sacral plexus and innervated the homolateral hind leg. In these cases there existed no lumbo-sacral plexus on the side of the implantation, and the autochthonous spinal cord and its ganglia were asymmetric and reduced on that side. The reduction concerned the ganglia, and the white and gray matter of the autochthonous spinal cord, especially at the level of the segments of the absent plexus. The motor-horn here also was lacking in the autochthonous spinal cord on the affected side. The reduction of the motor cells was both ponderable and numerical.

These results show that the absence of innervation to a hind limb, due to the latter's absence or to its innervation by a supernumerary spinal cord, reverberates on the autochthonous spinal cord and its ganglia through a sensory and motor hypoplasia. The ganglia are very much reduced on the side, and along the segments, from which the lumbo-sacral plexus is absent; the lateral half of the spinal cord also undergoes a marked reduction of its white and gray matter on that side and along those segments. This latter reduction is easily observable through the absence of the motor-horn, and by a marked asymmetry. There is, besides, and up to a certain degree, a repercussion of the reduction in the neighboring segments. It therefore follows that the hind limb innervation plays a part in the development of both the sensory and motor neurones of the neuraxis.

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The Water and the Phosphorus Combinations of Degenerating Nerves.

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I have shown,[1] by means of microchemical methods, that the lesion of a cerebral hemisphere of the guinea pig gives rise to an increase in the water, nitrogen, and sulphur content, and to a decrease in the phosphorus content of the disintegrating cerebral matter. In the present research I have studied the variations of the water and phosphorus in degenerating peripheral nerves of the rabbit.

The sciatic nerves of one side were sectioned high in the thigh of 9 rabbits; they were later analyzed variously, from the 7th to the 196th day after the operation, the normal contralateral sciatic nerve serving as a control. All the analyses, which were made in dupli-

[1] May, R. M., *Bull. Soc. Chim. Biol.*, 1927, **9**, 970; 1929, **11**, 312.

cate on the individual nerves, were concerned with the water, the total phosphorus, and the following phosphorus combinations: lipidic, alcohol-soluble, proteidic, and water-soluble. Simultaneous histological preparations were made in all cases.

The water was determined separately after desiccation at 90° C. to constant weight. The phosphorus combinations were first extracted by means of absolute alcohol and ether, later by boiling water, in a Kumagawa micro-apparatus. After the first extraction the alcohol and ether were gotten rid of, and there were successively separated from the residue: (1) the lipidic fraction, by means of a mixture of ether and benzene, (2) a first water-soluble fraction, (3) the alcohol-soluble fraction. The first water-soluble fraction was later added to the product of the aqueous extraction. The remaining proteidic fraction was analyzed separately.

The various fractions were dried and then decomposed by sulphuric and nitric acids; the phosphorus content was determined in each of them by the previously described[1] microchemical method.

The water increased after the lesion, during the first month, at a rate which varied near 14% above its normal value in the unoperated nerve; later it decreased to a value which approached that in the control nerve (generally 64 to 67%).

The total phosphorus, established through a direct analysis, and through an addition of the phosphorus percentages in the 4 fractions, gave results which differed among themselves only within the limits of probable error. The total phosphorus decreased progressively during the first 2 months of degeneration, reaching a third of its normal value, which varies in different nerves from 1.01 to 1.24% of the dry nerve matter.

The most marked decrease was that of the lipidic phosphorus (phosphatids), which originally constitutes 50 to 60% of the total phosphorus. This fraction fell to one-tenth of its normal value after 100 days of degeneration. At this period a histological study shows the complete resorption of the lipidic constituents of the nerve. It appears probable that lipidic phosphorus which is still present after 100 days of degeneration is that of the phosphatids which are contained in the Schwann (sheath) cells and in the phagocytes which are always present in degenerating nerves.

There exists in nerves a phosphorus fraction soluble in alcohol, but insoluble in a mixture of ether and benzene, or in water; its composition is unknown as yet. This fraction decreased to a third of its normal value, which varies from 10 to 20% of the total phosphorus, after the first month of degeneration.

The proteidic phosphorus, after a rise during the first few days following the operation, fell to a third of its normal rate, which varies from 10 to 20% of the total phosphorus.

In all cases of diminution, the lowest level, once reached, was the one where the phosphorus values remained, there being no subsequent rise during the ulterior course of the nerve degeneration.

The water-soluble phosphorus fraction was the only one which increased during the degeneration. This rise, which was greater than that of the water, went beyond the normal rate (which varies from 14 to 24% of the total phosphorus) by 25% during the first days of degeneration, increasing up to 35% six months after the operation.

To a disintegration of the complex cellular constituents (phosphatids, nucleo-proteids, etc.) there thus corresponds a marked increase of the water-soluble phosphorus compounds, which very probably constitute the end-products, as simple substances, of these complex combinations. Nervous degeneration appears to bring back to the water-soluble form, in which they entered the organism, the phosphorus compounds which took part in the building up of its master tissue. However, there is also the possibility that the increase of the water-soluble phosphorus may be the expression of an incomplete synthesis in the degenerating nerve.

On the other hand, the small variations of the water, the total phosphorus, and the phosphorus combinations, in the unoperated nerves, are purely individual, and have no connection with the degeneration of the contralateral nerves.

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A Quinhydrone-Collodion Electrode of Special Applicability in Experimental Pathology.

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All the accepted methods of determining the hydrogen ion activity of biological fluids require extensive alteration and manipulation of the fluid itself. If the hydrogen electrode is used, the solution must be saturated with hydrogen; if an oxidation-reduction system is set up, as with quinhydrone, the solution must be saturated with