropaths, in neurasthenics, apathy

manifests itself sometimes in form of paroxysms, it may be in the wake of nervous discharges, it may be in consequence of the absence of physiological irritation. In epileptics these crises manifest themselves sometimes without known cause.

If over-fatigue and physical and intellectual fatigue play incontestably a *rôle* in the production of morbid emotivity; the inactivity of the body and the spirit thereof are still more energetic factors. When the mind and the body are inactive attention fixes itself easily upon the sensations and the individual emotions which tend frequently to become the exclusive pre-occupation; the first step in alienation, this idleness acts upon individuals naturally feeble, like the absence of irritation upon oscillating animals. Among the idle the activity of the nervous system is abolished or perverted under the influence of inaction. This is just what we see induced amongst those who have retired and ceased from business and every occupation: and in women of the easy class who are not interested in the material conditions of existence, and have not a sufficiently cultivated mind to take part in the intellectual or social life.

A large number of troubles attributed to over-work are in reality due to an exclusive activity leaving in inertia nervous functions which fall into dissolution.

"I have heard," says J. Frank, "several gouty people who, feeling themselves more choleric, announced a coming attack of their illness." The gouty, like the epileptic, accesses are often preceded by morbid emotivity.

We have seen that, following the remark of Broussais, if the emotions accompany themselves with passing physiological conditions these same conditions, provoked by a material circumstance, accompany themselves with a concording emotion. So, if the emotions, being prolonged, can provoke durable physiological troubles, notably on the side of the heart, reciprocally chronic affections of the heart can accompany themselves with durable mental troubles: it is thus that Corvisart has noted in most individuals attacked by hypertrophy of the heart an extreme development of the affective sensibility and a great mobility of character. Amongst the physicians who have particularly insisted since upon the relations of mental troubles to affections of the heart must be

cited Nasse, Saucerotte, Burrows, Maurice, Raynaud, Peter, and finally d'Astros and Mickle.* D'Astros finds that, from the point of view of psychic troubles, there is a well-marked difference according as the lesions bear upon the mitral or the aortic orifice. The patients of the last category who are anemics have phenomena of excitation, are readily excitable: the others are "congestionnés," and are frequently sad and taciturn. The aortiques are easily attacked with intellectual fatigue, and by defective memory and fits of aphasia even: their intellectual enfeeblement verges sometimes even upon senile dementia. The mental and moral condition of aortiques may degenerate into veritable cardiac hysteria. The mitrals are melancholic or violent, and frequently these two characters are associated.

Mickle admits differences in mitrals according as they are associated with narrowness or dilatation or by a trifling lesion. In insufficiency there exist great emotivity, melancholy, hallucinations of sight and hearing: in the third case there exist irritability and a tendency to delirium of persecutions.

Cardiac madness, which is not absolutely independent of heredity, is influenced by the march of the causal malady: it presents oscillations more or less sudden: but the intensity of the intellectual troubles does not necessarily correspond to a recrudescence of the cardiac troubles.

In asystole we observe frequently hallucinations, mainly of sight, producing themselves especially at night: at other times it is a melancholic delirium, or more or less systematic maniacal delirium. In the last days, when there has not previously been mental troubles, there frequently supervenes a common delirium especially at night.

We can say that, like the heart, all the organs which are specially affected by the emotions, when they are out of order, affect irritability and emotivity, and consequently entail mental troubles. We cannot always know, up to the present, to assign them a special form.

Most of the passions act with more force in solitude because the ideas which serve them as base, can then exclusively occupy the mind. Zimmerman, who remarked this fact, exhibits well the

* On insanity in its relations to cardiac and aortic diseases, 1888.

effects thereof, in the rivalries, the rancours of little villages. Solitude acts specially upon the sick.

Character is as difficult to define as temperament: the one constitutes the moral personality, whilst the other constitutes the physical personality: the temperament is the totality of the physical conditions of character; the character is the expression of the sensibility and emotivity (representative sensibility). The peculiarities attributed to the various temperaments which one has tried to distinguish are not always presented under forms of groups sufficiently natural to be unanimously accepted by the physicians. We cannot now attempt to find better classifications of characters. The ancient authors and Richerand admitted a distinction corresponding to the sanguine, bilious, lymphatic, and nervous. The multiple influences which we see act on emotivity indicate that there are as many characters as individuals.

We know that in the wake of indigestion there is often produced an enduring intolerance, sometimes even definitely persisting in respect of the aliment which has produced it: and this intolerance is such that this aliment cannot be taken any more in howsoever small a quantity it may be. They are not only alimentary substances which are capable of provoking these effects; intolerance of medicaments is also observed which is produced by the same mechanism. The Professor R. has the habit of ingesting very considerable quantities of opium in the form of laudanum, in order to allay paroxysmal pains, for which he employs also occasionally morphia and salicylate of soda, which he has always available. Being deceived one day in respect of the bottle he took a solution containing a small teaspoonful of morphia instead of salicylate of soda. Although the mistake was immediately recognised, and although a large portion of the medicament might have been rejected, there followed very unpleasant toxic phenomena. From this time the most minute quantities of laudanum, and opium in all its forms, determine phenomena of toxic sort, and one may say that intolerance is absolute.

One may observe the same phenomena of intolerance in the wake of physical shocks, and especially following isolation.

The violent emotions can produce an effect analogous, and can leave after them a remarkable intolerance for the most trivial

emotions; the individual who is attacked remains in conditions of a chronic emotional intoxication.

OBSERVATION L.

Moral Shock—Hysterical Paralysis—Cure by the Diapason—Persisting Emotivity.*

La Nommée L., æt. 41 years, costume maker, without any neuropathic heredity, so far as she can tell, has herself always been well cared for, and has never presented any nervous troubles: her periods were regular and painless. She has always worked regularly, and has never been addicted to any kind of excess. She lived as wife to a commercial traveller for 20 years: with whom she always remained in touch (intelligence). She has never had infants or any miscarriages. This woman had assisted at accidents of more or less dramatic sort, several times: the accidental death of her brother, who fell from a roof, his house being on fire, without her experiencing any consequence of morbid emotion. On May 25th, 1885, her lover, without any prior discussion, declared to her that the liaison weighed upon him, and that he must leave; and he set about realising his effects; he left her effects and money for her wants, but nothing could make up for his going away and leaving her. L. was in a manner stupified by this sudden and unexpected departure. As soon as she was alone she wished to write, but she could not hold a pen, which she let fall: it seemed to her as if she had no arm, and in spite of efforts she could not move her right arm without the help of her left. She felt her hand sleeping, she pricked her right hand and forearm with a needle, she felt nothing of it. About the end of an hour, she began to experience formications, which mounted from the tips of her fingers up to the shoulder. These have persisted up till night, and have been replaced by a sensation of weight: it seemed to her that her arm was of an enormous weight, and she was incapable of making it execute the least movement. From the first days she determined that the whole of her upper right arm was entirely insensible to cold and heat. The arm remained flaccid till the end of December, then it began to become rigid, the fingers fixed in extension. Since her emotion she was constantly a prey to the obsession that the man who had left her was pursuing her; when she walked in the street, it appeared to her that he was following her, and she returned, but saw nothing. Sometimes during the night there came upon her what she called weak fits; she awoke with perfect consciousness of what was passing around her, but entirely unable to make the slightest movements, nor to call: this state, which associated itself with feelings of pins and needles in the fingers and nails, only ceased when it became broad daylight, and only then very progressively.

On January 25th, 1886, when she presented herself at the Salpêtrière to consult M. Féré, it was established that the right arm was entirely paralysed, and that it was rigidly extended along the side of the body. Tactile and thermal sensibility was abolished throughout the whole of this member except upon its back surface and the phalanges of all the fingers and the whole of the palmar surface of the hand and fingers. Above, the anesthetic border ends suddenly a little below the prominence of the shoulder. One could twist the

* This observation is garnered by Mme. Tsakni-Jraclidi, externe of the hospitals.

articulation of the elbow and those of the wrist and the shoulder without producing pain; the articulations of the fingers were, on the contrary, sensible. All the muscular masses of the arm and forearm can be pinched and twisted without sensation. There exists besides a zone of cutaneous insensibility round the right eye, which failed to distinguish colour, and whose visual field is the subject of a concentric contraction very marked for white. The mucosa of the right nostril is insensible, and the olfactive anesthesia is complete on this side, so also the pharynx which can be touched with the finger without evoking a reflex: taste is abolished on the right. The external auditory meatus is anesthetic, and audition is feebler on the right side. The remainder of the face and body, on the right side, has preserved its sensibility, which is also intact on the left. The visual field is contracted on the left, but the patient sees all the colours on this side.

The right ovarian region is painful to pressure, and there exists a painful hyperesthetic point, spontaneously, behind the left ear, and another behind the middle part of the left sterno-cleido-mastoidien. L. is extremely emotional, the least unexpected sound, a question which she does not readily comprehend, occasion her a crisis of trembling or tears. Subjected during two months to static electricity, to hydrotherapy, to iron and sodium bromide, she did not experience any amelioration. Dating from April 5th, she was treated to massage and flagellation, of the head, on the side opposite to that of the paralysis, by Dr. Gautiez. The massage yielded no result, and the patient could not bear the flagellations. Suggestion in the sleeping state was without result.

Upon April 19th, M. Féré applied to her the foot of a diapason (tuning-fork ut 2) at the side of the head opposite to the paralysis. The application endured 35 minutes. At the end of 20 minutes the patient began to experience formication at the tips of the fingers, a sensation which gradually mounted towards the shoulder: sensibility returned gradually, simultaneously with movement: the fingers began to flex, then motility returned gradually into the wrist, elbow, and shoulder. At the end of this first trial, the right hand, which was incapable of any movement, yielded 15 with the dynamometer, the left hand giving 22. The sensibility and the motility have persisted gradually, diminishing during 2½ days.

On the 23rd the tuning-fork was again applied for 25 minutes. At the end of the experiment the left hand yielded 17 to the dynamometer, and the sensibility returned into the upper arm. The sensibility was wanting the following day at the same hour, but the patient preserved the movements of the hand, which yielded eight to the dynamometer. On April 27th sensibility returned after 20 minutes' application of the diapason, and the dynamometer yielded 17. Movement of the fingers is sufficiently established for the patient to work with the needle for nearly an hour. On April 30th the force of the hand had fallen to twelve: it returned to 17, and the sensibility became re-established after 15 minutes application of the diapason. On May 3rd the same result. On May 5th the cutaneous sensibility of the member persisted, the dynamometer was only lowered to 15; after 15 minutes application of the diapason it went up to 17. Up to this point the sensibility of the special senses had not been modified. We applied on the 8th the diapason successively to the cranium and to the suborbital nerve at its point of emergence. After these

two applications, each a quarter of an hour, the dynamometer yielded 22 for the right hand: the patient distinguished yellow from red, and the sensibility of the other sense organs was considerably augmented, if not completely restored. The patient, who brought two sheets of red and yellow paper, has established the fact that the amelioration of vision has persisted up till the night: it disappeared the next morning: up to May 19th it produced no new modification, except that the capacity of the right hand endures longer, gradually, and is easier. Dating from this day the patient began to see green. On May 19th, two days after the application, she obtained red vision, the dynamometer yields 17, it yields 24 after the application. On May 22nd the patient could, and for two days previously, work for four hours consecutively. After the application she could see all colours, with violet: she complained of a feeling of grains of sand in the right eye, of which the conjunctiva, however, did not present any change of colour. On May 25th the cutaneous sensibility persists. For the last three days she has been able to enjoy sleep for five consecutive hours, without fatigue. The special sensibility is also returned in part, there only remains violet, which the patient cannot differentiate. The dynamometer in the right hand yields 17 before the application, 28 thereafter: with the left hand 25.

This local treatment, combined with hydrotherapy, iron, and bromide of potassium has been continued up till July 18th. The seances were prolonged in interval in proportion as the effects were more prolonged. At the last seance the sensibility persisted for twelve days, and the dynamometer gave 28 to the right and 25 to the left. The restoration gradually demanded less and less time during the final seances. The patient had increased in weight by twelve pounds since the commencement of her treatment. She had no longer any painful points: the obsessions had disappeared, but the emotivity persists: she emits cries at the slightest accident of which she is witness. She has been seen several times during the course of the year: her monoplegia remains cured, but she cries out always on the slightest pretence. At the sight of a rearing horse she has been seized with a general trembling lasting two days: she hardly dare go out alone into the streets, for fear of being seized with some nervous trouble, if she went to assist by chance at some accident. At night especially, she is entirely tremulous at the least sound, and she can no longer remain without light during the night.

At other times violent emotions provoke a systematic emotivity: thus Crothers has instanced cases of individuals whose taste for strong liquors has shown itself in the wake of powerful emotions of moral description as well as in the wake of physical shocks.

With few exceptions authors maintain that emotional madness is isolated from any intellectual taint. It is an opinion with which I do not agree. If one can cite a certain number of individuals who have suffered from a morbid emotivity capable of producing remarkable works and adapting themselves advantageously to the social life of their epoch, that is no absolute or commanding proof of sense and intelligence (esprit), as Moreau de Tours says, most

of them presenting behind their special emotivity psychic troubles which render them incapable of filling an active *rôle:* the greatest number is affected by a manifest mental debility, a debility which moreover can be temporary if the emotivity is itself dependent upon a temporary somatic affection. If instinct is only a compound reflex, as is generally admitted, a perversion of the instinct cannot exist without the arc transversed by the reflex being, at some point, subject to some alteration. If it acts under impulsive perversion, an irritation of the motor centres must be admitted, an autochthonous or propagated irritation: if it is due to a perversion which only manifests itself apropos of external irritations, it is because the centripetal or sensitive portion of the reflex arc is altered, it may be in the central part, possibly in the peripheral part. Instinctive perversions, whatsoever they are, appear to me to be susceptible of no other interpretation than a physiological one.* It may often happen in a large number of cases we may not know how to set in evidence these physiological conditions, notably troubles of sensibility and reflectivity, in an individual, but this lack of capacity upon our part does not warrant a negation.

Moreau de Tours reports, after Renaudin, an observation of troubles of sensibility coinciding with access of moral madness.†

We see that, in fact, the conditions of morbid emotivity, such as we have defined, consist in congenital or acquired organic defects which constitute a physical failure or forfeiture entailing general feebleness of nervous actions.

We have made record previously that, under the influence of fatigue, congenital debility can induce the same results; the phenomena of subjective sensibility and the representations can assume an intensity such that they can objectify themselves, that they exteriorise themselves: the ideas, the recollections, transform themselves easily into hallucinations susceptible of accompanying themselves with somatic phenomena altogether as intense as those which accompany actual sensations.

If morbid emotivity produces itself under the same circumstance as subjective morbid sensibility, is it not presumable that

* Ch. Féré. *Remarques sur la perte du sens moral chez le chien présenté par M. Richet (C. R. Soc. de Biol.*, 1892, p. 493).

† J. Moreau de Tours. *La psychologie morbid*, p. 313.

it produces itself by an analogous mechanism? It is actually so, in fact; the morbid emotivities are affective states exteriorised or objectified: they are hallucinations of sentiment. The more an individual is enfeebled the more has he a tendency to refer to the exterior the determining causes of his subjective sensations and his emotional states. The exteriorisation has for effect to strengthen the emotion to such an extent that it accompanies itself with physical phenomena as intense as if the reactions had been provoked by a real excitation coming from without: that is exactly what we have observed to take place in sensorial hallucination.

The objectified or exteriorised sentiments determine analogous motor reactions to those which would be provoked by necessities or physical pains: when they are very intense, they entail indemnable discharges, fears, or impulsions.

When resistance to a desire provokes, by reason of individual physical conditions, a painful sentiment of disproportionate intensity, it is by reason of this exteriorisation of sentiment that there is induced an explosion of anger, a morbid manifestation (furor brevis, etc.).

When a sentiment of desire or fear, developed by reason of this irritable feebleness, has exteriorised itself upon a given object, the sentiment and the sensation of the object remain bound together, and thus constitute a systematic emotivity. The same association can establish itself with the memory of the acts of the individual himself: or with assemblages, or imaginary beings. These diverse associations permit of the pathogeny of a great number of deliriums being understood.

The hallucinations or illusions of sentiment, which are not more distinct than the sensorial hallucinations and illusions, can produce themselves apropos of entirely transitory affective states. Under the influence of an insomnia, of a painful digestion, of an opposition, we experience a certain, a special, irritability at the sight of an object or a person who usually leaves us indifferent if we come to reckon them as cause of an emotional state: it is an illusion of sentiment. If the conditions of accidental depression

have an influence upon the objectification of sentiments, permanent organic debility must have a still more evident action. This is just what happens, in fact, not only among the degenerates characterised as neurasthenics, etc.: but even in individuals whose mind is little active, and who find always outside of themselves the reason of their painful sentiments.

CHAPTER XVIII.

On the Influence of the Physical and Mental Constitution on the Localisation of Physical Troubles of Emotional Origin, and on the Special Form of Psychical Troubles.

Summary—Sensorial Aptitudes—Physical Malformations—Acquired Defects.

Different intellectual aptitudes have for their physiological conditions particular modalities towards sensibility. Art is nothing more nor less than the expression of sensibility. Each of the forms under which it presents itself expresses one manner of being of the sensorial organs. A work of art is always an expression of a determinate physical or psychical personality: it is a sign.* Victor Hugo, whose descriptive tableaux are so alive, always had very excellent vision, and never used spectacles, although he lived till past 80 years.

The heredity of psychical aptitudes is bound by a necessary tie to a physiological heredity. "The sentiment of music," says de Candolle,† "that is to say, an aptitude for measuring time and distinguishing notes, is a natal disposition in many infants, and a disposition whose origin one clearly finds, in most cases, in the father, the mother, or the progenitors (ancestors). When the parents on both sides are musical almost always the infants are born with a correct ear." The heredity of musicians is not rare,‡ we find it in the family of Amati, Bach, Beethoven, Bellini, Benda, Benoncini, Dussek, Hadyn, Mozart, Hummel, Weber.§

Likewise, physiological aptitudes relative to the visual function explain the existence of numerous families of painters, those of Bassano, Bellini, Cariari, des Caracci, des Correggio, des Teniers,

* Hennequin. *Critique Scientific*, 1888.

† De Candotte. *Hist. de la Science et des Savants*, p. 323.

‡ Galton. *Hereditary Genius*, p. 237. Ribot. *L'hérèd. psychol.*, 2nd ed., p. 72.

§ Spencer. *Principes de Biol.*, t. i., p. 303.

van Ostade, van Eyck, Mieris, Murillos, van Dyck, van der Veldes, Landseers, van Loos,* Vernets.

Besides, the special sensibility which dominates the artistic expression is sometimes put in evidence by the existence of particular sensorial troubles of the sense which is specially in play. The musician Grétry, for instance, was subject to hallucinations of hearing: "For four years," says he, "those of the Revolution, I have at night (when my nerves are in action) a sound of a clock, a sound of a tocsin in the head, and this sound is always the same. In order to assure myself that it is not a veritable tocsin I close my ears."†

Just as the native feebleness of certain organs predisposes them to predominant troubles under the influence of the emotions, so the pathological troubles acquired can determine local intolerances for the emotions, analogous to the intolerances for pathogenic agents of the physical order.‡ M. Potain has well shown the pathological value of these conditions of "least resistance," as the ancients said, conditions which are applicable to the brain as to the other organs.§

Art being the expression of the sensibility can be subjected to scientific methods. "One very learned professor of physic, M. Charles, said to me," reports Alibert, "that in his familiar conversations he had never been able to inculcate Grétry into certain acoustic laws: the same thing happened to him when he tried to make a demonstration on the same subject to Méhul and to some other musicians besides very worthy of their celebrity."‖

Landry¶ has already remarked that the emotions only appeared to act in provoking explosions of various individual aptitudes.

Morel** admits the influence of the emotions of infancy on the evolution of genius, but it is necessary rather to think that certain infants are not apt to experience certain emotions otherwise than as the consequence of certain special sensorial aptitudes.

* Lucas. *Traité Philos. de l'hérédité nat.*, 1847, t. i., p. 583.

† Grétry. *Essai sur la musique*, t. iii., p. 133.

‡ Potain. *Du rôle pathogénique des myopragies ou aptitudes fonctionelles restreintes (Bull. Med.*, 1888, p. 715).

§ Abercrombie. *Maladies de l'Encéphale*, p. 371.

‖ Alibert. *Physiologie des passions*, 3rd ed., 1837, t. i., p. 10. Dr. T., a former superintendent of Glasgow Royal Infirmary, was also affected this way. (R. P.)

¶ Landry. *Consid. gén. sur la pathogénie et les indications*, etc., th., 1854, p. 33.

** Morel. *Etudes cliniques*, t. ii., p. 135.

"The ideas of time, education, the doctrines underlying the comprehension of nature, the character of the ideas which predominate in an alien, as also in him who is destined to become insane, do not create madness, nor the predisposition to madness: they do not create, they do not explain this nervous state, this physical and moral hyperasthesia" (or hypæsthesia R. P.).*

Not only do the individual organic conditions play an exclusive *rôle* in the genesis of psychical or nervous troubles in general: but even in their form the passions, the deliriums, the madness, base themselves always on native tendencies.

"Mental alienation," says Morel, "is an affection singular (une) in its essence, but its multiple manifestations depend on differences which one remarks in the intellectual and moral aptitudes of individuals, and in the general conditions of their organism. The causes themselves which act on our faculties are profoundly modified by these elements, etc."†

Certain individuals present a special sensorial susceptibility. We have cited the case of a young female villager, who in the wake of a first hearing of music, was seized with auditive obsessions which did not leave her till death.‡

The local susceptibilities can be put in evidence by the individual effects of toxic or medicinal substances. Handfield Jones remarked that a toxic dose of quinine could make one person blind, another deaf, and give a third a troubled heart action.§

These individual susceptibilities can even be localised in one part of an identical organic system. Holland cites the case of a man who, under the influence of even a trivial exercise, of eating, speaking, an emotion, presented a profuse sweat, only on the right side of the face.‖

It is especially in the case of violent emotions that one observes paralytic phenomena localise themselves according to predetermined dispositions. A stutterer who has considerable motor enfeeblement of the tongue will completely lose speech under the influence of fear. A child attacked by nocturnal incontinence has

* Moreau (de Tours). *La Psych. Morb.*, p. 126.

† Morel. *Loc. cit.*, t. ii., p. 88.

‡ *Journ. des Conn. Med.*, t. ii., p. 12.

§ H. Jones. *Loc. cit.*, p. 18.

‖ *Chapters on Ment. Phys.*, 2nd ed., p. 188.

an involuntary emission in full day under the influence of anger. For an identical reason such an individual will always have diarrhœa under the influence of a strong emotion, like the Maréchal de Villars. A patient who, in his infancy, had angers during which his limbs bent under him was attacked later by paralysis of alcoholism limited to the lower members. It would be easy to multiply instances of this localised emotivity, and especially of local fear, which left intact most of the functions and barely affected the intelligence.

Emotional susceptibility can localise itself, and this localisation (spécialisation) plays an important *rôle* in the development of obsessions and fixed ideas. Certain morbid emotional predispositions appear to exclude normal emotivity. It is thus that certain individuals, who exhibit an extraordinary tenderness for animals, feel little for their kind, even when they are their own children.* They are in general *héréditaires* who offer, or will offer, other physical or psychical troubles. One can say of them, as of a large number of philanthropists, who, under pretext of devotion to humanity or some other abstract idea, neglect absolutely the beings who are most near to them: or of certain cosmopolites, partisans of the Universal Republic, and who disrobing themselves of all duties of family and patriotism are only antisocial.

They are not only the troubles of development, the congenital anomalies, which are capable of determining the localisation of troubles provoked by the emotions. Pathological lesions of every order can have the same effects. If one often sees neuralgias, rheumatismal pains, or gouty pains recalled by painful emotions, one can see also ancient cicatrices rebecome painful under the same circumstances, as well as ancient fractures and ancient seats of inflammation. A large number of neoplastic productions are the seat of local emotivities. We discover again in these conditions a striking analogy betwixt the effects of physical agents and those of the emotions: people say often of diverse congenial or acquired defects that they constitute veritable barometers, because they are more or less vitally influenced by the atmospheric changes: they are also subject to moral influences.

* Magnan. *La folie des antivivisectionistes, C. R. de Biologie*, 1884.

OBSERVATION LI.

Summary—Neurasthenia, Localised Emotivity of Traumatic Origin.

"M. P., 43 years of age, merchant, belonged to a gouty family: his father died in an access of acute delirium which interrupted a fit of gout. He knows of no characteristic neuropathy in his forefathers nor their collaterals: he acknowledges only that most of them had "la tête pres du bonnet." He himself is always well borne, had never any nervous symptom in his youth, and the gout has never manifested itself in him as it has in his two brothers. He attributes this benefit to the physical exercises to which he has always been passionately addicted. He has two children, two boys, the one eleven years and the other nine years old; the elder has nocturnal incontinence, and is subject to nightmares in which he rises and cries: the second has never had any nervous troubles.

"Six years ago M. P. in jumping a hedge during the hunt fell so awkwardly that he fractured two bones of his right leg. This fracture has been perfectly reset and united, and (December, 1888) it has left barely a trace apparent on the front aspect of the tibia. The callus is not sensitive to pressure any more than the neighbouring parts. M. P. is sometimes several weeks without feeling any sensation coming to remind him of his fracture: but in some well-determined circumstances, the tibial callus becomes the seat of some extremely intense pains, which nothing up to the present has been able to relieve: and which are sufficiently quick sometimes to make the patient lose all self command, and give himself up to contortions and vociferations which he himself calls grotesque. The circumstances which provoke these explosions of pain are storms, indigestions, and moral emotions. The two first are those which act most frequently, the action of storms cannot be avoided, and by reason of his occupations M. P. is often late with his dinner or foregoes it altogether, a thing which brings about for him the same result, and provokes an indigestion of the succeeding meal. As for the third cause its action is put in evidence by every business worry or family annoyance. The crises of pain absorb to such a degree all his faculties that he is absolutely incapable of responding to the exigences of the situation whatsoever it may be. The fracture is the seat of spontaneous pains, continued, with beatings: and pressure on the region is extremely painful: but the provoked pain, like the spontaneous, has a deep seat: the skin is not sensitive. The crises last from some hours to several days, but, in general, they hardly remain acute for more than an hour, then they gradually attenuate, and there remains only one continued pain, which the patient interprets as that of a strange body, distending the canal of the bone. The crisis disappears generally with the cause. Most frequently the beginning is gradual and the acme is reached within a quarter of an hour: but sometimes it is absolutely sudden: one day that his elder son fell from a ladder in his presence he experienced a sudden shock in his leg, and he himself fell all of a heap. It is worthy of remark that the fibula never takes part in the pain."

"A great number of remedies have been tried with the view of preventing these crises, bromides, salicylates, antipyrine, superficial local cauterisations. One has only been able to produce a mitigation of the crises by pulverisations of methyl chloride."

The systematisation of morbid emotivity is often provoked by a local condition. A slight and fugitive irritation provokes sometimes a permanent and persistent obsession capable of surviving indefinitely in spite of the disappearance of the lesion. It is thus that one may explain, in the absence of all actual lesions, certain imaginary ulcerations of the tongue (Verneuil), dental obsessions (Galippe).

M. Charpentier* has recorded properly the existence of peculiarities of conduct recalling the main features of delirium, and whose origin one could trace back to infancy. It must be remembered that, up to the present, the study of the antecedents of patients has been quite insufficient in this respect: if one has occupied oneself with character and habits, one has completely neglected aptitudes and artistic tastes. It is nevertheless a most interesting direction, for if an individual can manage to mask under conduct the foundations of his temperament he can hardly disguise his ethical character which emerges in his artistic and literary productions, and especially in his literary and artistic sympathies. A work of art cannot, in fact, exercise any action on an individual except when it represents, in some measure, his special mental characteristics.

In the most decided degenerates extreme emotivity expresses itself by the rapid or even sudden explosion of a delirium which preserves traces of the mobility of the individual, and which may be of very short duration. The instability of the delirium entails the instability of the individual whose life is simply a series of explosions followed by periods of exhaustion. These fitful deliriums, (ces bouffées délirantes), frequently evidence the mental peculiarities, unperceived till then, but not entirely latent. If, among degenerates, moderate emotions provoke often instant deliriums, it is occasionally the same in individuals who, in spite of a nervous predisposition, do not present the same physical and psychic phenomena: and in whom it is necessary for more intense and more durable emotions to take, rather under the influence of the consecutive exhaustion than of the emotional shock itself, a durable and too often permanent delirium, but, in every case remarkable in general by perturbation of sentiments.

* Charpentier. *Des idées morbides de persécution (Ann. Méd. Psych.*, 1888, t. ii., p. 106.)

CHAPTER XIX.

Diagnosis of Morbid Emotivity.

Summary—General Maladies—Neurasthenia—Hysteria—Epilepsy—General Paralysis—Dementia—Idiocy—Degenerescence—Criminality.

From the point of view of semeiological value of morbid emotivity in general, the distinction betwixt the diffuse forms and the systematic is very important.

The diffuse troubles of emotivity are, so to speak, the rule in neuropathies, like hysteria, chorea, epilepsy; but they are frequent in the beginning of general affections, and in convalescences, and, in general, in the conditions of depression which constitute neurasthenia. Sometimes it is excessive emotivity, sometimes it is apathy. These troubles do not bear always every time on all the emotions, but especially on those which distinctively mark character.

But the research into the physical conditions of emotivity of the morbid kind is not above all interesting when there are concomitant pathological states: it is much rather when it is the preamble, or larval manifestation, of these pathological states.

Among the advance couriers of gout one marks frequently an abnormal excitability. Dyce Duckworth even says that a violent attack of anger can be the only manifestation of a regular attack of gout.*

Diffuse emotivity precedes often, and by a long time, apoplectic attacks. It figures also among the prodromata of progressive general paralysis and most madnesses. It can serve to put on guard against certain events, more or less at hand; but so long as no physical trouble is apparent impossible to be precise about anything (*i.e.*, impossible to make precise diagnosis).

When, however, this morbid emotivity lasts a long time in young people of neuropathic breed, or who have already presented

* *Traité de la goutte trad.* Rodet, 1892, p. 255.

fitful deliriums; and bears the physical marks of degenerescence, it suffices to characterise the state known under the name of reasoning mania. Diffuse emotivity is often a character of senility, and it can manifest itself at an age, little advanced, in individuals who have presented the characters of infantilism or feminism, and whose general aspect expresses a precocious usury.

Diffuse apathy is often a sign of general depression, which can manifest itself at the beginning of a large number of maladies: but when it presents itself without fever, and in the wake of convalescence from acute maladies, in the absence of every chronic malady the invasion of a mad fit must be suspected: research into the physical signs would permit the recognition of a fit of general paralysis.

M. Regis* admits that the essential cause of neurasthenia is heredity, and he classes it among the degenerescences of evolution.

Neurasthenia is, in fact, a chronic fatigue, and it does not appear to us easy to maintain that fatigue necessitates an hereditary predisposition. Fatigue is a physiological state which could be created of all pieces: and neurasthenia, chronic fatigue, can result, in the wake of every disposition, from all conditions capable of provoking a prolonged fatigue.

If it is certain that a defective heredity can favour the production of fatigue and neurasthenia, this heredity is not indispensable, and consequently the neurasthenic emotivities can be independent of heredity, and even of degenerescence.

M. Magnan admits that the most frequent forms of systematic emotivity, and especially the phobias, constitute special phenomena, psychical marks, the sydromachal episodes of degenerescence. But morbid fears present themselves, to a certain degree, in all states of depression. They constitute often symptoms of psychical neurasthenia, in which Beard has included them, for the most part correctly. All the conditions of organic enfeeblement of the organism constitute a predisposition to their development: one can see them supervene in the wake of traumatic or

* *Manuel pratique de méd. ment.*, 2nd ed., 1892, p. 256.

moral shocks, in the course of chronic maladies, in convalescence from acute maladies, intoxication, etc., all as hysterias.

We have in the course of this work reported a certain number of facts of systematic emotivity observed in hysterical persons: these cases do not appear exceptional. One can meet with them annexed to chorea, and especially to epilepsy. The existence of the signs of these neuropathies must be searched for carefully.

Idiotcy and dementia present themselves with characters sufficiently defined to enable us to reach a diagnosis without hesitation, and the prognosis of those emotivities which support them.

All the causes of depression are so susceptible of determining one of the forms of systematic emotivity which is only, in reality,* a symptom, like lunacies generally, whose form is not linked in any way to a particular determining cause. For the rest when morbid emotivity must be referred, by exclusion, to degeneration, and reckoned a trouble of evolution, it is not the less a simple symptom thereof.

The clinical value thereof can only be established by a general study of the physical and mental state of the subject, and this study is most important from the point of view prognostically of the treatment.

Systematic emotivity, like diffuse morbid emotivity, can be one of the premonitory troubles of a general affection. Morbid fears can figure also amongst the preambles of gout.

OBSERVATION LII.

Paroxysmal Fear of Obscurity—Gout—Epilepsy.

M. T., æt. 48 years, was born of a diabetic father, and has a diabetic brother. He himself has always been healthy up to the age of 28: he had never had any nervous trouble, and was not aware of any in his family. At this time he began to experience, once or twice a year, during several days, an invincible anguish when he found himself in darkness: he recognised well the absurdity of this fear and struggled several times to conquer it, notably one day when he was on an excursion with his friends. After a long period during which he had been wet to the skin he was lying in a chamber in his hotel with one of his companions. He was agitated and could not sleep, when at about the end of an hour, he began to experience an uneasiness relative to the darkness: he did not wish to avow this weakness, and attempted to forget it, but by and bye he experienced an extraordinary oppression, and felt himself covered with a cold sweat. He would have wished then to issue from his

* Suckling. *Agoraphobia and Allied Morbid Fears (Am. Jl. of Med.*, 1890, t. ii., p. 476).

chamber or make a light, but he was incapable of making a movement: finally he could not refrain from crying, and his friend came to his help with a light: but the effects of fear had not passed away: he was of an extreme pallor, his respiration was rapid and superficial, and almost immediately he was seized with a diarrhœa, which lasted part of the night and ceased suddenly. Up to the age of 28 years these fits of nocturnal fear repeated themselves a dozen times, during two, three, or four successive nights, and disappeared. In the interval he slept without light, and slept even very difficultly with a light in his chamber: so that the threat of an access could not make him take means for maintaining the habit. At 38 years, in the wake of a fit of this kind, which had forced him to maintain a light for several nights to the great detriment of sleep, he was seized with a fit of typical gout. From this date the fits of fear of darkness have always been the preamble of a gouty access. It is only since two years that the vertiginous and convulsive attacks have supervened, which have not in any way modified previous accidents. The potassium bromide appeared to calm the epileptic manifestations, but had no action on the emotivity troubles, which reproduced themselves twice with gout since the commencement of treatment.

The ancient authors, Fracastor, A. Paré, Swediaur, have noted the moral depression which, in subjects infected with syphilis, precedes often every secondary outbreak. This depression accompanied by irritability is often at the limit of the physiological reactions: at other times it exaggerates itself, and puts in evidence latent hysteria: it is the most frequent case.* But sometimes one observes to appear in the course of a syphilis of the brain perhaps a general morbid emotivity which has no direct relation with the pre-occupation of the infection; perhaps again a systematic morbid emotivity: both can disappear under the influence of treatment of specific sort, and betray thus their origin.

Observation LIII.

Systematic Morbid Emotivity in the Course of Cerebral Syphilis.

M. P., 32 years of age, merchant, belongs to a nervous family: a maternal aunt is affected by a tic douloureux of the face, two of his sisters have had chorea, and he himself has had nocturnal incontinence of urine up to the age of 14 years. Apart from this inconvenience there is nothing to report regarding himself up to the age of 18 or 20, except some nocturnal terrors. He contracted, at the age of 25, a syphilis apparently benign in character: the chancre healed quickly, and he had as secondary only a roseola rapidly evolved: also he only followed a short course of treatment. For six years nothing troubled his quietude. He married at 29 years, his wife had two miscarriages, but as they had remarked nothing on the body of the fœtus, and as his wife did not offer any trouble attention was not recalled to the syphilis.

Five months ago M. P. after a period of sadness without motive began to

* Bertrand. *Cont. à l'étude de l'hystérie dans ses rapports avec syphilis secondaire*, th., Lyon, 1802.

show himself fidgetty regarding the closure of doors and windows, concerning which up till then he had never shown any pre-occupation. He made the persian blinds close before twilight. He pretended that he had been incommoded by moths, and that it was impossible for him to bear either the touch or sight of them, and the idea that one of these insects could touch him put him into a state of anguish. When he spoke of it one could see his brow cover itself with sweat. It was the end of September when his family were made acquainted with this fear: they thought that when the season was over the trouble would cease, but this was not so. Gradually M. P. refused to go out alone after sunset, or even when he was accompanied. Without cease they observed him engrossed by his anxiety, and he was only reassured a little when the absence of every form of moth was asseverated. More than once he threw himself violently to one side pretending to having been pushed. Since the month of December he refused absolutely to go out at night: and in his bedroom, even after a minute visit which always precedes his lying down, they often noted his disquietude, looking round him, listening or settling quickly his nightcap upon his head. He had bought a musket, but they were not sure whether it was loaded.

Apart from his moroseness and this bizarre fear M. P. appeared to those about him an easy-going man, laborious, conscientiously facing all the necessities of family life and his business which prospered.

It was only dating from December 20th that M. P. began to complain of pains in his head, and people remarked that his traits altered their character: he had become thin and very pale. On the first of January, 1889, in the wake of a heavy dinner, he went to bed without complaining, but he was wakened about two o'clock in the morning by a violent pain in the head which was limited to the right parietal region. The pain extended itself gradually with a character of very painful pulsations: he could not get to sleep again till six o'clock in the morning. From this period this pain of the head reproduced itself every night, with very variable intensity, but always limited to the same spot.

M. P. had, in fact, consciousness of the morbid nature of his nightly fears, and he was unwilling to consult a doctor, thinking he would be suspected of madness. But on March 12th on rising he had an epileptic attack limited to the left arm and face, and which left after it a considerable difficulty of speech, this difficulty lasting several hours.

It was then only that the patient allowed himself to be cared for. He was put upon a mixed treatment, four grammes of potassium iodide and six of mercurial pommade daily in frictions. The convulsions did not return. The fifth day the pains in the head were already much better, but they only disappeared on the 12th. In proportion as they diminished the nightly fears became weaker, it was noted that the patient did not dream any more of the precautions which pre-occupied him so imperiously a few days previously, and when the first fortnight of treatment was ended he went out in the evening without any alarm and returned without manifesting any alarm. When he was asked about this he said that he had no longer the least fear, and that his past anxieties seemed to him preposterous.

This patient has been submitted to a periodic treatment by alternate

fortnights of treatment and repose during four months. He has not presented any head trouble since.

We understand that this same systematic emotivity can be developed in the course of secondary syphilis without coincidence of any other cerebral localisation: it can be provoked by infection in an individual predisposed, in the same manner as hysteria or vesanies: we have seen attacks of madness cured by treatment in the secondary period of syphilis.

Beard and Perraud have remarked for a long time that agoraphobia in particular is often kin to a nervous depression due to any cause whatever, and Suckling has insisted afresh upon the same thing. Moreover the emotivity troubles are sometimes so related to dyspeptic troubles* of neurasthenia, that doubt is hardly possible. I can cite as an example thereof the letter of a neurasthenique who has, moreover, been cured of neurasthenia and agoraphobia.

OBSERVATION LIV.

Agoraphobia in a Neurasthenic with Dyspeptic Troubles—Description.

Here is related the manner in which the nervous troubles manifest themselves especially in the morning, at mid-day, and about 4 o'clock, when the work of digestion is entirely ended.

As soon as I am in the street I experience after the first few steps a great anxiety; the extremities become burning: heavy pains make themselves felt in the temples, behind the kidneys, in the feet and hands: the limbs, as if paralysed, can scarce move themselves, and the sun appears to unrobe himself before me. The heat beats violently; the respiration becomes panting. Anxiety increases till the terror point is reached. If at this moment I can enter into a house, or if I can find a support, especially a human support, the malaise disappears almost completely, and there remains nothing but a great lassitude with slight pains in the buttocks and the thighs, like those which remain on the morrow of a forced march. I traverse, with great difficulty, desert places and streets where I feel myself more in view than elsewhere. In the open country, the widest spaces affect me none at all, because, doubtless, I do not feel myself observed. The impressionability is very great.

Appetite is good; digestion is rapid, but followed by excessive flatulence, against which all remedies have been powerless: Belloc's charcoal, chlorhydrate of morphia, tincture of nux, etc. After food the nervous troubles are less frequent. In the morning, fasting, bright colours, red especially, trouble my sight.

The urine is often loaded with brick dust. For two months at rare intervals spermatic emissions take place when stooling. The memory is enfeebled.

* Cherchewsky. *Cont. à l'étude de l'agoraphobie (Rev. de Med.*, 1885, p. 909).

It is important, when one has diagnosed a morbid emotivity, to study with care the somatic state of the subject, (after having eliminated the possibility of a neurosis or an organic malady of the nervous system), with the view of discovering if there does not exist a cause of depression foreign to the nervous system, or a curable depressed state of this system.

If certain abnormal needs, such as lust of drink, morphinism, etc., be the result of a morbid emotivity; the intoxications that result therefrom can, in their turn, become the origin of a diffuse or systematic morbid emotivity. It is, therefore, important to search for the well-known signs of these intoxications and signs of privation, if the patient has been put into a situation such that it is requisite for him to renounce his habits.

To reckon all the emotional states as marks of degenerescence necessarily inaccessible to treatment, constitutes a doctrine not only erroneous but nefarious.

It is not possible to deny, however, that a good number of morbid emotivities are allied to constitutional conditions, congenital and acquired, but permanent.

Legrand du Saulle* cites the case of Jousset (de Bellesme) in whom fear of spaces developed itself synchronously with an epileptic fit of convulsive sort, and has remained with him.

More often degenerative emotivity develops itself early, frequently in adolescence, sometimes even in infancy: it characterises itself by mental irritability, and it is associated to other physical or psychical marks. The systematic emotivity of degenerates is not always unchangeable: a degenerate, after having agoraphobia, can become dipsomaniac or erotomaniac; his accesses of dipsomania can be followed by wild pranks; it can give place to another vesanic manifestation.†

One cannot, moreover, affirm that this unique morbid emotivity, self-developed in a degenerate, is necessarily incurable. The prognostic of the systematic emotivity of degenerates can be drawn from *reactions* to which it gives place; and which are capable *by themselves* of establishing a connection between the

* *Etudes cliniques sur le peur des espaces*, 1878, p. 60.

† Souques. *Automatisme ambulatoire chez un dipsomane* (*Arch. de Neurologie*, 1892, t. xxiv., p. 61).

primitive mental trouble and the degenerescence. In the absence of every other grosser degenerative character, be it somatic, be it psychic, *one* of the best signs of the constitutional and degenerative nature of the systematic emotivities, is the preservative reactions:* consisting, most frequently, in words and acts which would be *perfectly absurd* if the emotion was the result of an event capable of provoking it legitimately.† Such was the patient whom Legrand du Saulle presented frequently at his lectures, and who signalised his fits of agoraphobia by the word "Bibiraton," repeated often several times with a bizarre movement of the right arm.

As for systematic apathy, which manifests itself, it may be in the form of aboulia,‡ it may be in the form of dubitation madness, it may exhibit itself in the same conditions as systematic emotivity.

The circumstances which must rivet it to degenerescence are; the mode of spontaneous or provoked beginning by a slight cause apart from every sufficient cause in a normal subject of feeble physique, its precocious inception, the consecutive apparition of bizarre proceedings of reinforcement of will consisting in augmenting motives of action.

We have already remarked the relations which exist betwixt morbid emotivity and morbid sensibility. Sometimes one can recognise the pathological condition common to the two troubles: one gouty patient becomes intolerant upon the slightest opposition: but the least noise, for instance the rustling of the wood in the porch, induces in him the same irritation. It is that, in him, the emotion, like the irritation, (sensation), accompanies itself to muscular contractions, of which it yields explanation perfectly, and which react (retentissent) painfully on all the pained articulations.

Can one distinguish morbid emotivity from criminality? We have already explained our position on this question upon several occasions, whilst defending the pathological and degenerative theory of crime. We content ourselves by recalling the opinion of

* and † Andarie. *Etudes sur quelques symptômes ses délires systématisés et sur leur valeur*, in 8vo, 1892.

‡ Aboulia seems to mean "heedlessness."—R. P.

criminalists who pass for champions of the distinction. Garofalo admits that the moral madman is a born criminal, but that the born criminal is not a moral madman. For Marro, the character of the cerebral organisation of the criminal is the insufficient nourishment of his nervous system. It is a character we might give to morbid emotivity.

CHAPTER XX.

Individual and Social Consequences of Morbid Emotivity.

Summary—Relations of Morbid Emotivity with Misery—Genius and Madness —Crime and Morbid Emotivity—Degenerescence—Sterility.

The irritable feebleness which constitutes the physiological condition of morbid emotivity, is not only for the individual who is the subject thereof a cause of numberless physical ailments, but it is also the origin of other ills of which he alone is not the sufferer. One can say that the whole life of him who is the sufferer is only one long interrupted series of moral bankruptcies: bankruptcies of love, friendship, *amour propre*, to which are joined also bankruptcy of fortune and honour. His lot is physical misery, intellectual misery abounding in hate, and powerless revolts. So much for his surroundings, they have to bear the consequences of these impotences, and for the little they participate in the defect they assist in the collective bankruptcy. Not only does the emotional, incapable of any sustained attention, become frequently unfit for every productive activity, but the more his infirmity is accentuated the more has he need of strangers' help.

Equally sensitive to physical as to moral influences he has need of a special hygiéne. His alimentation, his clothing, his lodging require special adaptations: his life being always painful he has unceasingly need of perfecting thereof or modifying the conditions thereof. The unceasing increase in the numbers of individuals of this category has a great influence on the development of luxury under all its forms *and all the depravations which take on a public character and tend to generalise themselves by contagion.*

The inaptitude to resist atmospheric influences expresses itself by the necessity for migration which manifests itself every year in a very evident manner and which, if it could explain itself in part by the greater facility of communications, is certainly not in relation to the development of wealth.

This need of change, which manifests itself mainly in the degenerate, merits comparison with the rapid diminution of nostalgia, which hardly persists except in individuals who have gone from more cultivated countries to poorer (or does not persist in individuals who have gone from the poorest and least cultivated countries).

Since Moreau (de Tours) one willingly accords to genius a neuropathic parentage because a certain number of celebrated men have presented more or less characteristic nervous troubles. The history of these relations of genius and neuroses has been recalled, since, by several authors (Lombroso, Nisbet); but we have not established between them a necessary relation.

Neuropathy is not indispensable to genius, one can even say that the most useful men of genius were vigorously constituted and clear of every flaw which could have influenced their conduct. The men of genius in whom nervous flaws are most evident are founders of religion, warriors, artists, whose social utility is not very evident; but, let one read the history of useful men, one will see that neuropathy holds but a small place.*

This impressionability which constitutes the indispensable condition of morbid emotivity, and intolerance of external agents, realises, when it is not pushed to excess, one of the physiological conditions of genius: invention consisting in the perception of relations unknown up till then. But impressionable subjects are not only most apt for most useful actions: "Multiply sensitive souls," said Diderot,† "and you will multiply good and evil actions." Morbid emotivity conducts more often to crime than to genius.

We do not say that useful acts can produce themselves apart from every emotional state, for emotion is the necessary preamble to every kind of acts. "The philosopher who would strangle his passions," says Chamfort, "resembles the chemist who would smother his fire." But passion cannot be considered a morbid state so long as it is not hurtful to the individual or the race, so long as it is not disproportioned to the individual (or the race), or *its object.*

* Similes. *Self Help.*

† *Paradox sur le comédien.*

It is this disproportion which constitutes morbid emotivity and which characterises emotional people. "An emotional person is literally an explosive thing," says Maudsley. His life is only, after a sort, a series of storms which, in blinding sometimes by their brilliancy, trouble not the less profoundly the environment where they produce themselves. Most frequently these tempests are destructive without compensation. This destructivity does not strike only the objects and persons of the neighbourhood, it bears upon the individual subject him—or her—self.*

Emotionals disappear frequently, exhausted by their excess or ruined by their insatiable desires or reduced slowly to misery by their invincible inertia (paresse). But it is not rare for them to be more active agents of their own destruction.

Suicide is not rare amongst emotionals: it is sometimes the result of an impulsion provoked by one of the most futile motives; at other times it is the consequence, near or far, of unhappy emotional reactions.

Certain subjects are affected with a veritable moral hyperesthesia, which often conducts them to pessimism and suicide. This is what produced itself, for instance, in a lady who had experienced violent chagrins in consequence of the political dramas at the beginning of this century. "Imagine," she cried, "that a false reasoning, an iniquitous act, all that scents of fraud, hypocrisy, bad faith, produces on me the same effect as discordant music on the ear of the most irritable mélomaniac."†

Suicide is the proof of a cerebral derangement, but is not, of itself, an act of madness: what has been mad most often in the conduct of the individual who has put an end to his days are the badly adapted acts which have rendered the position in which the suicide finds himself at a certain moment, not only logical but inevitable.

Emotionals are hurtful to the community of which they make part, not only directly by their destructive or criminal acts or by their inaction, but more, indirectly, by their descent. The irritable feebleness, neurasthenia in all its forms, constitutes a state un-

* *Physiology of Mind*, p. 425.

† *A des Etangs, Du Suicide Politique en France*, 1860, p. 388.

favourable to generation. Those who are attacked thereby produce frequently infants more defective than themselves.

The passionate, impulsive, etc., hurt themselves not only by what they destroy or what they fail to make, but very often they absorb the activity of those who surround them, or reduce them to inaction. Intolerant like all the feeble in spirit they support quite impatiently, even benevolence.

Morbid emotivity is the consequence of temporary or permanent organic conditions. The uncertainty of its duration is a source of constant disquietude, and this absence of security can only augment its defects. When morbid emotivity is *not* the consequence of an accidental trouble, when it is part of the constitution, it is, if not incurable, at least very tenacious, and one is never sure of its cure.

"To say of an angry man, unequal, a quarreller, chagrined, punctilious, capricious, 'it is his humour,' is not to excuse him, as one believes it," says la Bruyère, "but to avow, without thinking it, only that such great faults are irremediable."

The anti-social desires which entail not only anomalies of emotivity but also a considerable perversion of intelligence are neither more nor less curable than morbid emotivities, than moral madnesses, from which it is impossible to distinguish them.

When one has been able to refer morbid emotivity to organic conditions and one has been able to make those organic conditions disappear by an appropriate treatment one might hope that the desires that one has to combat are definitely corrected. When, on the contrary, it proceeds from a native defect which one cannot arrive at the modification of, otherwise than by producing new conditions of life, whether moral or physical and which only act slowly, the result merits less confidence. The institutions which charge themselves with the restoration to health of badly formed beings rarely give complete histories of their cures with a sequel sufficiently long. They have perhaps other reasons than professional secrecy.

As these troubles are inherent in the nature of individuals, does it follow that one ought to accord them an absolute tolerance and bear the consequences of their morbid reactions?

The partisans of freewill admit that it is not possible to have a

crime when a hurtful act is accomplished by an individual whose reactions are directed by a diseased brain. One cannot then pursue him for reparation. What remains for determination then is, is it the victim or the community who should bear the consequences of the brain defects of the abnormal? There is no reason why the consequences of the anomalies and maladies of the other viscera should not also be laid to the charge of the community of laborious people. This practice subsumes that there exist in society beings charged by their intelligence and their labour to provide for the satisfaction of the needs and even of the caprices of unproductive neighbours. Natural history apprises us that sacrifices of this kind are not made in general except at the price of the life or the decadence of those who accomplish it.

"In the midst of the external world," says Claud Bernard,* "certain beings have been prepared from the point of view of philosophical facts in order to create substances destined for the alimentation of others. But from the philosophical point of view each individual works for himself and lives as he can at the expense of those who surround him." When the nutritive elements which he has accumulated for his subsistence or for his reproduction are drawn from a vegetable or an animal it can only be at the expense of its vitality and that of its race. That this subtraction may be voluntary and accomplished in the name of pity and charity does not alter the result. "Generalise by thought," says Bastiat, "self-renunciation, and you will see that it is destruction of society."†

Physiology concords with political economy in condemning intemperate generosity which favours the development and multiplication of emotionals. Philosophers of all time have affirmed that the great law of humanity is progress, and that, in the final reckoning, the most sudden and violent and apparently disastrous changes turn out for the benefit of the species. Let one consider intellectual evolution in its industrial and artistic manifestations, the amelioration, in a manner, of the greatest number and the augmentation of the mean duration of life: one will be rationally forced to recognise that, in short, the facts justify this optimism.

* *Léçons de physiologie exp. appliq. à la méd.*, 1855, t. i., p. 130.

† *Œuvres complètes*, 3rd ed., 1881, t. i., p. 11.

But when one desires to apply to the races and peoples in particular this general law of humanity, we make a logical error and misconceive facts of observation. These facts shew us that the people who have disappeared or who are feeble have succumbed less to the blows of their contemporaries than to their own sterility. This sterility is only the ultimate manifestation of a progressive degradation which shews itself after the epoch when the social state appears most prosperous and which has precisely its origin in prosperity. The unequal redivision of riches is especially efficacious in preparing defects in the social organism of laziness and opulence, of hard labour and misery. It is the fault of the citizens which has caused the loss of the ancient republics of Sparta, Athens, etc. The 9,000 Spartans of Lycurgus were reduced to a thousand by the time of Aristotle. Modern aristocrats are also incapable of maintaining themselves by reproduction. Humanity evolves towards the best, but societies crumble from civilization and sterility, whose most important factors are morbid emotivities.

CHAPTER XXI.

Medical Treatment.

Summary—Physical Agents—Air, Light, Heat, Alimentation, Exercise, Sleep, —Moral Treatment: Hypnotic Suggestion.

The emotions are states of consciousness of internal origin; that is to say, they repose on representations which accompany themselves by the same physiological phenomena as the states of consciousness of external origin, the sensations. It was interesting to shew that the two orders of states of consciousness were capable of entailing the same pathological results. But we have seen that the pathology of the emotions presents the greatest analogy with that which is dependent upon cosmic agencies, that all the accidents of the emotions recall those of fatigue and physical pain. Once developed, the maladies which have been provoked by the emotions ought to be treated altogether as if they were dependent upon any other physical cause. The knowledge of the possibility of this origin of the evil does not always give the means of suppressing the causes thereof, but it is an end one must always have in view. We have no need to dwell upon the different special cases which can benefit by the amelioration of moral conditions: we must insist only on the treatment of morbid emotivity which is in short, apart from preexisting organic lesions, the condition, if not indispensable, at least most frequent of the pathological effects of the emotions and which constitutes by itself a pathological state.

On the other hand, the history of morbid emotivities has put in evidence that which is at the bottom of these troubles, as of most of all those which result from emotions, namely, a state of depression, congenital or acquired; a state of depression which differs in nothing from those which are the consequence of the action of physical agents, and especially of traumatic shock. The medication of the emotions ought to be found in the same remedies

which serve for the evils induced by the insufficient or excessive action of physical agents, by fatigue or inaction.

I have already remarked, in passing, that systematic emotivity can only be produced when there exists a certain degree of apathy relatively to all the other forms of the emotions. These kinds of troubles are now found allied, like apathy, in general, *to a diminution of vital activity.*

When these troubles of emotivity proceed from a congenital vice of the organism, it appears that one can hardly find effectual help from remedies. However, even in these cases the only chance of amelioration finds itself still in the elevation of the levels of nutrition.

Air, light, heat, alimentation, exercise, distractions, sleep, such are the fundamental elements of treatment, which is especially hygienic. But these different elements do not apply themselves indifferently after the same fashion to all individuals. It is a mistake to suppose that one can systematise the treatment of nervous depression: most of the cases present special indications.

It is not necessary to lose sight of the fact that nervous feebleness dominates the situation: above all the provocation of fresh losses must be avoided.

We have related that all the peripherical excitations, as well as all the sthenic emotions, entail an exaltation of all the activities and especially nutritive activity: it results therefrom that they cannot have a happy effect except on one condition: which is that they coincide with absorption of a superabundant quantity of alimentary substances. If, in fact, in a feeble person we provoke an exaggeration of the combustions without any compensation the final result can only be an exaggeration of the organic depression and of all the troubles which are the consequence thereof. A long exposure to fresh air, excess of light and heat, burning pleasures, provoke losses quite as much as intellectual or physical labour.

The different elements of hygienic treatment cannot have good effects except on the condition that they act simultaneously: the exciting action of air, light, heat, ought to concord with a sufficient diet and reparatory sleep. Without doubt air, light, and heat, entail modifications of nutrition which render alimentation easy

and bring about sleep. "Air cures" in mild climates, or in the mountains, are capable of effecting cures.

The anoxhemia of the mountains is a passing phenomenon: at the end of a certain time, about 15 days or so, there is induced a notable augmentation of red globules and the respiratory capacity of the blood augments in the same proportions.* But it is not one element only which acts: one can hardly isolate the effects of air, and light, and the peace of nature. The isolated effects of these different agents have only as yet been little studied on man apart from the facts which we have related.

The effects of the different luminous rays on nutrition have provoked a certain number of therapeutic experiences on the mad. Ponza† has announced happy effects from red light in melancholics, and blue light in maniacs.‡ Davies, of the Kent Asylum, has obtained four cures of maniacs by the same treatment, but it has not obtained any result in melancholics. The experiments of M. Taguet have had a negative result in all cases.§

Morning impotence upon which we have insisted and which is so frequent in all cases of nervous depression entails deplorable consequences from the point of view of hygiène. The patients who cannot raise themselves from their beds have a progressive tendency to make day night, and night day. This inversion has for its effect the privation of the luminous excitant during several hours: the patient turns literally in a vicious circle, then the privation of physiological excitation runs harmoniously towards the pathogeny of morning impotence. The hydrotherapic discipline which compels the patient to present himself at a fixed hour in the morning renders him, from this point of view, a great service. Certain patients who, not finding themselves able, *at first*, to resign themselves to the rule of rising in the morning, do not obtain, in spite of all their pains, anything but an insignificant benefit, being rapidly cured when they submit.

A hot climate can alone provoke a happy change because it

* Viault. *Action phys. des climats de montagne (C. R. de Biol.*, 1892, p. 569). Regnard. *Les anémiques, Ibid*, p. 470.

† Ponza. *De l'influence de la lumière colorée (Ann. Med. Psych.*, 1876, 5th ser., t. xv., p. 20).

‡ Davies. *Photochromatic Treatment (Jl. of Mental Science*, 1877, p. 344).

§ *Note sur l'influence de la lumière colorée dans le traitement de la folie (Ann. Méd. Psych.*, 1876, 5th ser., t. xvi., p. 391).

diminishes the loss of heat, and it realises conditions favourable to an economy of combustion. Most neurasthenics and emotionals find themselves well after a residence in the South, especially in the countries where they are not exposed to the winds and to rapid changes of temperatures.

The change of environment of scene and mode of life can happily modify nervous depression and morbid emotivity, especially when they maintain monotony of existence from the incessant repetition of the same acts without intermission at the same hours determining a systematic exhaustion or an apathy for want of exercise. Weir Mitchell* has recommended camp life in neurasthenia. A period of military instruction can, like a long voyage, bring about the cure of a neurasthenia, of a morbid emotivity, contracted by prolonged assiduity at the work of the office.

The journeys during which the traveller changes locality daily, often at the expense of habitual comfort, in which he expends his forces in excursions or in visits to museums and monuments, are, in general, more hurtful than beneficial: they only augment nervous exhaustion, and add thereto frequently excitation. In all the changes of place, one ought to secure calm, both avoiding ennui and complete inaction which, of themselves, can be a cause of failure.

The happy results of the change appear due to the repose of the organs most tried by habitual travel. Repose is in fact one of the indispensable conditions of the restoration of health. But, the sleep of emotionals is painful and troubled, as it is in all conditions where nutrition is defective. One of the conditions of sleep is the absence of every sensorial excitation. Patients must be assured the most complete tranquility. Except the case of systematic emotivity in relation to darkness they must be left in darkness, in quietness, freedom from strong odours and irritant contacts. Certain aliments or certain drinks which leave persisting sensations can be causes of insomnia. Frequently insomnia is induced by cold, and principally by cold of the feet: it is sufficient then to warm the bed or to put a bottle of hot water therein to the feet in order to induce sleep. The prolonged exposure to fresh air simply, without fatiguing exercise, is one of the

* *Nurse and Patient, and Camp Cure*, 1877.

best preparations for sleep and it becomes entirely efficacious if it is followed by a sufficiently copious repast. The ingestion of a small quantity of aliments or a hot liquid, or slight stimulant before lying down favours sleep. A certain number of patients who awake after three or four hours' sleep, can sleep again if they are made to partake of some more aliment, a cup of bouillon or hot milk: this simple means can always be tried without the least inconvenience. Sometimes it suffices to calm the most agitated. These patients ought to sleep for a long time, eight or nine hours at least.

Alimentation specially merits a particular care.* The alimentary régime ought to be abundant. There are, says Arnard, numerous examples of prolonged manias, some even rendered incurable, by badly intentioned privation of sufficient nourishment.. Thurnam and Connolly have established for a long time the influence of regime on the curability of alienation and on the vitality of aliens: an improved alimentation augments the number of cures and diminishes mortality. But it is necessary to recollect that what nourishes is not so much what is introduced into the alimentary tube, as what is assimilated and digested. The quantity and quality of the viands must be constantly supervised and the conditions of good digestion favoured. Certain forms of aliments agree better, apart from every individual condition in certain categories of patients. For agitated and violent patients the milk and vegetable regime is preferable: a meat and gently stimulating diet is better for melancholics. We have advised aliments which contain heavy phosphates (des graisses phosphorées), fish, and eggs, for those who have a tendency towards psychical weakness (déchéance).

In order to favour the appetite, it is good, we repeat it, that the patient take exercise in the open air before his food. The regularity of the digestive functions is aided by the regularity of the meal hours. Cold dulls and paralyses the nerves of the stomach like other nerves: also cold aliments are often badly digested by emotional people whose nervous functions are already defective: it is therefore necessary to take pains to see that their aliments are administered at a proper temperature. Finally, in order to correct

* Amard. *Traité analytique de la folie et des moyens de la guérir*, Lyon, 1807, p. 44.

the disability of their digestive organs, whilst securing them an abundant alimentation, it is well to have recourse to aliments which can be presented in small bulk, powdered meats and so forth. Patients whose nutrition is slow, and who have a tendency towards chilliness, find themselves benefited by the introduction of a large proportion of sugar in their aliments.

Meats ought to be prepared with care.* "One good cook," says Clouston, "is a help for all, a pleasure for many, and a necessity for some."

Over-alimentation ought to be the object of very strict supervision, for neurasthenia and morbid emotivity can develop themselves by reason of an excessive and badly arranged alimentation, imposed upon themselves by the patients, under the pretext of anemia, and which causes a true intoxication. What we have said of the *rôle* of the intestinal apparatus in the emotions ought to impose certain hygienic measures. The rooms where one takes food ought to be managed, draped, and painted in such fashion as to excite the sight agreeably. One ought to avoid silence, immobility, and, in general, every unnecessary constraint. Speeches styled "spiritual" are never of value as enjoyable conversation.

Physical exercises are often useful, but on condition that they are moderate. It must not be forgotten, in fact, that fatigue can be still more prejudicial to these patients than inactivity. All the organic functions are solidaire; no one can be exercised in excess without the others suffering; as fatigue ensues upon intellectual or physical travail the functions in general resent thereat; digestion can be troubled by violent exercise after eating equally well as by tempestuous intellectual work. Thus, it is not without reason that some authors counsel repose of a complete kind for half an hour, or an hour, after eating, for neurasthenics.†

The knowledge of the happy influence of repose on digestion goes back to Hippocrates, but it has been experienced by Villain,‡ who has observed a prolonged run retard digestion, and especially by Salvioli§ who has seen fatigue produce an important diminution of the secretion of gastric juice which at the same time loses its

* Clouston. *Clinical Lectures on Mental Diseases*, 2nd ed., 1887, p. 131.

† Dowse (T. S.) *On Brain and Nerve Exhaustion*, 1887, p. 68.

‡ Le Villain. *Rapport de la gymnastique avec l'éducation physique et morale.* th, 1849.

§ Salvioli. *Influence de la fatigue sur la digestion stomachale (Arch. Ital. de Biol.*, 1892, p. 248).

acidity and hydrochloric acid. Violent exercise provokes also troubles of digestion by making ill-digested aliments pass more rapidly into the intestine.

One must not forgot, moreover, that if the mental state of emotional persons varies frequently from one hour to another, it is that their physical state undergoes the same variations, and consequently their resistance to fatigue presents, more often than in normal individuals, daily differences. Account must be taken of these differences, and not to exact an uniform task: a walk which soothes them to-day might exhaust them to-morrow.

The abuse of physical exercises is extremely hurtful to neurasthenics of every description. One sees such very often advised by hygienists *who oppose physical exercise to intellectual labour and appear not to know that intellectual labour is a physical exercise* accompanying itself with general muscular actions, and that the nervous energy which is spent in sports, is the same as that required for thought. Violent exercises can determine in neurasthenics a veritable ecerebration, a state of stupidity more or less durable. Very often one observes the phenomena of apathy, or aboulia especially, to exaggerate themselves under the influence of fatigue. Sometimes fatigue provokes accesses of excitement due to the exaggeration of the irritable feebleness.

Certain patients experience from time to time the necessity of developing unusual physical activity, they agitate themselves in every sense or give themselves up to co-ordinated movements which they repeat up to the point of fatigue. These manifestations constitute motor discharges susceptible of postponing impulsions of another order and that it is not necessary to try to prevent. Haslam* remarks that certain mad people who give themselves up to certain uniform movements for hours experience therefrom considerable solace, and that after their cure they bear witness to the fact.

Absolute repose is only indicated in very rare cases of profound exhaustion, like the Weir Mitchell treatment of which repose forms a part, and where it finds a palliative in massage and passive movements.

* Haslam. *Obs. on Madness and Melancholy*, 2nd ed., 1809, p. 81.

The Weir Mitchell* treatment consists in repose, sur-alimentation, massage and electrisation, practised in seclusion. It only suits neurasthenic or grave hysterical cases, and mainly cases where there exists a particular mental state favoured by environment and a disregard of hygienic discipline.

In diffuse emotivity, isolation may be indicated in order to facilitate discipline and suppress the influence of the environment. In systematic emotivity without impulsions it is only rarely indispensable when, for example, certain local circumstances provoke accesses, and even in these cases simple change of place can be advantageously substituted for it.

Isolation, a measure of intellectual and moral hygiène which it is the province of the physician to prescribe, differs from seclusion, which is a measure of public order and at the same time an attack upon individual liberty and can only be ordered by judicial authority, charged to provide for the security of the patient and his possessions.† This distinction appears to me so much the more important to recall as the two things are still usually confounded by the most eminent authors.‡

Sequestration (seclusion) must be reserved for the cases in which there exist dangerous and irrepressible impulsions, and resistance to treatment. It is especially in cases of motor madness that this measure ought to have been put in practice, on the demand of the patient himself, with analogous reserves to those which are admitted by English law. Seclusion, a legal measure, ought only to be practised under the permanent control of the law, and in public establishments.

Albeit the interest of the patient himself is not always the sole one worthy of consideration. Initium morbi est aegris sana miscere, says Seneca.§ Likewise isolation, when it is not necessary for the patient, may be prescribed in the interest of those who live with him and run a risk so much the greater as they participate in the same hereditary conditions.

We have already cited, making a diversion, a certain number

* *The Methodical Treatment of Neurasthenia, etc.*, 1883. Playfair. *The Syst. Treat. of Hysteria, etc.* Bouverie. *Neurasthenia*, 2nd., 1891. Le Villain. *Neurasthenia*, 1891.

† Féré. *Le traitement des aliénés dans les familles*, 1889, p. 4.

‡ M. Ritti, in a recent article, *(Isolement des Aliénés, Dict. Enc. des Sc. Med.*, 4th ser., t. xvi., 1889, p. 570), expresses himself thus: "Isolation or sequestration, confinement, or collocation as it is called in Belgium, is now essentially a therapeutic measure."

§ *De animi tranquillitate. vii.*

of facts illustrating the fatality of imitation which produces itself so much the more easily as it is brought about from defective acts. The disciples of Plato had the habit of wearing, like him, high shoulders, those of Aristotle to stutter, and the courtesans of Alexander to have a hanging head and a coarse voice. A proverb which Plutarch qualified already long ago says that one learns to drink with drinkers. Imitation does not only play an important rôle in social phenomena;* we find its influence again in the elementary phenomena of life, in the production of tissues and organs: and again even in the inorganic bodies which can crystallise in a different form, according as we put in contact with them a portion of substance presenting under a determinate crystalline form.† Imitation acts throughout: it is requisite always to reckon with it.

The obstruction which results from the sojourn of these chronic patients in families and which expresses itself by a social loss so much the more considerable as they beget the evolution of individuals whose industrial value is greater, can only be palliated by the institution of special hospitals, or according to their means, they may be able to find suitable help.

The intervention of medical means properly so-called can only be of utility in imitating and re-enforcing the fundamental elements of hygiène. When the change of scene and air is insufficient one may recur to an artificial aeration, say by baths of compressed air, or by baths of compressed oxygen, which, taken before food, have not only the advantage of favouring hematosis but also of exciting the digestive functions. I have often derived great advantages from these inhalations practised regularly. But it is not only the air which is of importance in hematosis; they are also the qualities of the blood. Emotionals are often anemic: ferruginous preparations are specially useful for them.

Activity of the digestive functions is excited by preparations of strychnine. The introduction of aliments of little volume, of powdered viands, of peptones, furnishes an important feature in sur-alimentation, certain inconveniences of which can be palliated

* Tarde. *Les lois de l'imitation*, in 8vo, 1896.

† Gernez. *Sur la production dans le même lieu et à la même température des deux variétés de soufer octaédrique et prismatique (C. R.*, July 27th, 1874). Sabatier *(Essai sur la vie et la mort)* has garnered a certain number of facts of the same kind, whence one establishes a true choice in imitation, and which constitute important materials for the history of inorganic psychology.

by arsenic and intestinal disinfectants. The efficacy of sur-alimentation can only be controlled by weighings which it is proportionately more important to repeat as the patients are encouraged and tonified by every amelioration of their somatic state.

Under the influence of sad emotions and concurrently to the mental depression constipation is very frequently observed; but constipation itself, once installed, can play the rôle of cause. It is as much more important to combat it as it is rare to see the psychic troubles yield with it.*

Many patients are convinced that when they are constipated they ought to eat less: the less they eat the more the constipation increases, the more they become enfeebled and the irritability increases in proportion. Voluntary privation of aliments often brings about anorexia. All these troubles can cease under the influence of a suitable alimentation.

Activity of nutrition can be excited by revulsives, actual cautery applied at various points to the vertebral column, extensive sinapisation, pulverisations of ether, of methyl chloride on the spine. Marcé has recommended flagellation with nettles, Jacobi† has obtained better effects from issues in characteristic madnesses. These successes ought not to astonish one if one only recalls the happy results, from the point of view of psychical state, which one observes in the wake of general maladies, suppurations, traumatisms. But the most practical means are surely hydrotherapy and electricity: the latter in the form of general faradisation (as by Beard and Rockwell) and of franklinisation as held in esteem by Romain Vigoroux.

Hydrotherapy is also employed in sundry forms, but it is especially the cold water cure which renders important services. The other forms have special indications.

When sleep cannot be procured by hygienic treatments, it is necessary to intervene by proceedings which approach as much as possible those of nature.

If one would remember well that the physiological condition of sleep is anemia of brain‡ one would understand better the utility

* Refers to note ⁹ on page 486.

† *Neue Beobachtungen*, Berlin, 1856.

‡ Durham. *The Physiology of Sleep (Guy's Hosp. Rep.*, 1860, 3rd ser., t. vi., p. 149).

of the simple means which tend towards its reproduction. All that tends to attract blood to a distant part (*i.e.*, distant from the head) tends to induce it. It is thus that the labour of digestion acts. Sinapisms placed over the stomach, to the feet, the mustard baths, mustard fomentation, the Junod's boot,* the ligation of the lower limbs at their origin; amongst children the cold foot-bath followed by dry friction with a rough towel produce the same effect. In the case of excited or febrile patients, insomnia can maintain a general exaggeration of the circulatory activity.† Cold lotions act happily at once by the loss of heat and the cutaneous reaction which they engender. A good number of anemic patients are somnolent during the day because the anemia of the brain is more pronounced in the erect position, but at night when in the horizontal they suffer insomnia owing to receiving an unaccustomed quantity of blood. This insomnia only yields to general treatment: iron is for them the best of narcotics. M. Hayem‡ recommends especially among the protosalts of iron, the protoxalate, with which he advises the association of hydrochloric lemonade. I believe that one can, with precautions, avoid the inconveniences arising from the use of the perchloride, which appears to me to be one of the best preparations.

In anemia, so frequent among emotionals, as well as among the degenerate and the neurasthenic, ergot of rye and arsenic appear useful adjuvants frequently.

Battie§ says expressly that for the feeble mad the lancet is as dangerous as the sword. It is a remark one might generalise by application to all neuropaths, although bleedings have been prescribed in order to calm impulsive tendencies.

Damiens, the assassin of Louis XV. had the habit of bleeding himself. He had remarked that fixed ideas dominated him less after blood losses, and he attributed his attempt at assassination to the delay which, on this occasion, had taken place in effecting a bleeding. We have cited cases of nymphomania cured by general or local blood losses.‖

* *C. R. de la Soc. de Biologie*, 1889.

† Fothergill. *Causes and Treatment of Sleeplessness (Pract.*, vol. 16, p. 105).

‡ *Du sang et ses altérations anatomiques*, 1886, p. 701.

§ Battie. *A Treatise on Madness*, 4th ed., 1758, p. 94.

‖ *La nymphomanie ou traité de la fureur utérine*, Amst., 1778.

The emotions and passions can be, in fact, allayed by all the conditions which modify, by depressing, the encephalic circulation, but the abstraction of blood is not necessary. I have, for several years, practised the habit of giving to the patients of my service, when they are seized by morbid passionate movements, mustard baths, which have the effect of diminishing the blood pressure by provoking a considerable dilatation of the vessels of the skin. The psychical effect rarely fails to accompany the physical.

If impulsive manifestations of morbid emotivity are not beyond the resources of therapeutics, and can be allayed by blood-lettings, derivatives, and antispasmodics, fear or apathy can be assuaged sometimes by stimulants in moderate doses. It is thus that Kush reports that John Hunter who experienced a painful emotion when he had to speak in public, came to conquer it by the help of small doses of laudanum.

Morbid emotivity results from an organic trouble and it is especially by acting upon the body that one can bring about a cure: discipline of the organic functions is now the most correct for favouring the functions of the mind. But the organic functions can be influenced by intellectual activity; also on the side of physical pains, moral pains have always had their place in the therapeutics of mental ailments.*

What we have said of the physiological effects of agreeable sensations and emotions, enables us to comprehend that the provocation of æsthetic emotions is not a matter of indifference. To-day we apply ourselves with reason to the decoration of establishments destined to receive patients such as those we treat of: it is not without reason. Burrows† even already (1880) regarded an agreeable aspect of the asylum as an important condition of success.

Lasègue‡ has sufficiently happily divided the methods of moral treatment into reasoning and sentimental according as it is addressed to the reason or sentiments, but he remains mute in regard to the practical procedures. We proceed to consider that for a moment.

* Bridger. *Delusions, the result of intestinal accumulation (Br. Med. Journal*, t. i., p. 688). Adam. *Visceral Lesion and Mental Disease (Ibid*, p. 1,019).

† *An Inquiry into Certain Errors relative to Insanity*, 1880, p. 134.

‡ Lasègue. *Questions de Thérapeutiquement (Ann. Med. Psych.*, 1844). *Etudes médicales*, 1884, t. i., p. 585.

The reasoning method comprises pleasant procedures and forcible procedures which address themselves to the delirious idea, with the avowed intention of uprooting it, and the indirect procedures which tend to substitute reasonable ideas for false. The substitutive proceeding, or indirect, constitutes the basis of the moral treatment whilst the patient remains in the midst of the family, or it applies itself, so to say, automatically, the patient only intending to express reasonable ideas and only having under his eyes examples of acts reasonable and adapted to social necessities.

As for the direct proceedings their application is restricted equally well in the family, as in the asylums and homes. Forcible procedures, which consist of intimidation in all its forms, ought to be rejected in all its forms, absolutely.

Intimidation, prescribed in the treatment of madness by Leuret, has hardly any sanction to-day.* Besides, the so-called moral means of Leuret consisted mainly in the cold douche and given in such a fashion that one might entirely question its title to a *moral* character.

Leuret did not hesitate to subject monomaniacs to the douche even until they would consent to renounce their false ideas, but the results which he obtained were at the least doubtful: the most common effect of intimidation is dissimulation.

The mild procedures which consist in reasoning, in the discussion of the false ideas, are not applicable in the periods where the false ideas are in full activity, they cannot but exasperate them. It is precisely because it excludes the possibility of persuasion that madness differs from error.†

The sentimental method comprises procedures analogous to those of the reasoning. One can act indirectly upon the sentiments of patients by setting under their eyes an example of happy emotions springing spontaneously in a normal environment. The happy emotions are specially capable of producing this effect. Violent procedures consist in the provocation of lively emotions, which, we know, determine sometimes the cure when they present them-

* *Du traitement du la folie*, in 8vo, 1840.

† Lasègue and J. Fabret. *La folie à deux ou folie communiquée (Arch. Gen. de Med.*, 1877).

selves spontaneously. The happy emotions are specially capable of producing this effect.

The gentle procedure under the sentimental method consists in raising the consciousness of the patient, reawakening his *amour propre*, his affectionate sentiments, stimulating his will. "Presume aptitudes in your pupil," says Feuchstersleben,* "it will develop them."

But in order to wish to act on the intelligence or sentiments one must not lose sight of the fact that the emotional person is not an imaginary patient. *The imaginary patient is a literary creation which answers to no actual fact; there are no imaginary maladies but there are maladies of the imagination.*†

But the maladies of imagination have always physical conditions which can only be modified by the determination of different physical conditions. It is not by denying his ailment that you will cure an overscrupulous or a heedless person, but by demonstrating to him that he can be cured and that he can help in his cure.

In fact, the best moral treatment consists in discipline and moderate physical labour, which quickens the organic functions, develops the motor organs, and acts as a derivative to the morbid activity of the intelligence. But the moral diet, as Guislain says, is in fact the most delicate to eat and one must remember that, in fact, expectation, "negative Behandlung" (Heinroth), is often more useful than interventions inadequately motived.

Hypnotic suggestion has been recommended in morbid emotivity and some authors appear even to consider this form of moral treatment as superior to all other treatments. In fact suggestion comes under the sentimental method of moral treatment: it can have a tonic action and when it acts upon hysterical persons suffering from local affections, it can induce a rapid cure, whether it be employed during sleep or the hypnotic condition, but against hysteria it can only act as an adjuvant. And it must be added that even in hysteria most frequently the effects of suggestion are only

* *Hygiene de l'âme*, p. 105.

† Ch. Féré. *La medicine d'imagination (Prog. Med.*, 1884).

temporary and have as result no durable cure, if a general treatment does not intervene to modify the somatic state.*

Now for a long time past I have observed and noted that even the hysterical hypnotics are capable of conserving their moral identity when brought to bear on acts habitually and intensely desired. There is no room for astonishment then if a morbid emotivity, obsession, fixed idea, etc., resists when an hallucination or a paralysis even can yield.

When suggestion does not act in a direct manner in addressing itself to false ideas, morbid emotivity, it can be useful in acting indirectly on nutrition. In an hysterical person with instinctive perversions, direct suggestion has only momentary effects: but when I had taken the notion to suggest to him an exaggerated need of aliments, he throve rapidly and the so frequent ideas of suicide common in hysterical males, and which were with him very intense, rapidly disappeared.†

The reserves to be made about hypnotic suggestion ought to be so much the greater as hysterios and some neurasthenics can only profit thereby and then only in a restricted manner.

The possibility of fixing the attention is one of the conditions of hypnosis: but most mad folk (vesanies), epileptics, and emotionals, are most frequently incapable of fixing otherwise on their morbid ideas. All those who have shut eyes do not sleep, and all those who sleep are not in hypnosis: these are facts it is needful to attend to at the outset. I must own, to my confusion, that in spite of numerous attempts, and although patience was not a-wanting, I have never been able to put into a state of hypnosis either a mad person or an epileptic either at the Salpetrière or the Bicêtre. At the latter I have tried on male epileptics exactly 228 times; 16 times the attempt was ended by an attack, 12 times the patient went off into a sleep which did not afford any objective character of hypnotism.

The treatment of emotionals has not only a personal interest, it has besides an interest for their descendants. Whilst the descendance of alcoholics is progressively degenerative: that is to say that the children become more defective in proportion as the

* Ch. Féré. *Les hypnotiques hystériques considerées comme sujets d'expérience en médicine mentale* (*Ann. Med Psych.*, 1883, 6th ser., t. x., p. 299).

† *Les doul. hystériques et la simulation. Loc. cit.*

intoxication becomes more ancient and profound, one can in the degenerate, and especially in subjects become emotional by reason of physical conditions, observe an inverse phenomenon: that is to say that one sees in proportion as the physical constitution benefits under a suitable hygiène, the descendants whose ancestors lived improper lives or were more or less defective, return progressively towards the normal type. Descendance effects a return to mediocrity, a return to the normal type, exactly as it must happen in the case of a happy alliance.

OBSERVATION LV.

Return to Mediocrity in the Descendants of a Degenerate Emote.

"M. X., 43 years, has had a mad maternal aunt, presents marks of degeneracy, ears *en anses*, facial asymetry, a symmetrical chromatism of the iris, bad enunciation. He has had convulsions in his infancy, and was subject to violent rages in which he rolled himself upon the ground. Besides, he presents, even now, furious anger storms during which he smashes any vessel or furniture which comes under his hand. In spite of a vivacity of spirit and a great facility in the play of words, at puns, and the most singular jocularities, he has been incapable of acquiring his Bachelor degree, although no pains have been spared upon him. He has tried several business houses, but he could not remain in them because of a defect of memory and a distraction which rendered him incapable of sustained effort. After three years of fruitless attempts his father tried the plan of leaving him unoccupied. He had never had a comrade, he went out alone after dinner and returned often very late in the night: he pretended to be walking: but in reality he went to play in the gaming house, where he lost pretty large sums: his father reprimanded him without success. Besides, his mother came to die, he played with a part of his fortune, and gave way to his passion. After the play people had no cause to reproach him with any blamable act, but he secluded himself in his chamber the following day in complete inaction. One night he came home all covered with blood: he had had a quarrel with his companions of the gaming house where he was in the habit of passing his evenings: and on departure he had been attacked and robbed of his purse. He became very sad, and his father had to force him to go out. Being much occupied himself, he was in the habit of proceeding after breakfast to his place of business, and he took him to rest on the terrace of a café. He rapidly took on a habit of drinking absinthe exclusively. Several times he returned drunk: no remonstrance would make him abandon his new habits. He would only drink abroad, never at home, where everything was at his disposal. For about six months this passion for drunkenness held him without interruption: when one day on returning entirely drunk, he fell down the steps, and sustained a fracture of the lower maxillary. He was necessarily restrained for several weeks with appropriate fixings. When he was able to go out, there was no further question about absinthe, the habit of getting drunk was definitely abandoned. The gaming had lasted for a

little more than a year, the drinking for six months. M. X. was 26 years old, his father thought the time was come when he should marry. One of his cousins, little fortunate, consented to marry him, although she knew his antecedents. During the preparations M. X. became sad again, and refused to go out, and especially to go out alone, he ends by informing his father that since he had gotten his jaw broken and cured; he could not go out into the street without experiencing a painful anxiety whenever he met anyone, that when he had to pass through a crowd he was seized with an irresistible fear, and that he ran home directly. He knew himself that this fear was ridiculous, but it was impossible for him to resist it without help. M. X. had always been thin, somewhat puny, pale, but his general health was satisfactory, he complained of no physical trouble. He married. His wife was his kinswoman, but far enough removed to be justified. After marriage fear of crowds and even of solitary persons in the street became accentuated; M. X. never went out without his wife: and when he met groups, she had pains to escort him; if not he was seized with an invincible fear, accompanied by cold sweat, trembling of the limbs, which obliged him to enter a warehouse or a cab, where he found himself less ill at ease even than in a crowd.

"Since her marriage at the end of 1872 even unto 1877 Mme. X. has had successively two infants stillborn without external lesions, and two others, which have succumbed the one at six weeks and the other at three weeks with convulsions, also without external lesions: besides the father had never had any venereal affection. In 1877 Legrand du Saulle advised them to remove into the country. The following year Mme. X. gave the world a child, which is now (September 23rd, 1889) eleven years old, and which enjoys excellent physical health, but has been operated on for hair-lip and has facial asymmetry, and after having had convulsions during lactation, became epileptic at the age of seven. Mme. X. has had two other infants since: the one, nine years, a boy like the first, is well made, bears himself well, has never had convulsions; the other, a girl, has never had any nervous trouble, and, in fact, presents no deformity, except a marking on the upper incisors and chromatic asymetry of the sides.

"M. X. is always an anthropophobe and subject, at more or less distant intervals, to violent wrath. But his morbid emotivity has not had occasion to manifest itself since the change of residence; and, under the influence of tonic treatment prescribed for him at the same time, he has become stouter, and his physical aspect has changed. This has taken place rapidly, and it is since this epoch that the vitality of his children has been happily modified.

"In the country where he lives M. X. only rarely meets wayfarers and he has time to gather courage: he can walk alone: but if he comes to Paris his anxieties at first less intense soon develop their whole force, often on the second day."

I do not believe that this tendency to reversion to the normal type amongst degenerates can be very exceptional. I am able to cite various other examples of it. I have chosen this one

because it shows that even when the brain has become the seat of an affection of so definite a kind (tellement propre), as the ancients said, mental troubles persist in spite of organic rehabilitation, and this has nevertheless an interest from the point of view of the descendants.

CHAPTER XXII.

Prophylaxy—Legislation.

Summary—Hygiene of Generation; Education—Discipline—Necessity for a Legal Sanction—Need of Civil Responsibility—General Application of the Common Right.

If morbid emotivity can develop itself in consequence of accidental circumstances it is not any the less incontestable that these accidental circumstances are especially efficacious when there exists a certain native disposition; and that, in a great number of cases the troubles manifest themselves without provocation of some intensity: the predisposition then plays the principal rôle. It appears then that the first measure ought to consist in a certain regulation of generation. This idea is not the less ancient enough, for one which has not yet been fortunate. "In the City of the Sun," says Campanella, "the Love Magistrate is specially charged with the care of generation: that is to say with the making, after a fashion, of such sexual unions as may eventuate in the most beautiful progeniture possible. Also the inhabitants of this beautiful city mock at us who give ourselves all manner of trouble for the amelioration of the race of dogs and horses and who neglect that of our own species. If by chance a man and a woman are mutually attracted to one another, it is permitted them to play and enjoy themselves in public together: to give themselves garlands of flowers and leaves and to address themselves verses; but if they are not in conditions adapted for beneficial generation they cannot in any case unite sexually."

The country which has given birth to the economic doctrine of Malthus ought to be heard declaring legal measures against the marriage of degenerates and especially mad folk.* But having formulated a law there is a question to face, what is a mad person?

* W. Aitken. *The Science and Practice of Medicine*, t. i., p. 490. Strahan. *Marriage and Disease*, 1892.

So that one would have to trace the boundary betwixt reason and madness before any measure of this kind could be tolerated. It would allow too fine a scope for the medical arbiter who finds already enough to exercise him in questions of responsibility and sequestration. We ought now to endeavour to propagate the idea of a morbid heredity.

Emotes (emotifs) have betwixt them elective affinities which drive them to seek themselves and too often they find themselves. An hysterical person has successively married two individuals who committed suicide, and she is actually the wife of a general paralytic. If it is necessary, so far as possible, to impeach unions betwixt emotes, ought the same prohibition to attach to unions betwixt an emote and a sane person? Galton thinks that crosses of the abnormal with the normal, can have for effect a return towards mediocrity, but practice (experience) teaches us that by these unions the best races lose more than the bad gain: as far as possible they ought to be avoided. It is not only moreover against the heredity of habitual emotivity of the character that it is necessary to be on guard.

The influence of the emotional states of the parents at the moment of conception on that of their children has struck men of intellect before medical men had occupied themselves therewith. Hesiod prescribed abstinence from coitus after return from funeral ceremonies for fear of breeding melancholic children. Erasmus said to a madman, "I am not the fruit of an ennuyed conjugal effort!" Tristram Shandy attributes the troublesome peculiarities of his character to a question made by his mother at a very inopportune moment. One of the adulterous infants of Louis XIV. conceived during a fit of tears and reproaches on the part of Madame de Montespan that the ceremonies of the jubilee had become dull, preserved all his life a character which entitled him to be named "The Jubilee Infant." The influence of inebriety at the moment of conception is well known.

The interesting researches of M. Dareste exhibit under what slight influences the development of the organs can be troubled, especially during the first periods of embryonic life. One can then understand that certain accidents of gestation may be capable of determining abnormal states which are not hereditary but are

congenital. The nervous and mental troubles, so frequent amongst subjects whose birth has been irregular, have not perhaps any other origin:* we know, for instance, that bastards are not unusually the victims of delirium of persecutions. I have shewn besides that when, during pregnancy, the mother is subject to even slight excitations the fœtus reacts—it has already been excited itself. Moreover, the influence of the moral emotions and traumatisms during gestation on the development of idiocy and epilepsy are to-day unquestionable.

The hygiène of our sexual relationships and of pregnancy ought therefore to figure amongst prophylactic measures quite as much as the happy choice of progenitors. Some pathological facts which we have cited also shew that lactation merits being supervised with the same solicitude as gestation.

Education and the conditions of environment, *in the first infancy*, constitute, after a fashion, a prolongation of the gestation; the hereditary influences continue themselves there, and, if they are bad, they can contribute to the development of morbid emotivity. Can it be said that education is capable of correcting constitutional faults not only in the individual but in his descendants, that education can prolong its effects throughout the race?

The belief in the heredity of acquired characters, illustrated by Lamarck and maintained by Darwin and Spencer, has been called in question by Galton, Weissmann, and Ray Lankester, and has been strongly contested by Ball (W. P.)† in these last days. And it does not appear permissible, at least in man, to put it into the theory of evolution on the same footing as Natural Selection. If discipline has surely a personal effect, it does not follow one can surely reckon upon an artificial education to perfect his descendants.

So far as individual effects go, they are incontestable. It is especially upon emotes badly armed for the struggle that the direction of the movement is determined by the least resistance.‡ It is undoubted that the resistance to morbid tendencies can have a happy effect, but there is only a brutal resistance which is proposed for the purpose of destroying an instinctive penchant,

* Ch. Féré. *La famille neuropathic (Arch. de Neurol.*, 1884).

† W. P. Ball. *Les effets de l'usage et de la désuétude sont ils héréditaires? (Bibl. Evolut.* t. ii., 1891).

‡ H. Spencer. *Les premiers principes*, 4th ed., Fr., p. 202.

of avoiding a nervous discharge. Inhibition has no more right of citation in paedagogy than in physiology. We can only command nature by obeying her; one can only moderate an instinctive discharge by deflecting the activity of the nervous system. This is a fact not unknown to those who occupy themselves with moral hygiène. "The hygiène of the soul," says Feuchstersleben, "has for its basis the subjugation of the physical and moral forces to the will; but this subjugation consists in their regulation and direction, not by arrest of their movement."*

The influence of discipline in education upon the sentiments and the desires, is susceptible of a physiological explication evidenced by Braid in his hypnotic experiences, where he shows that the somatic attitudes command the mental. Besides, this fact was not unknown before the discovery of hypnotism. Confucius thought that the habit of suitable acts and attitudes determines necessarily homologous (convenables) sentiments, and there is the end of ceremonial which plays so great a rôle in religion and one may say in the morale of the Chinese. It is to these entirely physical conditions that must be attributed the sudden conversions of the comedians who mimicked to their utmost the ceremonies of the Christian Cult (St. Genés, etc.)† The same effects of an involuntary attitude, or voluntary for that part, manifest themselves in the visceral functions. Anorexia can result from prolonged hunger‡ or the voluntary privation of aliments.

To wish to forget an object, says La Bruyère, is to think about it: to forget, one must think of other things. To allay pain or a desire one must not only pass them over in silence, but occupy otherwise one's physical and mental activity.

If physical or intellectual fatigue can realise the conditions of morbid emotivity, moderate work has, on the contrary, a preventive action: it regulates at once the functions of the body and the functions of the mind.

Burton ends his work on Melancholy with this recommendation: "Be not solitary, be not idle": solitude and inaction must be avoided. These witnesses re-enforce by their sole presence the

* Feuchstersleben. *Hygiène de l'âme*, p. 75.

† Butler. *Vie des pères*, etc., *(trad. Godescard*, 1834, t. ii., p. 236).

‡ Goodhart. *Rest and Food in Treatment (Am. Jl. of Med. Sc.*, 1892, t. cii., p. 236).

power of control, and work constitutes a derivative of nervous tension.

What to-day forms the basis of psychological medicine, says Griesinger,* are the sentiments of humanity substituted for cruelty, with which aliens were but yesterday treated. One can add that one can pass over the measure, and one can forget often that those who merit most consideration are not the patients, but the healthy, who perpetuate the race and succour the defective.† Excessive indulgence which one practises towards emotes can only exaggerate the extent of their demands.

Rush well understood the importance of discipline and he went so far as to admit that in despotic states madness is rare. Whatever be the reserves which one can make regarding this last remark, it is not doubtful that discipline plays an important rôle in the treatment of a great number of madnesses. It plays a still greater *rôle* in the prophylaxy of madness and crime.‡

The influence of discipline on conduct is evidenced by well-known facts of incontestable value. The absence of discipline, on the contrary, enfeebles self-control, and when emotes are self abandoned, they soon know no curb and abandon themselves to every impulsion. This loss of control leads not alone to crime; it can of itself alone induce veritable madness. Carpenter relates§ that Conolly said to him, whilst walking the female wards at Hanwell Asylum, that, in his opinion the two classes of aliens who were confined there, came there because they had not known how to master their originally bad character. It is generally admitted to be absolutely useless to convince a mad man of his error. Arago never succeeded in undeceiving a mad inventor. But if it is impossible to destroy by reasoning a trouble of sensibility and a trouble of association of ideas, it is possible to oppose material obstacles to acts which can result from them: isolation and sequestration and the discipline of the Asylum are based on this possibility.

The most violent impulsions can be restrained so long as the subject has consciousness of his criminality of act and the consequences it may entail upon him. Marc, Calmeil and others have

* and † Griesinger. *Loc. cit.*, p. 525.

‡ *Medical Inquiries*, etc., Philad., 1812, p. 69.

§ *Principles of Mental Physiology*, p. 333.

cited remarkable cases of patients attacked with impulsions who made themselves bound in order to resist a criminal act, and only succumbed when external circumstances could not be brought to their aid.

But instead of witnessing the re-enforcement of motives of resistance to morbid impulsions one observes more and more addiction to passionate crimes. This indulgence plays a great part in the increase of contemporary criminality. I have already expressed the opinion* that impulsives ought to be brought up in this conviction that if they escape the necessity of reparation it is only by a badly justified toleration of a law based on metaphysical considerations and exposed to an indispensable reform. The rôle of the physician is not to encourage emotes in the assurance of impunity; but, on the contrary, to make them understand that not having the physical defect capable of characterising objectively a defect of will, they are subject to the laws like their fellow citizens. I have had the pleasure of seeing that, quite recently, Dr. Hammond† maintains the same opinion, making observation thereon that the habit of considering himself as subject to the common law is the most proper condition for the maintenance of mental equilibrium and self control. Consulted by an individual who was possessed by the idea of killing his own daughter Dr. Hammond made him a reply worthy of the approbation of all medical men who are preoccupied more for the public security and their duty than the protection of the antisocials and their special interests. After having remarked to him that his will was capable of triumphing over his impulsion, concerning which he could reason with intelligent calm, he counselled him to recall his sequestration in an Asylum, adding, that if he did not follow his advice after having asked him for it, and if one day he yielded to his impulsion, he would be culpable of murder and that he would merit execution like any other murderer.

The same moral treatment should be applied to all those who know themselves subject to a depression of will under the influence of voluntary intoxications such as alcohol, morphia, ether, etc.

* *Les Epilepsies et les Epileptiques.*

† *Self Control in Curing Insanity (North Am. Review,* March, 1891, p. 311).

Those who wish to find a legal excuse in these voluntary intoxications have never reflected that the will is weakened in consequence of every fatigue and that it is always possible to discover a physiological condition for an impulsion. All physical or moral causes of fatigue entail a failure of will power; it is a consequence which finds itself cleared up by contemporaneous physiological psychology, but which has not escaped moralists. "Man, worn by pain, and deprived by his condition of relief pleasures, is forced to seek in sensual excesses a deceitful solace," says Channing. "Excessive labour renders man incapable of resisting temptation." Lord Bramwell remarked that if the menace of the law did not suffice always to turn man aside from crime, it could suffice to turn the alien aside; there is not then, from this point of view, any fundamental difference betwixt the two. Under the pretext that the mad cannot be restrained by ordinary motives, it does not follow that these motives are to be diminished, it is rather necessary to reinforce them.

When one reviews the observations of patients cured by moral treatment, and even those of Leuret, one acquires very quickly the conviction that it is not over delirium, that it is not over false ideas, neither over hallucinations that one acts, be it by reason or fear; but that one modifies the emotional state by excitations of a moral or physical order, though having in fact the same physiological conditions.

A good number of medical alienists appear to have undertaken the task of developing passional criminality by fostering excuses in him.

Hoffbauer* in two chapters on "Momentary Estrangement" and on "Unwonted Impulsion," has defended with rare candour irresponsibility in passional crimes. The following passage deserves quotation so much the more as the book from which it is taken is annotated by Esquirol who did not hold himself reserved in his commentaries and who approves by his silence. "A man introduced himself one night into the chamber of an aged female with a view to theft. Whilst executing his design the aged one awoke, arose, and seized him. In the fear of being taken in the

* Hoffbauer. *Méd. lég. relative aux aliénés trad. Chambayron*, 1837, pp. 259, 270.

act, he seized the woman by the throat to prevent her crying and giving an alarm and held her there strongly; probably he fractured the larynx. He thought well she might be ill therefrom sometime; but he did not believe she would die from it. However, she was after awhile found dead in her chamber. At first sight it appears that the culprit was guilty of the murder; nevertheless there are two cases to distinguish, where the position or the scene of the trouble caused by the first action has been able to be foreseen as being a natural result; or otherwise, where there could have been no probability that this trouble would have resulted from the first action. In the first case, it is so much the more responsible than the second as there were more motives to think that the state of trouble which had been caused would immediately result from the first action; in the second there is only responsibility for this last."

Several medical men even have no fear to take the position of advocate in defence of criminal malady, as if every criminality did not presuppose a defect of intelligence necessarily correlative to troubles of sensibility.

Morel says textually, "I have openly pleaded before the assizes the cause of a young girl belonging to a family in easy circumstances and in whom the tendency to theft was brought to its highest intensity."

The basis of penal right reposes on the doctrine of free choice which has not itself any scientific foundation and which is contrary to what physiology teaches us. The penal law admits two categories of individuals, the one responsible, the other irresponsible. *This distinction is not founded on any scientific argument:* desire, passion, impulsion, virtue, vice, madness, are allied to organic conditions betwixt which science can only establish degrees of intensity. It is in vain that one has endeavoured to establish anatomical characters, specific or congenitally criminal. The works of anthropology referring to criminality cannot serve as a basis of a classification. The morphology of the organs is incapable, of itself, of guiding one to their functions. The sole criterion of moral value of an act is its utility, and the sole principle of the law can only be the right of social defence. Every criminal act results from ignorance of reasonable motives of action,

from a defect of discernment; that this fault of discernment is allied to a defect of original perception or to the rapidity of impulsion, it is not thereby the less organic, necessary. The notion of moral responsibility introduced by the philosophers and defended to-day even by medical men, cannot establish itself on precise facts. It is only to condemn it, to avow, as M. Tarde has done, "that it ought to be (i.e., la responsabilité) maintained by force, imposed as a dogma socially necessary, although scientifically untenable."

When one relegates to medical experts the right of establishing categories of responsibles, demi-responsibles, irresponsibles, one erects an inadmissible pretension, because it is without clearness, without scientific precision. "If clearness is the probity of philosophers," says Vauvenargues, "this pretension lacks probity." Science has not at its disposition precise signs which put it in the way of affirming distinctions of this kind, and a defender of expert evidence of responsibility admits that ingenuously in these terms, "The expert is the feature of union betwixt the scientific gifts of the medical man and the metaphysical hypotheses of the magistrate." The evidence of the medical expert, as says Falret, ought only to be a question of clinical fact. The clinical fact is the only scientific ground of the medical man in acquiring the conviction of the existence of a mental trouble. But in order that the expert evidence may be efficacious, it will not suffice only that the expert should be convinced of what he advances, he must necessarily be able to bring conviction to the mind of the magistrate. Can he fulfil this in the same degree as the chemist expert who exhibits the lethal agent? No! absolutely no! There is no criterion of madness, remarks Sémal impressively. Up to this present, and apart from general paralysis, which is sometimes accompanied by indisputable physical signs; (but which have not moreover any necessary relation with mental troubles;) no mental ailment is accompanied by physiological troubles which distinguish it peremptorily from normal psychic phenomena. The physiological conditions of the emotions trace out for us in the most perfect form all the physical symptoms of madness. To say that a mad person is an invalid, is a speech which cannot be set up as a

criterion. A line of demarcation must be shewn betwixt this malady and the physiological states, and a pathognomonic sign of madness. Belouino admits that if certain passions diminish imputability, others, those which are reflex, augment it.

The medical man ought to renounce not only the right to judge of responsibility and its degrees (a prerogative, moreover, which does not legally exist); but, even in general, to appraise the exceptional cases provided for by article 64 of the Penal code: "There is neither crime nor misdemeanour when the prisoner was in a state of madness at the time of the act, or when he has been constrained by a force which he could not resist." If he can in some cases give physical proof of madness where will he find specific characters of an impulsion or morbid emotivities? And it is precisely by reason of this possibility that the articles of the code which consecrate exceptions in favour of individuals affected by troubles of the mind, ought to be purely and simply suppressed.

The immunity acquired for morbid crimes one would expect to see claimed for passionate crimes, and it is not in the name of Physiology that one would be able to oppose its extension, because there is no fundamental difference actually known, *from the point of view of physical conditions*, betwixt the normal and the pathological emotions.

Beard has already remarked that in neurasthenia there exists a diminution of mental control; M. Levillain attempts timidly to go further to obtain for neurasthenics the benefit of an attenuated responsibility. But every act of criminality (or dereliction) signifies a diminution of mental control; as this diminution is allied to organic conditions, congenital or acquired, to social conditions or others, there is no distinction possible from the physiological point of view. The law ought to be equal for all: deformities or maladies cannot serve as an excuse.

Instinctive perversions can only exist as a consequence of alterations of sensibility; and these alterations never consist in a perfecting, but ever in a diminution often considerable. One cannot compensate a defect of sensibility except by a proportional augmentation of the excitant. That is to say that, amongst the perverted the only chance of moderating harmful activities is to

reinforce the motives. Physiology teaches us now that if we must establish a difference betwixt the ill and the well, from the point of view of prophylactic or reparatory legislation, it must be to the gain of the last (*i.e.*, the well). This view point, that the social economy cannot be resisted, is not absolutely repugnant to all lawyers.

Pity for crime, as for all other forms of failure, is one of the most active causes of the degradation of the species: it opposes itself to the beneficent effects of natural selection. The struggle for existence is the law which presides over the persistence of species and over their perfecting—this law imposes itself as a fact. It is not doubtful, although one has been able to say of it that this procedure must be painful for those who succumb; but it is not the less necessary for man as for the lower animals. Impunity for crimes and excess of assistance to all categories of degenerates concur to traverse natural selection.

As Spencer says, one cannot adapt to the species the family régime, in which the pains of the parents ought to be proportional to the imperfections of the young or ailing members. "If the benefits received by each individual were proportioned to his inferiority, if, consequently, the multiplication of inferior members were favoured, and the multiplication of superior interfered with, there would result therefrom a progressive degenerescence."

"Indulgence towards crime," says Adam Smith, "is cruelty towards innocence. If the criminals do not bear the material responsibility of their acts, it is a crime to the community which must support it. And it is not only indulgence for violently destructive criminality which constitutes a cruelty towards innocence; it is still further, and especially, indulgence for unproductive apathy which can only survive by using up the goods of the commonalty. The abuse of assistance does not date from yesterday only, and their effects have not passed unperceived."

"At Rome, the hospitals effectuate," says Montesquieu, "that all the world is at its ease, except those who toil, those who are industrious, those who cultivate the arts, those who have ground, those who make commerce." In most great towns the administration of the public assistance has become the nurse of criminality, distributing without discernment thereof, to the lazy, the fruits of travail. The

abuses are become such that one sees formed societies for the organisation of charity which, by their minutely inquisitive procedure, come to refuse every succour to those who refuse to help themselves, and put in practice the principle of St. Paul, "If any would not work, neither should he eat."

The struggle for existence is a law which imposes itself and against which hardly any effort avails. The struggle is at once a condition of life and a condition of evolution.

The corollary of the law is that every irregular help accorded to degenerates of every kind is a crime against humanity. Solidarity can only be gained by individuals following one end, (un même but). Between two groups of individuals, of which the one follows the perfecting of the conditions of life by an always increasing production: and the other the multiplication of causes of destruction, there can only be antagonism. Though this antagonism can be veiled by a charity more or less consciously hypocritical, the effect thereof is not the less fatal: it is necessary that the feeble perish, it is the law: force does not establish right (la force ne prime pas le droit): it is the right throughout all nature (Spinoza, Hobbes, Schopenhauer).

The international union of penal right admits, in principle, that the penal system ought, before everything, to have for its object the placing of delinquents beyond the power of mischief as long as possible. But to put an obstacle in the way of harmful criminal acts does not constitute the whole of the prophylaxy of crime. Every member of society must be interested to refrain from recruiting it with the néophytes of crime.

Amongst the prophylactic measures of criminality and morbid proclivities in general the necessity of civil responsibility must be insisted upon, under the guarantee of the family, commune (or municipality). This responsibility, ensuring reparation, interests not only the individual, but the community, in respect of persons and property, and consequently in the restriction of the effects of morbid emotivities of anti-social quality. Solidarity in the reparation imposes itself especially on passional crimes, and without admitting the principle, I maintain, legislators are bound to obey it in certain measure.

The article 106 of the Law of the 6th April (French) 1884 on Municipal Organization says: "The communes are civilly responsible for waste and damages resulting from crimes and derelictions committed by open force or violence on their territory by mobs or assemblies armed or otherwise, be it against persons or public or private property. The damage interests for which the Commune is responsible are redistributed amongst all the inhabitants in the Commune, by virtue of a special *rôle* comprising four direct contributions." And, quite recently a special law has accorded indemnity to the victims of dynamite.

We have indicated above that collective emotions, the passions of a crowd, propagate themselves by a mechanism of which physiology renders account. We have concluded for an attenuation of responsibility for acts committed under these circumstances. But these kinds of suggestions, (as we have indicated for a long time in regard of hypnotic suggestions), are only efficacious when there are brought about acts conformable to the tendencies of the individual who excites himself by contact with other individuals of the same tendencies, as such another excites his courage by alcohol. To join oneself to a crowd is already the manifestation of a tendency. It is there that the preventive measure ought to begin. If material difficulties restrain the pursuit of reparation, reparation is not the less due on that account. M. Fournial ends his dissertation on the "Psychology of Crowds" by this conclusion: "It is most frequently dangerous to bring men together into crowds. It is needful to expect from these collections an explosion rather of bad instincts than of generous sentiments. Of a crowd, one must say, it is most often the human beast which arises." This conclusion which is only a formula of public sentiment, comprises a practical deduction which the author, borne away on humanitarianism, did not suspect: that is, that the right of reunion is the most pernicious to the laws of individual liberty and to the public liberties. In a country where universal suffrage is the sole master, and is guided by the press (free), the manifestations of the crowd ought to have no authority: they can only put in evidence instinctive tendencies, in general harmful, and which in every case do not express the reasoned opinion of individuals which constitute it. The crowd is a being deprived of brain, which can only have blind reflexes, it is

a spinal being (Lacassagnet) whose ill deeds can only be favoured by tolerance.

The idea of an act is the commencement of an act: if to think is to act in a certain degree, one may say that the expression of the thought is the commencement of its execution. And if it has relation to a harmful act this expression is so much the more dangerous as it is produced before more numerous witnesses, and more excitable, and so consequently more capable of putting the idea into execution be it singly or collectively. Physiology thus leads to the assimilation of menace, attempt and perpetration of crime, and to the application to them of the same measures of prophylaxy and reparation. This assimilation, forced upon us from the physiological point of view, imposes itself also from the point of view of public safety which is the principal condition of a healthy social activity: public security is troubled under the same title by menaces and attempts, as by criminal acts.

Ought the age of subjects to entail special measures?

The Areopagus put an infant to death which had put out the eyes of a bird. This severity shows that the assembly understood the necessity of combating instinctive perversions from their origin. To-day such a punishment, or even any punishment, would appear to be a proof of barbarism. It is not that we would doubt that cruelty towards animals is only a prelude to other anti-social perversions. It is not but that we have before us evidences of the possibility of cure of such perversions; but we feel ourselves so invaded by perversions of every kind that the radical remedies appear to us also as dubious as the evil: we can say as in the time of Titus Livius: *Nec vitia nostra nec remedia patimus.* And then we cannot resign ourselves to impotence, we wish to believe that science can change nature, or at least that it can establish strongly that which remains sane.

So far as we are capable of distinguishing incurables we ought to try to cure all emotional and perverted persons. M. Boulanger terminates a recent work on the instability of the mind by the following conclusions: "These patients confided during their early years to competent medical men are susceptible of great amelioration, and are frequently cured. One ought now to institute for

them a treatment entirely special, hygienic and, above all, pædigogic.

"Hospitalisation of these patients ought to be of long duration: they ought to be the object of constant and prolonged pains. Freedom ought not to be accorded to such subjects until by a long period of calm they have afforded reason for the belief that they are cured. Even in this case they ought not to be completely enfranchised of all tutelage, and they ought always to be had under observation."

Although I do not participate in this optimism, which is not justified by a sufficient number of observations, and although I continue to believe that those who are most often cured in the asylums are those who are capable of being cured outside of them, I admit quite willingly the principle of hospitalisation for emotionals dangerous or difficult to manage, under condition of its exercise under control of the law. To leave the field open to the medical man is to open the gate to an arbitrament without limit and to perpetual recriminations. The hospitalisation of the perverted, of emotionals of every description, like aliens in general of whatever age, ought not to be effected except in public establishments of which the administrative and medical personnelle cannot be suspected of personal interest: and which should be, besides, under permanent control of judicial authority, solely responsible for attacks made on personal liberty.

This is not the place to advocate private asylums. The new English law relative to aliens (1890) judges them by prescribing that a new licence shall not be accorded to any person for a house destined to receive aliens; and that a house provided with a licence at the period of the passing of the law cannot be furnished with a new licence for a larger number of patients than that which had been authorised by the original licence. The Irish law only tolerates them of necessity, expressing regarding them the advice that all isolated patients are better treated in asylums which do not function for the benefit of the proprietors, and they insist upon the necessity of a strict surveillance. In France this surveillance, reduced to purely formal inspections, gives no guarantee, and is not at all calculated to reassure opinion in respect of diverse reproaches which have been made in respect of the system.

The hospitalisation and particular coercitive pædagogy which

imposes itself in the education of perverted or irritable infants, etc., can only be regarded as attenuations of sequestration. The necessity of guarantees in the sequestration is only more urgent when it is brought to bear on infants who have not necessarily other relations than those who have the right of effecting their incarceration. For them security can only exist in a public asylum where they are secure not only from evil treatment and the lack of care inspired by interest, but even from sequestration unduly prolonged, or unduly prescribed.

Medical men have to defend themselves against accusations of arbitrary sequestration: the necessity for a guarantee is so much the greater as it would operate for adults and infants, that it would not be alone for the proprietors of private mansions; the *sequestration is money.*

M. Léon Lefort has made of "surgical brokerage" an outline which only merits the reproach of being exclusive: there are also apologists of sequestration or hospitalisation who receive so much for admission or so much for the months of sojourn.

These professional perversions, although limited to some individualities, constitute not less a danger, at least eventual, for the liberty of the subject and the material interests of the patients, and accredit the suspicion of the public.

The danger would increase itself if some purveyor, as it might happen, for certain waters, more or less happily mineralised, has interested in his enterprise, by good actions, some of the authorities ordinarily appealed to in respect of the control of opportunities of sequestration.

The only remedy against this danger, which I ought to qualify as imagined, (d'imaginaire), although the best authors affirm that illegal sequestration has never been observed since the law of 1838, is exclusive recourse to public institutions.

If Society must defend itself against emotionals by the Common Law; it ought also to protect them in their goods as in their persons according to the same Common Law.

The article 901 of the Civil Code says that in order during life to make a donation or will the testator must be of sound mind. Apart from states of habitual imbecility, of dementia and fury, drunkenness can be reckoned one cause of nullity of testamentary disposition, not only by reason of momentary alteration of intel-

ligence, which modifies individuality, but especially in view of the fact, that, in this state, deception and suggestion are easy.

But morbid emotivity of toxic origin which one observes in drunkenness hardly differs in its effects from constitutional emotivity which gives place to the diverse reactions which characterise the passions. Before the ancient French right the action *ab irato* could determine the nullity of the act, especially when it proceeded from very obvious hatred, of unjust sort, and clearly kin to the disposition in question (contestée). The Civil Code is silent upon this cause of nullity, which hardly appears moreover to have been invoked except in rare circumstances. In the cases where hatred and jealousy have served as bases for the contestation, it is brought about from sentiments developed on a primitively morbid ground, of such sort that, in reality, it was not a passing emotion which was the cause thereof. If we suppose always the case of a testament made by an individual the prey of a violent anger, and succumbing by a certain cause before having returned to his normal state, or placed in a position rendering annulment impossible, the practical distinction from a case of drunkenness would not impose itself.

Contestation has had more frequently for its basis the suicide of the testator, a suicide which has been able to produce itself under the influence of an acute and morbid emotional state; but which can be a logical consequence of the conditions of existence, and cannot for this reason be considered by itself as a proof of derangement of intelligence. Furthermore jurisprudence does not admit that suicide of itself alone can be a cause for nullity of the act (*i.e.*, testamentary).

Emotivity plays an important *rôle* in the pathogeny of nervous troubles induced by shock in general troubles, of which railway spine is one of the most frequent. We know, in fact, that when individuals are exposed to a collision certain conditions diminish the chances of morbid effects; such are sleep and drunkenness: individuals asleep or under the influence of wine are rarely attacked by severe troubles: the same can be said of infants, who are less aware of the risks they run.

Under pretext that, in general, we admit, that the nervous troubles which succeed to a shock only develop themselves in subjects endued with neuropathic disposition, one is also asked if the

material responsibility of the authors of the accident ought not to be attenuated, when reparation is demanded. This opinion is not always unanimously admitted: many authors recognise a traumatic neurosis determined in all cases by shock, and we have seen that fatigue can create in a healthy individual an irritability analogous to that of hysterios. Moreover an abnormal emotivity can exist during all the life in an individual without there resulting therefrom any really pathological results: when a moral or physical shock evokes troubles, it ought then to be considered the cause thereof.

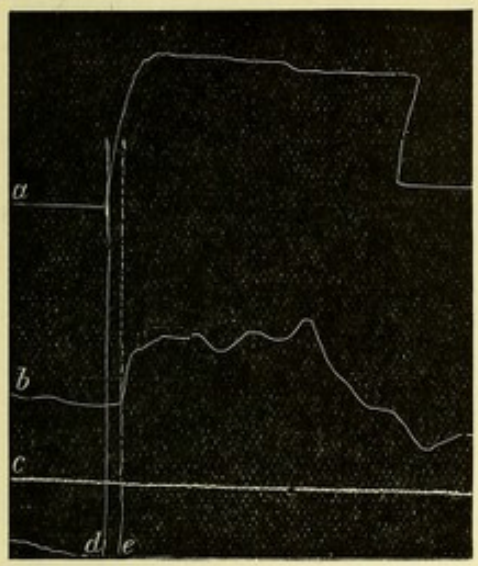
When an alien confides to his doctor a projected homicide, some authors admit, contrary to the Hippocratic doctrine of secrecy (serment), that he ought to prevent the crime by advising the police. If one might violate the rule of medical reticence when it concerns the life of a man, it would seem that one might do so equally for the honour of the family and for any particular interest. A rule free to discussion and individual arbitrament is no more a rule. Medical reticence relatively to these patients should be as absolute also as for the others. The diagnosis of mental maladies has nothing in common, from the point of view of sureness, with the contagious maladies: the consequences of divulgence are altogether different: one cannot establish an assimilation from the point of view of the public.

The pseudo-humanitarian sentiments with which the multitude is intoxicated in our time opposed themselves for a long time to anything effectual being done against emotional outbreaks of every sort. But the pathogenic conditions which show us that morbid emotivities are, in fact, dependent upon physical debility, bring into light the *rôle* which the general hygienic development can play in moral perfecting.

Toland* demands a new religion, according with philosophy, the cult of which addresses itself to truth, liberty, and health: if there must be absolutely a new cult, it must be to the public health alone that it must address itself. "The first condition of national prosperity," says Spencer, "is that the nation shall be constituted of good animals."

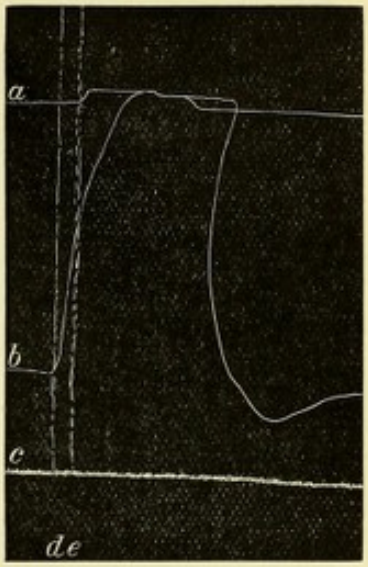
* Pantheisticon, Cosmopolis, 1720.

FIG. I.



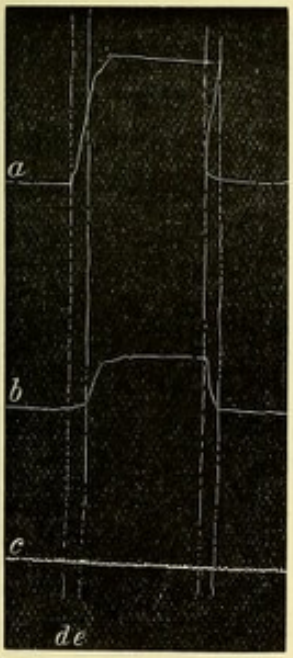
a, Signal of excitation.
b, Plethismographic reaction.
c, Trace of tuning fork.
d, *e*, Time of reaction—0.18.

FIG. II.



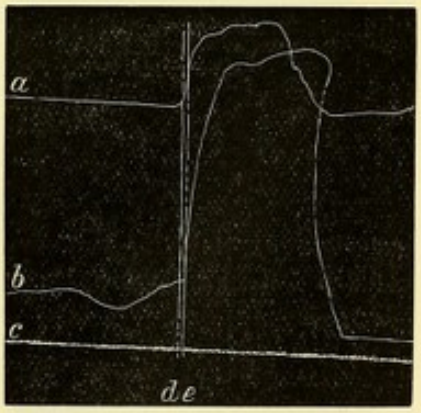
a, Plethismographic reaction.
b, Buccal reaction.
c, Trace of tuning fork.
d, *e*, Time of reaction—0.22.

FIG. III.

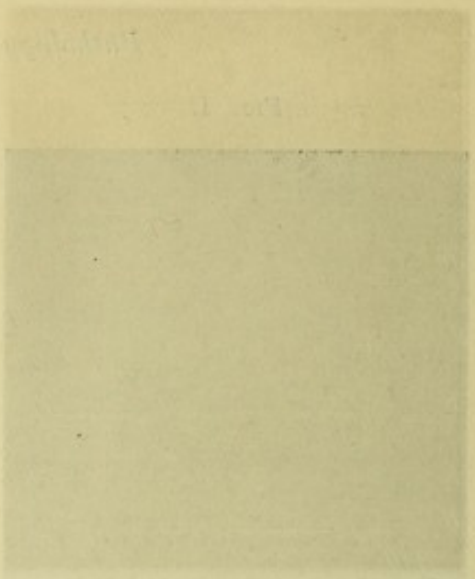


a, Buccal reaction.
b, Reaction of the hand.
c, Trace of tuning fork.
d, *e*, Retardation of hand reaction—0.14.

FIG. IV.



a, Myographic curve.
b, Plethismographic curve.
c, Trace of tuning fork.
d, *e*, Difference of time of reaction—0.6.



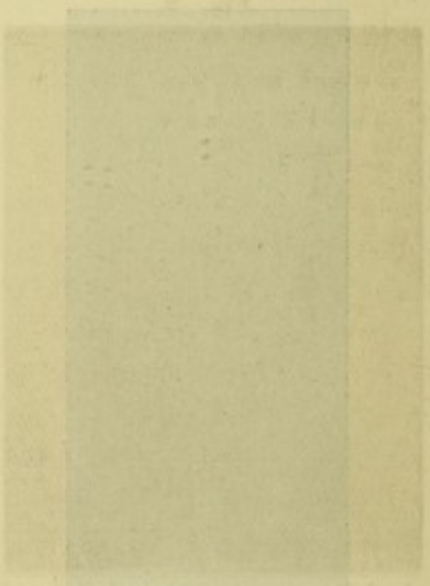
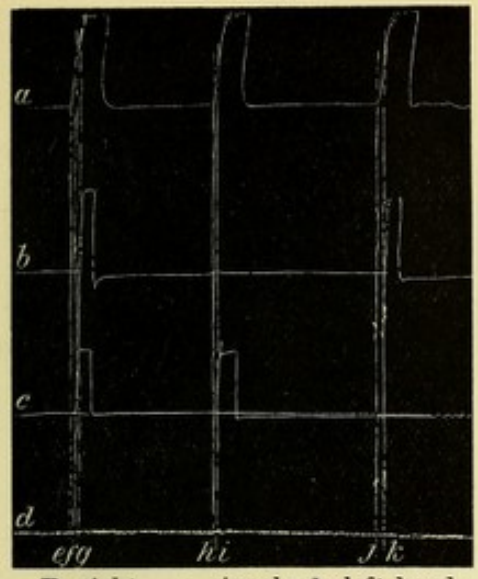
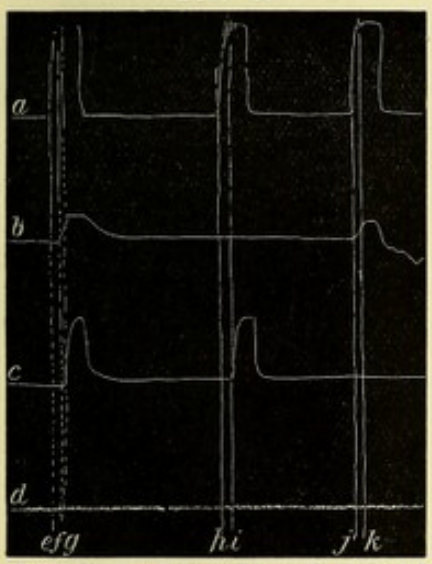


FIG. 7.



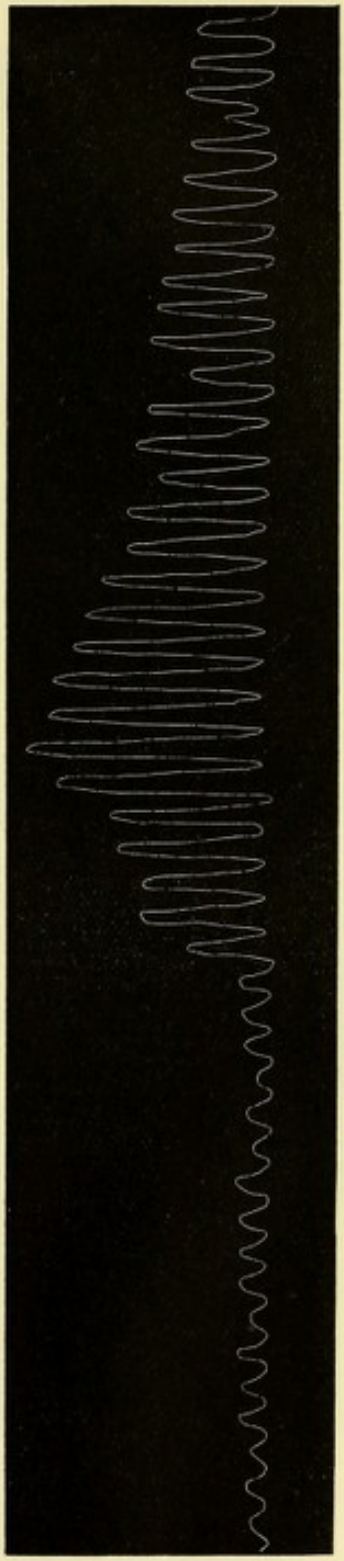
P, right. *a*, signal; *b*, left hand; *c*, right hand; *d*, tuning fork; *ef*, retardation of the reaction of the right hand; *fg*, retardation of the right hand compared with left hand in the simultaneous reaction of both hands; *hi*, retardation of reaction of the right hand (the right hand acting alone); *jk*, retardation of the isolated reaction of the left hand.

FIG. 8.



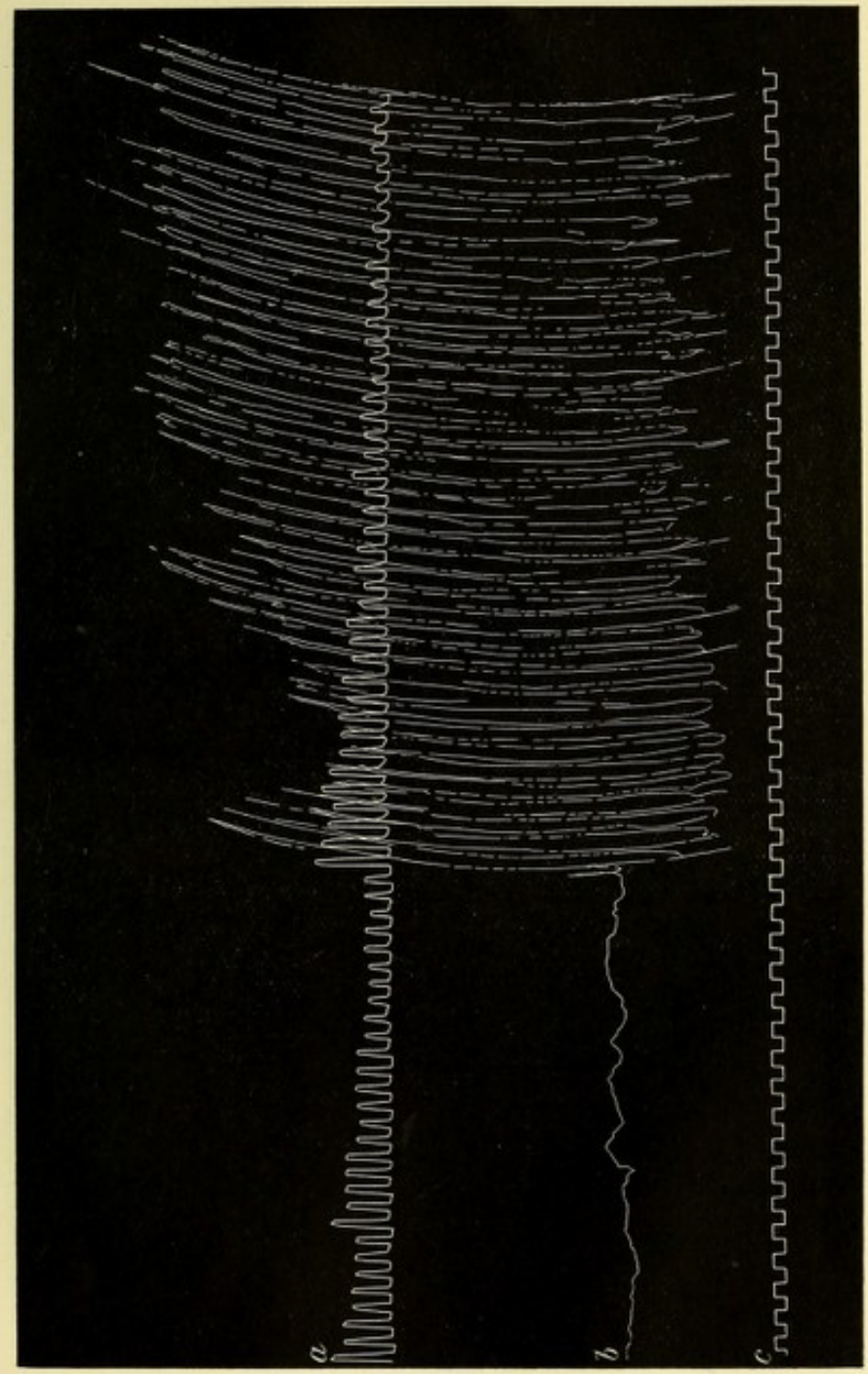
L, left. *a*, signal; *b*, left hand; *c*, right hand; *d*, tuning fork; *ef*, retardation of the left hand on the signal; *fg*, returning of the right hand on the left hand in the simultaneous reaction of both hands; *hi*, retardation of the reaction of the right hand acting alone on the signal; *jk*, retardation of the isolated action of the left hand on the signal.

FIG. 12.



Ergographic trace during an euphoric crisis interrupting fatigue.

FIG. 9.



a, Ergographic curve showing the modification of the energy of movements of the right hand at the moment when the movements are combined with those of a lower member of the left indicated on curve *b* by a myograph placed on the right leg.

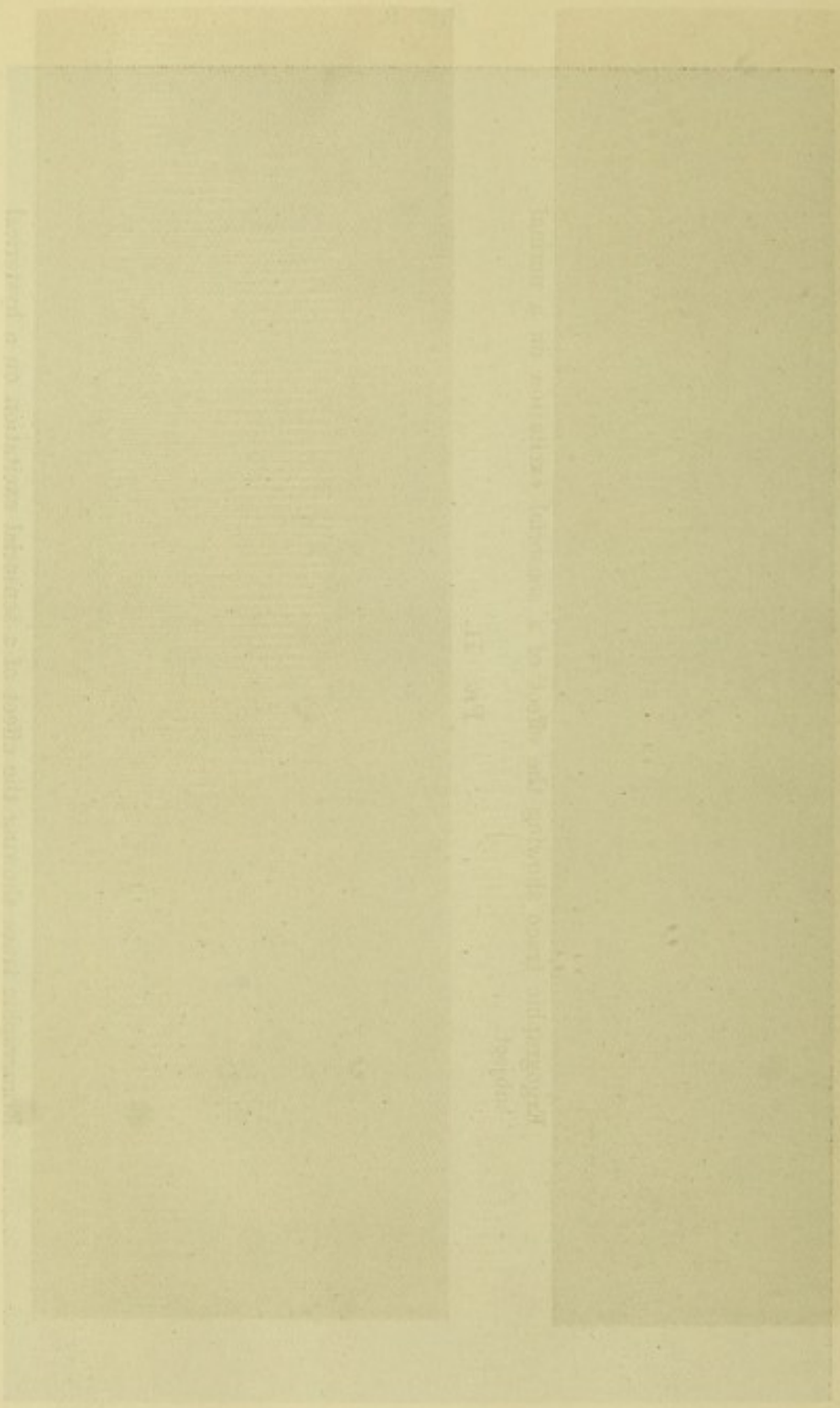
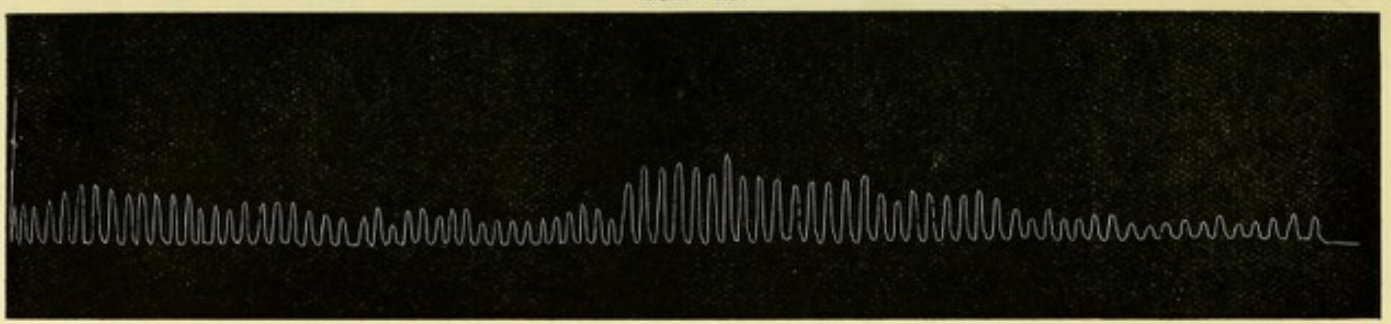
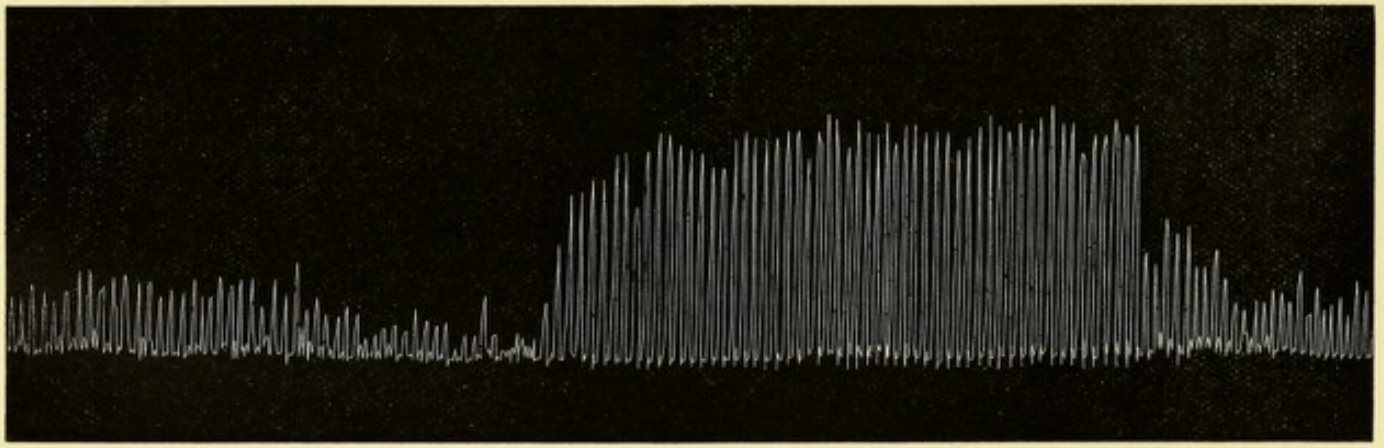


FIG. 10.



Ergographic trace showing the effect of a sensorial excitation on a normal subject.

FIG. 11.



Ergographic trace showing the effect of a sensorial excitation on a hysterical subject.

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