embryonic stages; such facts do not, however, establish a general law of retrogression or recapitulation, since the metamorphoses of insects and other similar phenomena show that evolutionary deviations and adaptations may occur at any stage in the life histories of organisms.

The adaptability of an organism is in general inversely proportional to the degree of ecological specialization already attained. Accordingly, highly specialized types tend to become restricted and to disappear, while the more primitive may persist and give repeated demonstrations of the evolutionary tendencies or variational possibilities of the group.

Parallel evolution is thus not necessarily adaptive or mimetic, and may often be interpreted as an indication that a tendency to a particular variation may outlive specific differentiation and become similarly accentuated, even in groups in which long separation has permitted the accumulation of many differences in other characters.

From the standpoint of a kinetic theory the inheritance of acquired characters becomes a purely formal question; indeed, it may be said that the origination and inheritance of characters are but different statements of the same fact, since characters originate and are extended because of the same inherent tendency to change.

The continued differentiation of vestigial organs and structures shows that there is no essential connection between evolution and use. The vast majority of variations and specific differences are also obviously non useful; they arise, are prepotent and are perpetuated because they are different and new, rather than through any external influence or necessity.

All hereditary characters are acquired, but not all acquired characters are hereditary. There is no reason to believe that any are hereditary which have not been acquired through the assistance of normal variation. Mere mutilations or reactions to external conditions are not hereditary. Evolution is essentially a process of acquiring characters, but no direct nexus between environment and heredity has been demonstrated, and none is necessary under a kinetic theory.

A kinetic theory enables us, in short, to recognize the varied facts of evolution without doing violence to any of them. While holding that all evolutionary changes are essentially the same in having an internal and spontaneous origin, we are still not compelled to deny that adaptations have been influenced by external agencies. Selection represents, however, not the causes, but the external incidents of evolution. Persistent variation should be compared with the main spring, selection to the balance-wheel, of an organic creation which progresses because new characters and powers are welcome, rather than because old types are exterminated.

O. F. Cook.

Washington, D. C.

THE LATE MILES ROCK.

Miles Rock, a notable scientist, born at Ephrata, Lancaster county, Pennsylvania, October 10, 1840, died on January 29, 1901, in his sixty-first year.

During boyhood he attended the public schools of Ephrata, and later the Lancaster High School, fitting himself for Franklin and Marshall College. At the outbreak of the Civil War he was pursuing his studies at this college; but love of country and the trend of public spirit at the time prompted him to join the Pennsylvania Volunteers and proceed to the seat of war. He remained a soldier at the front until the close of the war; and it is significant of his character that he carried in his knapsack a copy of Gray's 'Manual of Botany,' and employed his leisure in collecting and analyzing the plants observed in the campaign.

At the close of hostilities he entered Lehigh University, which Asa Packer, the philanthropist of Lehigh Valley, had just founded and established at South Bethlehem; he graduated as Civil Engineer with the first class of Lehigh in 1869. Of the three young men who entered Lehigh in 1866 and formed the first graduating class of this now famous institution of learning, two are gone—J. H. Hind Corbin, and now Miles Rock; the third, C. E. Ronaldson, a mining engineer, of Philadelphia, survives. Mr. Rock's graduating thesis was on 'Forest Trees'; and he treated the theme in physical, moral and scientific aspects, evincing thorough familiarity with the subject, and such originality and breadth of thought as to gain the hearty approbation of his fellow-students, with whom he was highly popular. Immediately after graduation, he became instructor in mineralogy and geology at the University.

In 1870 Mr. Rock married Miss Susan Clarkson, and subsequently accepted a position as astronomical assistant to Dr. B. A. Gould, director of the Cordoba Observatory, Argentine Republic. This he retained until 1873, participating in the Durchmusterung or Zone work, undertaken by Dr. Gould, and in mapping the multitude of star observations of the southern heavens. The results of his astronomical work at Cordoba are embodied in 'Uranometria Argentina,' published in Buenos Ayres in 1879.

In the autumn of 1874, Mr. Rock cooperated with Commander F. M. Green, of the U. S. Navy, in determining latitudes and longitudes, by means of submarine cables, in the West Indies and Central America, for the use of the Hydrographic Office. He was occupied in this work until 1877. During the two years immediately following he served as a field astronomer in the U. S. Geographical and Geological Surveys west of the 100th meridian under Lieutenant George M. Wheeler, of the U. S. Engineers, and determined latitudes and telegraphic longitudes in several of the western states and territories. On July 1, 1880, he was appointed assistant astronomer at the U. S. Naval Observatory, and served acceptably in that capacity at the transit circle under the immediate direction of Professor John R. Eastman, U. S. Navy. In 1882 he was detailed to aid Professor Lewis Boss in the observation of the transit of Venus at Santiago de Chile in December of the same year.

On the recommendation of the U. S. Government, Mr. Rock was appointed astronomical engineer for Guatemala in 1883; and for fifteen years he served as Chief of the Guatemala Boundary Commission, charged with the duty of determining and locating the disputed frontier between Guatemala and Mexico. To his technical knowledge, diplomatic skill, strong sense of justice, and invincible courage, Guatemala unquestionably owes the retention of her rights in certain valuable lands in the district of Peten, which had been claimed by Mexico, even to the point of threatened hostilities.

As a Commissioner Mr. Rock was highly regarded by the Guatemalan authorities, especially as he seldom failed to evince a ready and deep interest in the people, and in the development of the resources of the republic. During his incumbency he also served as the delegate of the Guatemalan Government to the International Congress at Washington in October, 1894, which adopted for the nations represented the uniform zero-meridian of Greenwich for maritime purposes.

On the completion of his official work for the Guatemalan Government, in 1898, Mr. Rock remained in the country, devoting himself to private interests.

Mr. Rock never ceased to take a keen interest in the affairs of his *alma mater;*

and on the formation of a Lehigh alumni association at Philadelphia in 1870 he was chosen its first president, and a few years later was appointed an honorary alumni trustee. He last visited Lehigh on the occasion of a reunion of the alumni in 1897, when he delivered an address. He was a frequent contributor to the collections of the several scientific departments of the University, and many of his collections are preserved in the University Museum. A nominal resident of, and frequent visitor to, Washington, he took a prominent part in the scientific activities of the Capital. He was one of the founders of the Anthropological Society of Washington, and of the Cosmos Club; he was also a member of the Washington Academy of Sciences and of the National Geographic Society.

Mr. Rock's death was sudden, resulting from acute gastritis followed by heart failure. The sad intelligence was reported to the State Department on the second of last February, by United States Consul-General McNally of Guatemala.

In recognition of the great worth of the services which Mr. Rock had rendered to Guatemala during the years of his official activities there, the Government of that country took charge of the funeral, and he was buried in the cemetery of Guatemala City with public honors under the personal direction of President Cabrera. In their official reports to the Department of State, the representatives of this country in Guatemala showed that Mr. Rock was universally mourned, and that no such funeral honors had ever before been accorded to anyone but the highest officials of the country. The most affecting if not the most impressive feature was the attendance of hundreds of poor natives, who had known Mr. Rock and experienced his never-failing kindness and generosity, who silently and tearfully followed him to his last resting place. Simple in their own lives and thoughts, they paid the only tribute at their command to the man whose singleness of purpose, love of justice and warmth of heart endeared him to all who knew him. Peace be to his ashes!

Mr. Rock leaves a widow, a married daughter, Mrs. F. L. Ransome, and a son, Alfred Mayer Rock, all of whom reside in this city.

William Eimbeck.

Washington, D. C.,
April 22, 1901.

OTTO LUGGER.

Otto Lugger, State Entomologist of Minnesota, who died May 21, from pneumonia, after a very short illness, was one of the most widely known of the many Americans of German birth who have obtained high scientific reputation in this country. He was born at Hagen, Westphalia, September 16, 1844. His father was a professor of chemistry in a Prussian university. Lugger was educated in Hagen, and in 1864 became a lieutenant of cavalry in the Prussian army. In 1865 he came with his parents to the United States and secured a position with the engineer corps of the army, and for two years was engaged in the survey of the Great Lakes. He had always been interested in entomology, and collected specimens while engaged in his engineering work. He became acquainted with the late C. V. Riley, who at that time was occupied in newspaper work in Chicago, and, when in 1868 Riley was appointed State Entomologist of Missouri, Lugger went with him as his assistant. During the years 1868 to 1875, when Riley established his great reputation as economic entomologist and published eight of the nine annual reports which brought him lasting fame, Lugger remained his quiet, unassuming, self-sacrificing and devoted helper. In 1875 he married Lina Krokmann and went to Baltimore, where he became the curator of the