sive as well as quite sudden. This we are inclined to associate with motor cells which have suffered actual injury and have undergone repair.[2] The gradual improvement which sometimes occurs seems more properly to be associated with the taking up of function by other motor cells.

Upon the unisegmental theory of innervation, the varying degrees of recovery are ascribed largely to the stimulation of remaining active fibers, but this does not entirely account for the improvement which takes place, especially that which comes late in the disease. The doctrine of plurisegmental innervation of individual muscle fibers which has recently been emphasized by Cattell and Stiles[3] seems to offer a more adequate explanation of the phenomena of recovery and to stimulate the hope that function may be restored in muscles which under the older conception are sometimes considered beyond repair. The manner in which plurisegmental innervation may operate in recovery is presented schematically in the accompanying diagram. The different degrees of motor cell involvement are given under A and illustrated graphically under B, with the corresponding paralysis shown under C. This schematic drawing shows both nerve cells of the first muscle fiber completely destroyed, which produces a total and permanent paralysis of this fiber. One nerve cell of the next muscle fiber is completely destroyed but its fellow is brought into play under reeducational treatment. The next cell represents the lesion which is associated with a paralysis which recovers sometime after the acute stage of the disease, while the sixth cell is one whose function is inhibited only while the acute process exists in the central nervous system tissue.

There is still a question whether the motor cell injury in infantile paralysis is produced by the direct action of the virus or toxins produced by it, or whether the injury is secondary to the interstitial lesions. There is considerable evidence that the latter is the case—that the nerve cell undergoes changes resulting from disturbances in its nutrition which are due to the interstitial lesions.

When it is recalled that the damage to the motor cells is accomplished in a very short time, one can not but be impressed by the effects which would undoubtedly follow even a slight reduction in the extent or duration of these interstitial lesions. Among the possibilities in this connection are the reduction of edema, the promotion of the circulation of the perivascular fluid, the destruction of even a small portion of the virus present by specific means, or the neutralization of irritating substances acting locally. Recent important advances in the physiology of the central nervous system[4] have opened new avenues of approach to this question.[5] It does not seem too much to hope that means can be found which will change the picture in the central nervous system to that represented in D, thus modifying the problem of the orthopedist to that shown in E.

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[2] Buzzard, E. F., and Greenfield, J. G.: "Pathology of the Nervous System," 1923.

[3] Cattell, McKeen, and Stiles, P. G.: SCIENCE, 1924, N. S., LIX, 383.

THE AMERICAN CHEMICAL SOCIETY

SECTION OF HISTORY OF CHEMISTRY

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Lewis C. Beck, M.D., a pioneer in the food and drug adulteration movement of America: L. F. KEBLER. Dr. Beck received both a literary and a medical training. He was identified with several institutions of learning, among them the Albany Medical College and Rutgers College of New Jersey. He taught materia medica, pharmacy, botany and other natural sciences. These all gave him a good background to write his book entitled "Adulterations of Various Substances Used in Medicine and the Arts," printed in 1846. In 1848 an appropriation of $1,000 was made by Congress to make certain chemical analyses. Dr. Beck was selected to do this work, and his two reports made in 1848–9 constitute the first records of the Department of Agriculture dealing with the great problem of food and drug adulteration.

A sketch of agricultural chemistry in America from 1663–1863: C. A. BROWNE. The history of agricultural chemistry in America is briefly reviewed from the time when Governor John Winthrop, of Connecticut, presented his report before the Royal Society upon the "Description, culture and use of maize," down to the time of the establishment of the U. S. Department of Agriculture in 1862. Rev. John Clayton's report on the "Observables of Virginia," in 1688, contains the first reference to the chemistry of American soils. The interest of Presidents John Adams and Thomas Jefferson in the practical applications of chemistry to agriculture is mentioned. Allusion is made to the early investigations of John Taylor, Gerard Troost, C. V. Sheppard, Edmund Ruffin, S. L. Dava, J. P. Norton, Evan Pugh, J. W. Draper, Ebenezer Emmons, Eben L. Horsford, Benjamin Silliman, Jr., C. A. Goessman, S. W. Johnson and other chemists and to their publications upon agricultural chemistry. A great impetus was given to agricultural chemistry in America in the decade 1840–1850 as a result of the publication of Liebig's "Chemistry in its Application to Agriculture,"

[4] Weed, L. H.: *Jour. Med. Research*, 1914, N. S., XXVI, 93; Weed, L. H., and Hughson, Walter: *Am. Jour. Physiol.*, 1921, LVIII, 53; Weed, L. H., and McKibben, Paul S.: *Am. Jour. Physiol.*, 1919, XLVIII, 512.

[5] Aycock, W. L., and Amoss, H. L.: *Johns Hopkins Hospital Bull.*, 1923, XXXIV, 361.

and of the beginning of the U. S. Patent Office reports upon agriculture. The latter contain contributions by Campbell Morfit, J. C. Booth, L. C. Beck, C. T. Jackson and other prominent American chemists upon agricultural topics.

Mauve: Perkin's discovery: BENJAMIN HARROW. In the early fifties, particularly under Hofmann's guidance, chemists took great interest in the artificial formation of natural substances. From Hofmann's remarks, Perkin was led to experiments on the artificial formation of quinine. As little was then known of the internal structure of compounds, the method of reasoning employed and the type of experiments undertaken in the conversion of one substance into another were crude. Perkin gives us an excellent example of this: "It (quinine) might be formed from toluidine by first adding to its composition C_3H_4 by substituting allyl for hydrogen, thus forming allyl toluidine, and then removing two hydrogen atoms and adding 2 atoms of oxygen. The allyl toluidine, having been prepared by the action of allyl iodide on toluidine, was converted into a salt and treated with potassium dichromate; no quinine was formed, but only a dirty reddish brown precipitate. Unpromising though this result was, I was interested in the reaction, and thought it desirable to treat a more simple base in the same manner. Aniline was selected; its sulfate was treated with potassium dichromate; in this instance a black precipitate was obtained, and, on examination, this was found to contain the coloring matter now so well known as aniline purple or mauve."

Charles W. Eliot—Chemist: LYMAN C. NEWELL. Charles W. Eliot, president of Harvard University for forty years, began his career as a chemist. While an undergraduate he did experiments by himself in Professor Josiah P. Cooke's private laboratory. Upon graduation, he became Professor Cooke's laboratory assistant, soon a tutor in chemistry, and finally assistant professor of mathematics and chemistry. When in Europe, from 1863–1865 he studied chemistry. In 1865 he was appointed professor of analytical chemistry and metallurgy at the newly opened Massachusetts Institute of Technology. In cooperation with Frank H. Storer, he made four original investigations and wrote two text-books. In 1869, he resigned to become president of Harvard University.

New light on phlogiston: TENNEY L. DAVIS. The phlogiston doctrine of Stähl appears to have been anticipated or suggested about a century before his time. Hapelius, in 1606, argued that phlogiston is the essence of the alchemical sulfur. He described an ingenious experiment in which sulfur is produced from antimony sulfide by the action of aqua regia, "common green brimstone, which *ipso facto* you will find to be phlogiston and you will find that it does not differ from common sulfur in that respect." The vocabulary of Hapelius, his problem and his solution of it are those which were later elaborated by Stähl and which dominated the science of chemistry until the time of Priestley and Lavoisier.

Pioneer applied chemistry in North America: GEO. L. COYLE, S. J. To obtain knowledge of the application of chemistry by the aborigines in North America, recourse was had to the missionary accounts of their customs sent annually to their superiors in Europe. These sources of information—The Jesuit Relations—cover a period from 1610 to 1754. Here we learn the methods of agriculture, the preparation of food, methods of making fire, cooking of maize, meat and fish, the preservation of fish and meat by smoking, the whale, porpoise and seal fisheries, whence the natives derived oil for food and toilet purposes, the drinks they used, their sources of roots and simples for medicine. Here also we learn of their clothing, textiles and skins, their primitive method of tanning and dressing leather, their sources of dyes and pigments, the colors for tattooing. We find them acquainted with the art of pottery, brick-making, the preparation of lime from shells, and even hydraulic cement. Descriptions are given of the copper mines of Lake Superior and elsewhere, of the aboriginal method of smelting lead, of reduction of iron ores and the forging of tools, metal working for utility and ornament. The discovery of salt and its use in preserving fish, petroleum, natural gas and coal were known to some tribes, altogether an interesting picture of applied chemistry in the 17th and 18th centuries.

John Maclean—Chemist: WILLIAM FOSTER. Dr. John Maclean (1771–1834) was the first professor of chemistry in the College of New Jersey, Princeton (1795–1812). He was born at Glasgow and was educated in the universities of Glasgow and Edinburgh and in London and Paris. Dr. Maclean specialized in surgery and chemistry, but he was a very broadly educated man. In his twenty-first year he became a member of the Faculty of Physicians and Surgeons, Glasgow, and his learned friends considered that he had no superior in Scotland. Being in sympathy with the political sentiments of America, he emigrated to this country in 1795, and came to Princeton where he delivered a short course of lectures on chemistry in the summer of that year, and in October was chosen professor of chemistry and natural philosophy, and taught with great distinction. As a physician, a surgeon, a natural philosopher, a mathematician, and, above all, a chemist, Dr. Maclean was eminent. Dr. Benjamin Silliman, the first professor of chemistry at Yale, saw his first chemical experiments at Princeton, and in his diary he acknowledges Dr. Maclean as his earliest master in chemistry and Princeton as his starting point in that subject.

Martin Hans Boyê (Lantern): EDGAR F. SMITH.

Researches in alchemy: ARTHUR J. HOPKINS.

M. Carey Lea's allotropic silver (with original samples): CHARLES E. MUNROE.

Memorabilia of famous chemists: EDGAR F. SMITH and LYMAN C. NEWELL.

The early iron industry in Alabama: ELTON R. DARLING.