can it take in the work of promoting the general welfare of children? Besides there are ever with us the great questions of the course of study and methods of learning—the what and the how of teaching. In collecting and reporting the more successful experiments which are being made in the schools of any part of the world, the Bureau of Education is doing an incalculable service in making well-established scientific formulations of education possible. Special help is needed in the study of ways and means for the teaching of morality and the elements of law that no child may grow up without being well grounded in the knowledge of the fundamental relations of human beings. The office of the Commissioner of Education has always been wisely and ably administered. It has been of immense assistance in promoting education in the United States. It is reaching out to a larger work. The time is ripe for it. But to do it, the Bureau of Education must have larger appropriations, more experts, and above all, a much larger authority and function in the service of the nation.

E. C. Moore

Los Angeles, Cal.

WATER VAPOR IN THE ATMOSPHERE OF THE PLANET MARS[1]

An expedition from the Lick Observatory, University of California, was recently sent to the summit of Mt. Whitney, the highest point of land in the United States, through the private generosity of Regent Wm. H. Crocker. It had for its purpose to study the question of water vapor in the atmosphere of the planet Mars. The instruments consisted of a sixteen-inch horizontal reflecting telescope and a suitable spectroscope. The observations, made on the nights of September 1 and 2, were mainly photographic.

Water vapor in the atmosphere of any planet causes dark bands to be formed at certain definite positions in the spectrum of that planet; conspicuous bands if the water vapor is abundant; inconspicuous bands if the quantity is slight, as this, the only method known, is not a sensitive one.

The observer of Mars must look up through the earth's atmosphere; and the great quantity of water vapor in our atmosphere, if the observer is near sea level or at ordinary altitudes, blots out the effect of any Martian vapor, making a solution of the problem impossible. By ascending Mt. Whitney, altitude 14,501 feet, the Crocker expedition placed itself above probably four fifths or more of the earth's water vapor. Further, the air on Mt. Whitney was astonishingly dry during the time of the observations. With barometer 17⅜ inches, air temperature 29 degrees Fahrenheit, and wet thermometer 17 degrees, students of the atmosphere will recognize that the observers of Mars were looking through remarkably little terrestrial water vapor. Even this small quantity would be almost fatal to success if we did not have a fairly satisfactory method of eliminating its effects, as follows: Our moon has no appreciable atmosphere. The lunar and Martian spectra will be affected alike by the water vapor in the earth's atmosphere. These spectra are photographed, one immediately after the other while the conditions in our atmosphere remain unchanged, and with the moon and Mars at the same altitude above the horizon so that their rays traverse equal paths in our atmosphere. If the vapor bands in the Martian spectrum are found to be stronger than in the lunar spectrum, Mars has water vapor in considerable quantities. If the bands in the two spectra are equally strong, water vapor on Mars does not exist in sufficient quantities to be detected by the spectroscopic method. The latter condition was found to exist, when this method was applied under the superlatively favorable conditions existing on Mt. Whitney. Both spectra were photographed when Mars and the moon were near the horizon, again when they were at medium altitudes, and finally when they were 49 degrees above the horizon. The best vapor band, technically called "a," was faint in both spectra when the bodies were low, fainter when the bodies were higher, and very faint when the bodies were at their highest; but for equal altitudes the "a" bands in the Martian and

[1] Statement by Director W. W. Campbell, of the Lick Observatory, prepared for the Associated Press.

lunar spectra were equally intense; plainly signifying that the observed bands were due to water vapor in the earth's atmosphere above the summit of Mt. Whitney. This does not mean that Mars has no water vapor, but only that the quantity present, if any, must be very slight. Let us recall that we see Mars by reflected sunlight. The rays which reached our instruments passed from the sun into the Martian atmosphere, for the most part down to the surface of the planet, and then out again to us, thus passing twice through the planet's atmosphere and any water vapor it may contain. Even with this multiplying effect on Mars the vapor bands in the Martian and lunar spectra were alike, and we conclude that any water vapor in the Martian atmosphere must have been much less extensive than was contained in the rarefied and remarkably dry air strata above Mt. Whitney.

These observations do not prove that life does not or can not exist on Mars. The question of life under these conditions is the biologist's problem rather than the astronomer's.

SCIENTIFIC NOTES AND NEWS

DR. IRA REMSEN, president of the National Academy of Sciences, has consented, at the request of Dr. H. F. Osborn, president of the American Museum of Natural History and Mr. Archer Huntington, president of the American Geographical Society, to appoint a scientific commission to examine the records of Lieutenant Peary and Dr. Cook, in case they are ready to present them to such a commission. Lieutenant Peary has accepted the suggestion, and it is reported that Dr. Cook will under certain conditions also accept.

THE mayor of Baltimore has nominated Dr. William H. Welch, of the Johns Hopkins Medical School, as a member of the new charter commission.

THE University of Manchester has conferred an honorary doctorate on Dr. Otto Wallach, professor of organic chemistry in the University of Gothenberg.

AN international committee has been formed to celebrate the fortieth year of university work of Professor Henrico H. Giglioni, professor of zoology at Florence.

MR. R. PRIESTLEY, who left University College, Bristol, to join Mr. Shackleton's Antarctic expedition as geologist, has left England for Australia on October 22. He intends to join Professor Edgeworth David, F.R.S., at Sydney University, to work up the geological results of the expedition.

WE learn from *The Journal of Terrestrial Magnetism* that the Norwegian Storthing has voted to Professor Birkeland 5,000 kroners annually for four years, making a total of 20,000 kroners (about 5,300 dollars), thus enabling him to continue the publication of his investigations on magnetic storms and polar lights.

PROFESSOR CHARLES JOSIAH SMITH, of the chair of mathematics of Western Reserve University, has been given leave of absence for the year.

DR. CHARLES H. MAYO, of Rochester, Minn., will deliver two lectures at the University of Maryland, on November 9 and 10, on "Diseases of the Thyroid Gland," and on academic day he will receive from the university the honorary doctorate of laws.

ON the opening of the graduate school of the University of Pennsylvania, on September 30, Dr. Thomas H. Montgomery made an address on "The Making of the Investigator."

MR. JOHN BIRKINBINE, president of the Pennsylvania Forestry Association, will give a lecture at Lehigh University during the present month on "The Relation of the Engineering Profession to Forest Preservation." This lecture and others have been made possible by a special gift for increasing interest in forestry.

THE valuable scientific library of the late Professor Simon Newcomb has been purchased by Mr. John Claflin for the College of the City of New York.

THE death is announced of Dr. Anton Dohrn, founder and director of the Biological Station at Naples, and eminent for his contributions to zoology.

DR. MAX HEINZE, professor of philosophy at the University of Leipzig, known for his important publications on the history of philos-