Bay, Wisconsin; Tacubaya, Mexico; and Mount Wilson, California.

A new solar observatory, which is about to be established in New Zealand through the generosity of Mr. Thomas Cawthron, will fill the gap in longitude between California and India, and thus aid in keeping the rapidly changing phenomena of the solar atmosphere constantly under observation. At the Mount Wilson meeting of the Union, it was decided to enlarge its scope so as to include the whole range of astrophysics, and a representative committee was appointed to report on the classification of stellar spectra. It is now evident that the Solar Union is destined to play an increasingly important part in the field of international research.

The Solar Union is one of the organizations endorsed by the International Association of Academies, to which it makes regular reports. Another of the international investigations conducted under the auspices of the association is that of the Brain Commission, the American Committee of which is also closely related to the National Academy.

The Committee on International Paleontologic Correlation, appointed by the Academy in 1908, has recently completed its work. Aided by the Bache Fund, the committee has pushed forward the important work of correlating the geologic formations of Europe and America on the basis of their paleontologic contents. The results have been published in a series of papers, by members of the committee, most of which treat of the mammals of the tertiary epoch and the formations which contain them in North America. Marsh and Cope dealt with the formation of the American Eocene as units, even when their thickness ranged from 1,000 to 2,000 feet. These formational units have now been split up into sub-units, or life zones, usually distinguished by geologic discontinuity. At the same time there has been a marked increase in the precision of recording the succession of species in certain formations which contain several levels of life zones, thus permitting exact comparisons with other life zones to be instituted. The importance of such work is obvious in connection with the trend and rate of development in different parts of the world, the possibility of geographic intercourse at certain epochs, and the cycles of physiographic and climatic change.

It is thus evident that the Academy is in a most favorable position to extend its operations in the field of international research, where the advantages of its national and representative character are felt to the full, and the disadvantages of its scattered membership are of minor importance.

From this brief survey it appears that the National Academy of Sciences, in spite of many obstacles, has played an important part in the development of American science. The time is now favorable for an extension of its work into new fields, which must be occupied if the special opportunities and obligations implied by the Academy's national charter are to be fully realized. In a later article some of the possibilities of future progress will be considered.

George Ellery Hale
Mount Wilson Solar Observatory

The Plan of Work in Connection with a New Marine Laboratory on the Pacific

During the past summer a new marine station was erected at Laguna Beach, California. At this place the varied and rocky coast offers peculiar advantages for the study of plant and animal life. The situation, too, is convenient for those in southern California, being within fifty miles from Los Angeles and easily accessible from other cities and towns.

The wealth of life at Laguna has attracted students of Pomona College during the past three years to visit this region for summer work. The growing interest of students and others in sea-side studies led to the erection of an adequate building. This contains two general laboratories, dark room, store rooms, aquarium for living specimens and nine private laboratories with fresh and salt water. There is in addition to the main building a tank house with two more rooms. The laboratory is established chiefly for teaching purposes, but there are facilities for a limited number of investigators. The plan of investigation and to some extent the work of teaching is organized along a definite line.

The laboratory is but one station for zoological work. The other center is situated fifty-five miles inland at Pomona College, Claremont. Between the two stations there are ranges of hills, low mountains with small streams and lakes, and great level stretches. Back from Claremont and the college buildings the mountains of the San Gabriel range, often covered with snow, rise to an elevation of ten thousand feet, and beyond them stretches the desert with its lower ranges and arid valleys. In this area a careful survey is to be made of all groups of living things, not all at once, but bit by bit, not by a few, but by many.

Some of the advantages of the location and of the climate are such as to contribute to the success of the enterprise. Field work may be undertaken at all times during the year at Laguna and to a large extent about Claremont. One of the chief recreations of the students is in the form of long or short expeditions into the mountains, and their services are enlisted to obtain specimens from different regions of high and lower altitude. In this way many interesting things have already been brought to light. Some species, for instance, are found to have a very local distribution on some mountain slope or in the depths of some scarcely accessible canyon. Besides the collection of specimens, there are possibilities in the way of observation of large animals, such as mountain sheep, deer, mountain lions and many smaller mammals and birds.

One of the features of class exercises in introductory courses is the collection of entomological and other zoological specimens with full data, as well as field work of other kinds. By these means the student obtains knowledge of the different animal groups, and the rough materials for more careful investigations are collected. For the more advanced workers special groups or special problems are studied in the field or in the laboratory. The necessary determinations are made so far as possible by the students, but their material is sent to specialists for confirmation. The results of this survey are not to be confined to mere records of species, but so far as possible in every group an attempt will be made to determine the adaptations to the environment, the relation of the insects and other forms to the cultivated plants in the region. Records are to be kept of climatic conditions from season to season and from year to year. Specimens collected at various times are kept with date and locality label until special students or specialists can determine them. At no time will the work on a particular family, order or class be regarded as finished, but from month to month new records are to be added. Although systematic investigations may come first in point of time, the effort will be made to determine other things from the material as occasion arises. This will necessitate a broad study of plant forms, topographical and climatic factors, as well as the interrelations of the animals studied. Knowledge of life histories and habits will also be a natural feature of the work.

There is so much ground to cover in this great outline, that it will be years before much of an impression is made upon the unknown, and it may be a long time before certain isolated facts seem to have any value or bearing on the rest. It is the purpose before long to have a special fireproof room to keep the specimens and records for the use of present workers and for the future. These data ought to be very valuable in a few years to many special

investigators. Some of the results of the work appear from time to time in the *Journal of Entomology and Zoology,* which is published quarterly by the college.

There are of course great gaps in the whole plan. Only here and there can a little be done at a time, but it is believed that by encouraging classes and individuals to collect data and specimens, and, when well trained, to record observations of a more difficult nature, we have an opportunity to do a great work which is unique and can not help but benefit all who partake in the effort. Whatever may be the value of the facts obtained and tested, whatever the value of the discovery of new species or new adaptations, there is, I believe, the value of method for the beginning student or the more advanced one. It will not matter what study he pursues after leaving college for the university; an awakened interest in things out of doors, an increased accuracy of observation should result. It seems to me too that the thought of contributing something to science, no matter how small a fact, ought also to be a stimulus in the future as it has been in the past.

William A. Hilton

Pomona College,
Claremont, Cal.

WINSLOW UPTON

Winslow Upton, professor of astronomy and director of the Ladd observatory at Brown University, died of pneumonia, at Providence, on January 8, in the sixty-first year of his age. His forbears were of north England origin but early in the seventeenth century the founder of the New England family emigrated to Massachusetts. Professor Upton was born on October 12, 1853, and was the fourth son of James Upton, a prominent merchant of Salem, Mass., and a liberal contributor to Brown University. Entering Brown in 1871 he was graduated as valedictorian of the class of 1875. He had attained to almost equal excellence in the pursuit of studies in ancient classics and in science, but he felt that his forte was rather in the line of scientific investigation. So he turned to the University of Cincinnati for graduate work in astronomy and was there awarded the degree of A.M. in 1877. His alma mater conferred on him the honorary degree of Sc.D. in 1906.

He was assistant in the astronomical observatory at Harvard, 1877–79; assistant engineer in the U. S. Lake Survey at Detroit, 1879–80; computer in the U. S. naval observatory at Washington, 1880–81; computer and assistant professor in the U. S. Signal office, 1881–84.

In 1884 he was appointed professor of astronomy at Brown University and since 1891 he has been both professor of astronomy and director of the Ladd observatory (the gift of the late Governor H. W. Ladd) which was built under his supervision. The facilities of the observatory have been used chiefly to aid in the instruction of the university, in the maintenance of a local time service, and in regular meteorological observations in cooperation with the U. S. Weather Bureau.

Professor Upton has been connected with a number of important scientific parties. He was a member of the U. S. astronomical expeditions to observe the total eclipse at Denver, Colorado, in 1878, and at the Caroline Islands in the South Pacific, in 1883. He also observed the solar eclipse of 1887 in Russia, that of 1889 in California, of 1900 in North Carolina, and during a sabbatical year, 1896–97, he was attached to the southern station of the observatory of Harvard College, at Arequipa, Peru.

Professor Upton's publications, for the most part in the department of meteorology, include the following:

1. "The Solar Eclipse of 1878," a lecture before the Essex Institute (*Bulletin of the Essex Institute,* Vol. 11. 1879; reprinted, pp. 19).

2. "Photometric Observations Made Principally with the Equatorial Telescope of Fifteen Inches Aperture During the Years 1877–79"; by E. C. Pickering, C. Searle and W. Upton (*Harvard Astr. Obs. Ann.,* Vol. 11, 1879, pp. 317).

3. "Information Relative to the Construction and Maintenance of Time-balls" (Wash-