Mendes, R. Teixeira. THALAMIC SYNDROME WITH CEREBRAL ARTERIOSCLEROSIS. [Brazil-Medico, May 22, 1920.]

Following the leads of Roussy and other observers of this general syndrome the author separates three types: the pure thalamic syndrome, the mixed thalamic syndrome and the thalamic status. He then describes a case of the latter type in which arteriosclerosis was evidently a factor. The first symptom fifteen years before had been sensations of heat in the hands, compelling the woman to bathe her hands frequently in cold water. Then came great debility and inability to lift or even grasp objects, with other symptoms of thalamus derangement.

Briand, M., and Rouquier, A. INORGANIC MOTOR DISTURBANCES. [Presse méd., July 14, 1920.]

These authors report a number of puzzling motor disturbances which at first sight seemed to resemble hysterical symptoms but which on closer analysis might better be referred to residual signs of a mild attack of lethargic encephalitis.

Hunt, J. Ramsay. THE STATIC AND KINETIC SYSTEMS OF MOTILITY. [Tr. Am. Neurol. Soc., 1920.]

According to the author, motility consists of two components, each represented throughout the entire efferent nervous system by separate neural mechanisms. This is true not only of the segmental nervous system but also of the larger integrating and coordinating masses of the brain and cerebellum. These two systems are mutually cooperative and yet physiologically and anatomically distinct. Under normal conditions they are inseparable and act in unison, and the harmony of their relation is only disturbed by the dissociations of accident or disease. One of these components of motility is the movement proper, which is subserved by the *kinetic system*.

The other represents the more passive form of contractility, which we recognize in tonus, posture, attitude and equilibrium. This static function of the efferent system is subserved by separate neuromuscular pathways, which may be termed the *static system*.

Comparative anatomy shows clearly that the muscular system, like all other structures of the body is in a state of evolution, adapting itself to the changing conditions of the organism. Development is from the slow movement of the unstriated to the quick movement of the striated muscle fiber. And in man, all gradations may be observed from the lowest type of unstriated muscle to the highest type of the striated muscle fiber. Striated muscle contains two substances, both capable of contraction. The one is the *disc mechanism* of the muscle fiber, which gives rise to the quick movement or the twitch. The other is the *sarcoplasm*, which yields a more plastic form of contraction. A clear conception of

the phylogeny of contractile tissue is important to the author's theory as he does not regard the skeletal muscle mass in man as a mere aggregation of muscle fibers of a standard type, but rather as systems of end organs representing different stages of phylogenetic development, and thus corresponding in some measure to similar differentiation in nerve tissue.

Motility in animal life is usually divided into three groups: (1) reflex, (2) automatic and associated, and (3) isolated synergic movements. It should be remarked, however, that one group merges imperceptibly into the other and the transition is so gradual that it is difficult to say where one type cases and the other begins. All of these movements, reflex as well as automatic, have their corresponding static components, and every cessation of movement is immediately followed by fixation of the contraction in posture. In the higher mammals and especially in man one encounters a new for mof movement which differs from reflex and automatic movements in the quality of individuality and dissociation. In all of these isolated forms of voluntary movement there is also the element of posture, and it may be stated without fear of contradiction that there is no form of motility from the simple reflex to the most skilled and individualistic type of movement which functions without a corresponding static mechanism. In a general way the *central nervous system* may be said to represent three great structural and functional divisions.

(1) A *segmental nervous system*, which contains the great reflex systems of the neuraxis.

(2) A paleoencephalon, which represent the essential sensory and motor mechanism in lower forms.

(3) A neoencephalon, which has its greatest development in man, and subserves the highest functions of motility and sensibility.

Hunt believes that these three great functional divisions of the nervous system are related to the three great types of movement and posture numerated above.

In this conception he regards the *cerebellum* as the great correlating center for the *static functions* of motility, in contrast to the corpus striatum and Rolandic area, which he regards as the essential correlating centers for the control of their respective forms of kinetic function. Furthermore, he believes that these systems are represented by special end organs in the skeletal muscles in the same manner as we conceive sensations with their special systems and modes of termination.

The *skeletal musculature* is composed of striated muscle held together by connective tissue, by means of which the contractile mass performs its functions. As we have seen each striated muscle fiber is composed of two distinct substances which are now generally recognized by physiologists as subserving different types of motor function. In a general way it is estimated that the *disc system* constitutes about $\frac{1}{6}$ to $\frac{1}{4}$ of the total muscle mass, the remaining portion of which is *sarcomplasm*.

Each muscle fiber contains a motor nerve ending, which is the terminal of a medullated nerve fiber. For many years this was thought to be the sole innervation of the muscle fiber, until Perroncito and Bolke demonstrated the existence of another smaller nerve ending in the striated muscle fiber which was shown to be the terminal of a nonmedullated nerve. The existence of two separate contractile systems in striated muscle fibers is also shown very clearly by the electromyogram. In myotonia congenita the presence of two distinct contraction waves may be demonstrated, the one quick and referable to the disc system, the other slower, more sustained, and of sarcoplasmic origin. In the author's theory of a dual efferent system the discs are to be regarded as the end organ of the kinetic system and the sarcoplasm as the end organ of the static system, just as we conceive the heat and cold spots or the tactile corpuscles as end organs in their respective sensory spheres. These end organs of the skin have undergone special differentiation on certain parts, and have thus acquired a greater accuracy and refinement of function. He believes that a similar specialization of function and structure exists in the skeletal muscles. By this he would emphasize what perhaps is not generally recognized, that the muscle fiber system, like the nerve fiber system, participates in phyletic differentiation, and that those muscle fibers which subserve the higher functions of neokinesis are more highly specialized than are those which are concerned with paleokinetic function.

According to this conception the corticospinal system (pyramidal tracts) and the striospinal system (extra pyramidal tracts) would both be represented by their respective contractile end organs. As the striospinal system is older the muscle fibers subserving this function would be less highly differentiated than those subserving the highest cortical function. This theory is confirmed by the existence of two kinds of fibers in skeletal muscles. The *pale* fibers which are rich in contractile substances and contain comparatively little sarcoplasm. The *dark* fibers which are rich in sarcoplasm with a relatively simple disc mechanism. Both kinds of fibers are found in all muscles in varying degrees. The pale fibers are the quick contracting and the dark fibers the slow contracting fibers of the physiologists. And the quickness of a muscle contraction which varies considerably in different portions of the body depends upon the relative number and distribution of these two types of fibers.

The segmental nervous system in its relation to a dual function of motility. Sherrington has reached the conclusion that two types of reflex action may be recognized. There is a reflex movement which he calls the phasic reflex, and a reflex posture which he terms the tonic or postural reflex, and in the realm of reflex action he indicates the duality of function which the author would extend to the whole of the efferent system. Reflex action is therefore dependent upon a peripheral kinetic

system which terminates in the disc contractile mechanism. And reflex posture is dependent upon a peripheral static system which terminates in the sarcoplasm of the muscle fiber. These are the neuromuscular representatives at the segmental level of the kinetic and static pathways of motility.

The central pathways of motility. The Kinetic System: In a previous study of paralysis agitans the author expressed himself as favoring the conception of two great motor systems from brain to muscle, one subserving paleokinetic and the other a neokinetic function. The corpus striatum, according to this view, is the kinetic center for the control of "automatic and associated movements," and the Rolandic area the kinetic center for "dissociated movements" of cortical origin. Their static functions he believes are subserved by other pathways. In striking contrast to the paleokinetic system is the neokinetic system. This is a direct pathway from brain to muscle for the control of isolated synergic movement. It takes its origin in the motor cells of the Rolandic area and passes by way of the pyramidal system directly to the spinal cord (pyramidal tracts), and from there to a special disc representation in muscle subserving the dissociated movement of cortical origin.

These two great motor systems, the *pyramidal* and *extrapyramidal*, are, according to this theory, both represented in nerves and skeletal muscles, but in different degrees.

The *central pathways* for the control of the *static component* of motility are, he believes, distinct from those subserving a kinetic function.

The essential suprasegmental mechanism for the control of static motility he holds to be the cerebellum. Anatomically the cerebellum has close connections with both the cerebrum and the spinal cord. The efferent cerebellar system originates in its central nuclei and passes in the superior peduncles to the rubrospinal system. In the cerebellum there are phylogenetic evidences of two great systems, which correspond to similar divisions of the encephalon. There is a paleocerebellum, or Vermian system, and a neocerebellum, or hemispheric system.

The older cerebellum stands in relation to the *paleostatic system*, which controls the static functions of movement of the "automatic and associated type." The cerebellar hemispheres, on the other hand, control the higher postural functions and represent a *neostatic mechanism*. This is controlled from the central cortex by a special system of fibers passing from the frontal lobe to the pons varolii and from thence to the opposite hemisphere of the cerebellum. The frontopontine system descends in the internal capsule and cerebral peduncle in close association with the pyramidal tracts and it is interesting to note that both structures receive their myelin sheaths subsequent to birth.

The *paleostatic system* originates in the older nuclei of the vermis cerebelli, and the *neostatic system* is an outgrowth of the dentate nucleus. They then pass in separate divisions of the rubrospinal systems to the

sarcoplasm of the skeletal muscles. (A paleo-rubro-spinal system and a neo-rubro-spinal system.)

Relation of the Dual Systems of Motility to Symptomatology.—In general it may be stated that a lesion of the kinetic system causes a disorder of movement and a lesion of the static system a disorder of tonus, or the posturing mechanism. In many of the disturbances of motility both systems participate, although it is usually possible to indicate one or the other as the essential factor. At the segmental level of the nervous system the tendon reflex is a typical example of kinetic function, as is the muscle tonus of static function. These two components may also be recognized on direct percussion of the muscle, by the quick contractions of myotatic irritability and the more persistent local reactions of the idiomuscular response. Such disorders of motility as paramyoclonus multiplex, myokymia and fibrillary twitchings are irritative phenomena in the kinetic spinal mechanism. The clonus of spastic paralysis and the tremor of paralysis agitans are both of kinetic origin. One is related to the neokinetic and the other to the paleokinetic system. The more plastic tonicities which are also present in both of these forms of palsy are of sarcoplasmic origin, and referable to the static system. Huntington's chorea and epilepsy are both of kinetic origin, the former is referable to the striatal and the latter to the cortical level of motility. Rarely in epilepsy there are attacks which suggest a relation to the static system. These are characterized by a sudden loss of postural control without convulsive manifestations (static seizures; static epilepsy). Other disorders of motility, referable to the corpus striatum, such as athetosis, dystonia, progressive lenticular degeneration and paralysis agitans represent different degrees of involvement of its efferent and inhibitory systems. This phase of the subject has been considered in detail in the author's contributions to the symptomatology of the corpus striatum. (Brain, 1917, p. 58.) All forms of myotonia, cerebral, cerebellar, spinal and peripheral, would appear to be of sarcoplasmic origin and referable to the static system. There is also much in favor of the hypothesis that tonic spasms of cerebellar origin and the tonic rigidity of tetanus are contractile manifestations of sarcoplasm. The nature of the Bárány reactions to labyrinthine stimulation would also indicate a very definite relationship to the static system and the sarcoplasm; *e.g.*, the *slow* component of the nystagmus is the direct response of the static system to labyrinthine stimulation, the quick response representing a compensatory reaction on the part of the kinetic system. One organic symptom in particular is closely related to the static function of the cerebellum, *viz.*, the *intention tremor*. The intention or cerebellar tremor presents the characteristics of a loss of the static component of motility. The coarse tremor movements may be regarded as effort of the kinetic system to compensate for the loss of the posturing or static functions of sarcoplasm. In addition to these various somatic expressions of kinetic

and static function, a similar division may be recognized in the mental sphere. Among these may be mentioned catalepsy, catatonia and certain of the hyperkinesses of psychic origin. A *psychostatic* and *psychokinetic* representation may therefore be postulated at the psychic level of motility. [Author's abstract.]

Lhermitte, J., Cornil, L., and Quesnel. THE SYNDROME OF PROGRESSIVE DEGENERATION OF THE PYRAMIDAL TRACTS AND THE PALLIUM. [Revue Neurologique, March, 1920 (Soc. Neur. et Psych., Paris, Seance, March 4, 1920).]

Report of a case, without autopsy, in a patient, aged 53, in which there was a gradually developing contraction and rigidity in all four extremities, marked difficulty in speech, etc., which symptoms were attributed to progressive degeneration of the pyramidal tracts (as in amyotrophic lateral sclerosis) with involvement of the globus pallidus. [Camp.]

Westphal, A. CONCERNING BILATERAL ATHETOSIS AND ALLIED PATHOLOGICAL CONDITIONS (STRIATE SYNDROME). A contribution to the study of diseases of the lenticular nucleus. [Archiv. f. Psychiat. u. Nervenk., 1919, Vol. 60, p. 361.]

There is still no complete understanding of the connection between the clinical picture and the anatomico-pathological findings in diseases of this nature. The author therefore publishes three cases which were remarkable in many respects and illustrated different forms of disturbances of motility due to affections of the corpus striatum. The clinical symptoms of the first case were athetotic affections of the muscles of the extremities on both sides, of the trunk, and of the face. The involvement of the face was very pronounced, taking the form of a nearly constant grimace. In the extremities it was not the distal parts, as usually, which were affected, but the proximal, and the spasms did not possess the rhythmic character mentioned by Lewandowsky, but occurred, for the most part, in irregular and constantly changing manner. The peculiar influencing of the movements by psychical emotions was noticeable; they ceased when the patient was spoken to, or his attention was engaged. The characteristic poverty of motion was pronounced, there were disturbances of speech and swallowing, as well as disturbances of the bladder of the character which led v. Czylarz and Marburg to assume a bladder center in the corpus striatum. The author emphasizes the resemblance which the disease picture presented to paralysis agitans, on the one hand, and to dystonia musculorum deformans on the other, and calls attention especially to the symptom of retropulsion which he has never seen mentioned in bilateral athetosis though it cannot be considered as pathognomonic for paralysis agitans, as it occurs in other amyostatic symptom complexes. The resemblance to dystonia musculorum