In conclusion, it may be of interest to examine the question whether changes of climate can be attributed to changes of ocean currents. It has then in the first place to be observed that the development of ocean currents depends to a great extent upon the boundaries of the ocean and the depth to the bottom. Major changes of the bottom configuration or the coast lines may lead to major changes in the flow of the water and thus to appreciable alterations of the climate. Scotland and Iceland are connected by a submarine ridge. If this ridge should rise, the volume of Atlantic water flowing into the North Sea would be reduced, and if the passage should become completely closed the effect upon the climate of the Scandinavian countries would be disastrous, and these countries would perhaps face a new glacial period. On the other hand, if the Aleutian Islands should sink into the sea and Bering Strait should widen and deepen, the Pacific west wind drift might turn north; Alaska would probably receive a much milder climate than what it has now, and the Yukon Valley might become covered with orchards. Such changes may take place during long geological periods, and it is possible that changes of this nature have had bearing on the past climates of the Pacific area and may receive bearing on the climates of a very distant future, but in a discussion of climatic changes in geological periods many other factors enter in, particularly changes in solar radiation.

It is of more immediate interest to examine the question whether variations of short duration in the character of the currents occur, and, if so, whether these variations will be reflected in similar changes of the climates of the coasts. This question is a very complex one because the ocean currents are determined to such an extent by the prevailing winds that any change in the general circulation of the atmosphere will lead to a change in the ocean currents, but such a change in the general circulation will also have direct bearing upon the climate of any particular region. It is therefore difficult to discriminate between the direct influence upon the climate of a change in the atmospheric circulation and the indirect influence which is brought about by an alteration of the ocean currents. We have a striking example of this condition in northwestern Europe. During the last thirty years the winters of northwestern Europe have become milder, and the most conspicuous change has taken place in northern Norway and in Spitsbergen. In Spitsbergen the average winter temperature has, during the last decade, been about 15° above the average winter temperature of forty years ago. There is good evidence that this rise of winter temperature has been accompanied by a greater transport of Atlantic water towards the north. The increase in the volume of warm water flowing along the coast has certainly a bearing on the climate but the greater part of the change may not have been directly caused by such greater transport. Both the major effect on the climate of Spitsbergen and the effect on the currents of the North Atlantic Ocean may be due to a displacement towards the north of the tracks of the low-pressure areas. Such a change of the atmospheric circulation may again be due to a slight alteration of the amount of energy received from the sun which keeps the atmosphere running and maintains the ocean currents.

It should be borne in mind that the atmosphere and the ocean represent two delicate thermodynamic machines which are interdependent. A change in the performance of one of them leads to a change in the other which brings about a new reaction in the first one. A balance—a steady state is never attained. In order to understand the complex sequence of events and to be able to discriminate between changes in climate caused directly by changes in atmospheric circulation and indirectly by changes in ocean currents, it is necessary to acquire a better knowledge of both the atmosphere and the ocean and of the interaction between the two. At the present time it is possible only to state empirically how the climates of the coasts are influenced by the ocean currents. If we wish to comprehend the mechanism of this influence and to predict what changes we may expect as the circulation of the atmosphere is subjected to changes we have to know how the enormous machines represented by the atmosphere and the ocean really work. When dealing with the atmosphere great advances have been made in recent years, largely because it has been possible to secure and to interpret upper-air observations, but when dealing with the oceans progress is slow because of the difficulties of obtaining adequate data. This, however, should not discourage us but should be an added reason for increasing the efforts in the study of the currents of the oceans and particularly of the Pacific Ocean which, at the present time, is less known than any other ocean in the world.

OBITUARY

EDWIN MORRISON

ENDING an active life of seventy-eight years and an actual teaching career of half a century, Professor Edwin Morrison passed away on July 16, 1939, at his home in East Lansing, Mich.

For the last twenty years he had been a member of the department of physics at Michigan State College, retiring from active duty in 1936. He was born on March 5, 1861, at Bloomingdale, Ind., where his boyhood was spent and his education begun. While at-

tending the Bloomingdale Academy he decided to become a teacher of science. He continued his education at Earlham College, graduating in 1888. Three years later as a result of summer school work he received an M.S. degree from Indiana University. He continued his work at the University of Chicago for several summer sessions, where he came under the influence of Dr. R. A. Millikan, with whom he worked on a number of special problems.

Professor Morrison held positions as follows: instructor in science at the Pacific Academy at Newberg, Ore., and at Spiceland Academy, Indiana. When the Pacific Academy became a college, he went back as head of the department of science. In 1901 he became head of the department of physics and chemistry of Penn College at Oskaloosa, Iowa, and in 1906 was called to Earlham College, his alma mater, to become head of the department of physics, from which post he moved to Michigan State College in 1919.

In all his teaching he used and promoted the laboratory method, and wherever he went he built up a good laboratory for the teaching of undergraduate physics. He was a member of the American Association for the Advancement of Science, the American Physical Society, the American Association of Physics Teachers, the American Optical Society and the Indiana Academy of Science.

C. W. CHAPMAN
O. L. SNOW

WILFRED AUGUST WELTER

DR. WILFRED AUGUST WELTER, professor of biology and head of the department of biology of Teachers College, Morehead, Ky., died in an automobile collision on December 20. He was born in Creighton, Nebr., on March 29, 1906. In 1911 he moved with his parents to a farm north of Verndale, Minn., where he attended a grade school and the Verndale High School, from which he graduated in 1922. From high school he entered the Teachers College at St. Cloud and graduated in 1924. He obtained the bachelor's degree from the University of Minnesota in 1926 and the master's degree from the Iowa State College in 1927. He taught one year in the Teachers College at St. Cloud and one at the Teachers College in DeKalb, Ill., before he entered Cornell University, from which he received a Ph.D. degree in ornithology in 1932.

The degree was conferred on him while he was very young, and he came to Morehead with an eager step and a boyish smile which endeared him to all. He was a man of unlimited capacity, one who was rapidly climbing professionally. He was the ideal of all students and as head of the department of biology he influenced them to take up graduate work.

Dr. Welter collected specimens and built up a museum of mammals, reptiles and birds. He made a survey of the fish in Kentucky streams and added a large collection of specimens to the museum. He worked with the government in bird feeding and bat banding. He found and classified rare salamanders. He made colored movies of the birds, flowers and animals of this region and was much sought as a lecturer at educational and conservation meetings. He established a wild flower garden on the hill behind the college to preserve rare specimens in their natural habitat. He assisted in training school supervisors to teach nature units. He wrote articles for science magazines, and maintained membership in organizations related to his field.

His favorite pursuits were connected with his professional work—conservation of wild life, fishing, collecting, making colored movies of birds, flowers and animals, studying nature at close range, out-of-doors cooking, field trips, boating, canoeing, travel by motor car and building a museum of wild life for the college.

His passing is a great loss to Morehead College and to the study of science in Kentucky.

A CORRESPONDENT

RECENT DEATHS

DR. JOHN HENRY TANNER, professor emeritus of mathematics at Cornell University, died on March 11 at the age of seventy-nine years.

THE death is announced of Lieut.-Colonel J. A. Amyot, Canadian deputy minister of pensions and national health, formerly professor of hygiene in the University of Toronto, at the age of seventy-two years.

SCIENTIFIC EVENTS

THE INVENTIONS BOARD OF THE CANADIAN GOVERNMENT

AN Inventions Board has been established by the Canadian Government to deal with the growing volume of inventions and suggestions intended to further Canada's war effort which are being received by the various departments of the government, according to an announcement made by the Hon. W. D. Euler, Minister of Trade and Commerce and chairman of the Committee of the Privy Council on Scientific and Industrial Research.

The establishment of the Inventions Board provides a means whereby ideas and inventions submitted by citizens of Canada and abroad can be carefully examined, and promising proposals cleared to the proper authorities.

The board itself is composed of Dean C. J. Mackenzie, acting president of the National Research