even man himself, gets fully or nearly fully adapted to its environment, then, until something new happens, some new factors come into play, that organism will simply keep on, like a light that keeps burning evenly. But turn on a greater supply of oxygen or furnish some other suitable stimulus, and the light will flare up with renewed life and activity. The rate of evolution in any given organic line is commensurate with the influences that act upon such line.

(5) Does evolution ever reverse itself?

Here is a problem which does not seem to be difficult to answer. There is no case known in which a fully developed species has reverted to an ancestral species. But single parts, and even whole variants, can and do revert. And a progress in efficiency may be accompanied by simplification of structure. Something of this nature seems, for example, to have happened in the diatoms.

The differentiation in given phyla or organisms is led by what may be termed the chief object of such organisms. The structural parts accommodate themselves to this chief requirement. The accommodation may be partly by growth, partly by simplification. And simplification is effected by degeneration of useless or interfering parts and their eventual elimination. Man is full of examples of all this. The living system does not favor anything that has ceased to be useful, whether it is an indolent human brain or an effete appendix; it weakens, reduces and eventually eliminates in one way or another.

(6) What are the relative rôles of mutation, or sudden jumps in evolution, and of gradual changes?

When de Vries discovered mutations in his Oenotherae, it seemed as if a new principle had been discovered in organic developments. To-day, when looked at more soberly, it is perceived that mutations and the more gradual changes are merely differing steps, differing rates, of the same process, except where mutations may be accidental, as they are time and again due to poisons, rays and mechanical causes.

Mutations, as seen to-day, are not as desirable as more gradual changes. They demand much greater accommodation of the organism to them, which may not always be "healthy" or even possible. A mutation may be of such a nature as to demand a substantial change of the organism. Accommodations to lesser changes are always easier. But mutations are not changes of a distinct order.

(7) In observing general organic evolution, do we perceive in the species, genera, families, orders, kingdoms anything like life cycles?

The life cycle, in its essentials, is a universal attribute of polycellular, if not all, organisms. It is something very fundamental and general. Is it limited to individuals—or does it extend also to the species and higher groups?

Some observers are inclined to see such group life cycles (*e.g.*, in mollusks), and to explain it as in the individual by a progressively diminishing capacity of oxidation.

It is impossible to say as yet anything definite on this point. There are slowly growing indications to the effect that there are in nature factors that act simultaneously on whole groups, whole varieties, whole species, and that such groups behave in unison, as sorts of superindividuals. But all this, as so much of what preceded, is still full of uncertainties and can be decided only by future investigations. We sense that there is something in this direction but can not yet be sure.

(8) The last problem I am able to approach in the time available is one that is essentially human. How far can man hope eventually to control biogeny—biogeny of plants and animals, biogeny of his own genus?

The promise is warm, if not yet glowing. We are gradually learning the ways of nature, and how to use its powers. There is a steady advance also in understanding as to what is and what is not desirable. Nature's chemical and physical laboratories, as well as our own, are ever more effectively at our disposal. Genetics and experimental science are already trying their hands in the biogenic fields, with as yet not large but growing results. When man shall have reached so far in knowledge as clearly to distinguish the right ways, the means to proceed along these will soon follow. With the advance in the scientific knowledge of nature there can be set no limit to man's possibilities. He may confidently be expected to become an enlightened coworker with nature. But this will not be greatly achieved in our nor yet the next generation.

OBITUARY

MEMORIAL TO PROFESSOR EDWARD S. MORSE[1]

FROM a Japanese friend I have notice of an event which may be of interest to the readers of SCIENCE who knew the late Professor Edward S. Morse. The following is in part adapted from the account which appeared in the *Japan Advertiser* early in November.

On the afternoon of Sunday, the third of last November, some two hundred scientists and scholars assembled at the shell-mound near the station at Omori for the ceremony of unveiling a monument in

[1] We learn with regret that the author of this contribution died suddenly on January 28.

honor of Morse, and in commemoration of the fact that the mound was the cradle of archeological and anthropological studies in Japan.

It will be remembered that Morse went to Japan for the first time in 1877. As he passed Omori on his first journey to Tokyo from Yokohama where he had landed, he recognized a shell-mound such as he had often investigated along the coast of Maine and elsewhere. He found that the significance of such heaps of shells was quite unknown to the Japanese, and that nothing of the kind in Japan had been noted by any foreign observer. With characteristic enthusiasm, he began investigating the Omori mound, and speedily identified it as a prehistoric kitchen midden. This investigation was the first of its kind in Japan; Morse's publication of it was the first of a series of archeological studies issued from the Imperial University, and the collection of implements and pottery from the Omori mound, arranged by Morse, was the beginning of the archeological collections in the Imperial University and in the Imperial Museum in Tokyo.

The monument which commemorates all this is in the form of a great stone slab, eight feet by five, upright upon one of its long sides, and inscribed "Omori Shell-Mound" in Chinese characters large enough to be read from the passing trains. In the middle of the upper long side is a granite jar shaped like the typical vessels found in the mound. It stands on a plinth above an inscription in honor of Morse and his contribution to science in Japan.

The memorial inscription was composed by Dr. Chiyomatsu Ishikawa, professor emeritus at Tokyo Imperial University, who was Morse's interpreter in the early days and one of his students. Associated with him in planning for the monument were two other students under Morse—Professor Chujiro Sasaki, of the Tokyo Imperial University, and Professor Tomotaro Iwakawa, of the Tokyo Higher Normal School—and a number of his friends of later years. The cost of the monument was borne by Mr. Hikoichi Motoyama, and it was designed by Prince Oyama, Dr. Arisaka and Mr. Sugiyama.

It may also interest the readers of SCIENCE who esteemed Morse to know that at the Museum of Fine Arts in Boston, where for the last thirty-three years of his life he was keeper of the Morse Collection of Japanese Pottery, the Edward S. Morse Memorial Fund was established in 1927–28 through the generosity of a large number of his friends. The income of that fund is used to augment the collections of pottery in the custody of the department of which Morse was a member, and the purchases made from it are distinguished as belonging to the Edward S. Morse Memorial Collection.

F. S. KERSHAW,
Keeper of Chinese Ceramics

RECENT DEATHS

DR. WILLIAM H. NICHOLS, chairman of the board of the Allied Chemical and Dye Corporation, past president of the American Chemical Society, the Society of Chemical Industry and the Eighth International Congress of Applied Chemistry, known for his work on the metallurgy of copper and in industrial chemistry, died in Honolulu on February 1. Dr. Nichols was seventy-eight years of age.

DR. JOHN HOWARD APPLETON, professor emeritus of chemistry at Brown University, died on February 18 at the age of eighty-six years. Dr. Appleton retired in 1914.

DR. WILLIAM OTIS BEAL, for seventeen years a member of the faculty of the University of Minnesota, and recently chairman of the department of astronomy, has died at the age of fifty-six years.

DR. GUY L. NOYES, dean of the school of medicine of the University of Missouri, died on February 4. He was fifty-seven years old.

JOHN N. COBB, dean of the College of Fisheries at the University of Washington, Seattle, died on January 13 at the age of sixty-two years.

MAX LATSHAW, Ph.D. (Johns Hopkins), died suddenly in Berkeley, California, on January 23, aged thirty-seven years. At the time of his death he was a research chemist on the staff of the Shell Development Company.

DR. ROBERT FULFORD RUTTAN, emeritus dean of the faculty of graduate studies and research at McGill University, died on February 19. He was seventy-four years old and had retired last year, after having been associated with the university since 1886. He formerly was director of the Canadian Advisory Council for Research.

DR. JAMES MATTHEWS DUNCAN SCOTT, professor of physiology in the University of Saskatchewan, died at Saskatoon on January 28.

EDWIN TULLEY NEWTON, F.R.S., until his retirement in 1905 paleontologist to the British Geological Survey and to the Museum of Practical Geology, London, died on January 28, within four months of completing his ninetieth year.

THE death is also announced of Dr. George Goudie Chisholm, Edinburgh, known for his work on geography, at the age of eighty years.