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*Myographische Versuche am lebenden Menschen.* Von A. FICK. Arch. f. d. Ges. Physiol., September, 1887.

Change of tension in muscles so disposed that their length cannot vary is called isomeric contraction, and an apparatus devised by Fick to show this change of tension is called a tension indicator. The extended hand was laid in a simple frame with the palm or surface vertical, the thumb directed upwards with its ball resting against a solid wooden surface, and the index finger, to the second joint of which the indicator was attached, in a horizontal direction. The changes of length were of course not absolutely excluded, but were registered, greatly magnified, by a very long lever. Electrical stimulus was applied to the abductor indicis. Thus it was possible to reckon what Weber called the "absolute muscular power," or the direct pull of the muscle on that part of the bone leverage to which it is attached, which is a magnitude of the same order as that which Koster by another method determined for the muscles of the calf of the leg. No endurable degree and no frequency of electric stimulus can excite the same degree of tension as the will, but only at most about two thirds as much. A tetanus can develop from six to ten times as great tension as a single shock. While a frog's muscle of about the same size develops great energy of contraction from a single shock, a series of tetanizing shocks can hardly develop double the energy of one. The voluntary and electrical stimulus summate, but the greater the voluntary tension the less is the additional tension caused by electricity. The interval of time between the individual shocks is within wide limits indifferent. Besides this increased tension the electric stimulus there is a later reflex diminution of the voluntary tension. If the latter was maximal, only the reflex effect is seen on the indicator.

*Ueber Ataxie und Muskelsinn.* GOLDSCHIEDER. Verhandlungen der Physiol. Gesellsch., Berlin, August, 1887.

Dr. Goldscheider reports experiments which favor the Leyden theory of spinal ataxia (which ascribes it to lesions of sensory tracts), as opposed to the theory of Erb and Friedreich (which ascribes it to centrifugally conducting co-ordination fibres). As both parties admit that in rare cases there may be extended and absolute anæsthesia produced without ataxia, as well as ataxia without disorders of sensibility, the question really focuses down to the problem of the muscle sense. To test this he rested the hand in a plaster mould, palm upward, and bent the index finger back by changing pressure of a small weight, measuring carefully the least angular bending at the first joint which could be perceived. A faradic current was then applied over the joint which caused nearly complete anæsthesia, when it was found that the finger joint must be bent far more to be perceived than before. Thus centripetal impressions from the nerves of the joint seem to be an element in the perception of passive movement. If active movements are attempted by a finger thus faradized, they can no longer be made continuously, but are intermittent, as well as excessive and more rapid, in other words ataxic, while the subject believes the movements to be uniform. With strong currents the graphic representation of both flexion and extension is like stairs. If the eye and attention are turned to the finger, the amplitude and rapidity of motion are reduced to the normal, but the intermittence can be but slightly

reduced. This phenomenon is ascribed to a reduction of sensation for changes of position. The greatly increased threshold value of the stimulus of co-ordinating the action of antagonistic muscles is the closing explanatory suggestion.

*Ueber Unterscheidungszeiten.* J. v. KRIES. Vierteljahrsschrift f. Wiss. Philos., January, 1887.

According to Wundt, perception is the entrance of a conception into the inner field of vision, and apperception is its entrance into the inner point of vision; and he ascribes a distinct element of a total reaction time to the interval between these two processes. v. Kries doubts the wisdom of thus introducing figurative expressions which are not immediately intelligible into the description of psychic processes, and thinks that this formulation of Wundt runs some risk of overlooking important things and confusing different ones. It inclines uncritical minds to think that each concept, a certain time after it enters the field of mental vision, passes on to the focus of attention, and that thus apperception time of *e. g.* a complex object is always a quite definite time. v. Kries therefore prefers the term differentiation time, first used by him in 1877, because the different qualities of the same object are known in quite different times depending on the direction of attention, etc. In these earlier experiments the task for the experimenter was to give all his attention to determining whether a signal had a certain quality (*e. g.* was red or not), which is quite different from recognizing which of several colors appeared. Again, the so-called *c*-method of Donders requires simply reaction on *a* and not to *b*, and is not to be confounded, as Wundt does, with a choice between motion and rest. v. Kries's experiments involve only mental differentiation, and his results, such as that localization is quicker than judgment of intensity, optic direction than distance, and acoustic localization time increases with decrease of the angle of divergence, are not to be brought under Wundt's rubrics. Wundt's method of reacting after the judgment is made that perception has taken place, introduces an element of introspection which is too variable to give precise results. Differentiation time proper is here at least increased by a value of unknown magnitude, and it is impossible to exclude cases in which the impulse to reaction precedes knowledge. In such a series of psychic processes it is impossible to bring the reaction always at one and the same stage of each series, as much so as it would be to react at either the optic or the acoustic sensation of an electric spark at will. Results by Wundt's method are therefore doubted. Either the reaction is too quick, or else reflection time is added. Of Wundt's pupils, all have found, therefore, too long reaction times, and one of them, Cattell, even intimates that v. Kries not only often reacted prematurely, but often suppressed results, in one series in fact more than half of all. This v. Kries indignantly denies, and repeated his former experiments only to find them correct.

*Kritisches und Experimentelles über den Zeitsinn.* VON RICHARD GLASS. Philosophische Studien, IV, Heft 3, pp. 423-457.

The fact that in the sphere of the time sense, more than elsewhere, the conclusions of different observers stand in glaring contradiction to one another, induced the author to attempt to add his contribution to the topic. He follows in the footsteps of Estel and