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

the substance comprising the system. The only exception to this is the glass electrode, which for several reasons is unsuited to routine work.

There appeared to be a real need for an electrode which would be precise in potential values, reasonably rapid in its responses, simple to prepare and, above all, capable of functioning without alteration of the solution being examined. Such an electrode obviously could not be a gas electrode; and of the possible oxidation-reduction systems, the utilization of quinhydrone appeared the most feasible since this system has been well studied.

In principle, the device which we have called the quinhydrone-collodion electrode consists of a very minute collodion sac, the interior of which contains solid quinhydrone. On immersing the sac in the fluid to be examined, the interior, which may have contained water at first, rapidly reaches equilibrium with the exterior with respect to the readily diffusible molecules and ions. Quinone and hydroquinone liberated by the quinhydrone diffuse through the collodion membrane very slowly so that in effect a very small portion of the fluid is isolated and saturated with the quinhydrone. A platinum or gold wire introduced into the interior of the sac will acquire a potential which will be a function of the hydrogen ion activity of the contained fluid. If, now, a reference half cell is connected by a suitable bridge to the fluid outside the sac, the potential difference measured will be the sum of the electrode potential within the sac and the membrane potential due to the unequal distribution of the ions. From considerations advanced by Donnan, it may be shown that in solutions of electrolyte concentration 0.01 M or greater, the membrane potential is negligible so that the quantity measured is the electrode potential only and of the same magnitude that would be obtained if the entire solution were saturated with quinhydrone.

To construct the electrode, a short piece of platinum wire of any desired size is sealed in the end of a glass tube 3-4 mm. in diameter and 10-20 cm. in length. A small amount of mercury is placed in the interior to act as a bridge between the platinum wire and a small copper wire which serves as a conductor to the outside. The platinum wire is allowed to project 3-4 mm. beyond the seal externally and is given a thin plating of gold. It is then heated sufficiently to fuse the gold and produce a smooth gold surface. By repeatedly dipping the gold surfaced wire into a saturated solution of quinhydrone in ether, a deposit of small crystals of quinhydrone is established. Without allowing the ether to evaporate entirely, the electrode is dipped into a 4 to 6% collodion and while held horizon-

tally is rotated until it is dry. A second dipping and drying is advisable.

The electrode vessel may be of any type; but in general a flow past the electrode is desirable. A very useful form is one in which is incorporated a thermocouple as a means of measuring the temperature at the electrode.

The equations of state derived from theoretical considerations may be verified experimentally. The preliminary variations of the electromotive force are due to diffusion only and equilibrium is reached in approximately 3 minutes, the actual time depending upon the thickness of the membrane and the amount of quinhydrone deposited. By equilibrium is meant a value within one millivolt of the true equilibrium value.

The diffusion rates of quinone and hydroquinone through the collodion membrane are practically identical so that there is a gradual loss of the solid quinhydrone without important disturbance of the quinone-hydroquinone ratio.

The electrode is stable in such fluids as whole blood where the usual electrometric methods fail, the membrane protecting the electrode system. Excellent results may be secured with the electrode in whole blood in experiments running for one half to one hour. Where it is important to maintain a constant partial pressure of gases above the solution this electrode is convenient inasmuch as it may be incorporated in a closed system.

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Etiology of Acute Upper Respiratory Infection, (Common Cold).*

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In 1914, Kruse[1] reported that he was able to reproduce the common cold in human volunteers by introducing into their nasal passages small amounts of Berkefeld filtrate of the nasal secretions from individuals suffering from natural colds. This observation

* This investigation was carried out under The John J. Abel Fund for Research on the Common Cold.

[1] Kruse, *München Med. Wchnschr.*, 1914, **61**, 1547.