surroundings, as revealed by the ways and the means of the physical and the biological sciences, is incomparably more wonderful and inspiring than the fiction of the most lively imagination and, being idealistic and non-materialistic in character, is of the imperishable treasures of the human race.

MEDALS OF THE NATIONAL ACADEMY OF SCIENCES

PRESENTATION OF THE AGASSIZ MEDAL FOR 1934 TO HAAKON HASBERG GRAN

WHETHER we ourselves be physicists, chemists or biologists, I think we will all agree, as living beings, that no question of sea science is more intriguing than how the inhabitants of the waters manage to survive in the waste of waters. And if we follow the life chain backward far enough we come at last to the question: What it is that governs the productivity of the sea for the microscopic floating vegetation which serves as eventual sustenance for all the animals of the sea? If all flesh be grass, it is as nearly true that all fish be diatoms. It is in this most significant field that Haakon Gran has delved, until his name and fame are as familiar to students of marine biology as is his genial countenance to many of us here.

Gran's earliest scientific papers were along somewhat other lines, for he opened his productive career as a student of the taxonomy and distribution of diatoms, a field in which he soon attained high eminence. He commenced his scientific authorship in the last years of the past century; in 1902 came his famous monograph on the plankton of the Norwegian sea, where he traced for the first time the relationship that the communities of floating plants bear to the various water masses through the seasons for so extensive an area. By 1908 he had produced his well-known handbook of the marine planktonic diatoms. In 1912 there followed what still remains the best-rounded account of the vegetable plankton of high seas that has appeared, based on his own field studies on the transatlantic expedition of the *Michael Sars*. And he has ever since continued adding to our factual knowledge of the microscopic plants of the oceans, far and wide.

All this, however, expresses but one side of Gran's scientific life. Even in his earliest papers, while a young student, we see him concerned with the sudden and spectacular increases and decreases in the amount of planktonic vegetation in northern seas, and with the wide variations that may exist in this respect within short distances, the occurrence of which was already well known, but for which no explanation had previously been suggested. Influenced, perhaps, by the Norwegian oceanographers Nansen and Helland-Hansen, he early saw that advances here, as in the physics of the sea, awaited the development of a precise quantitative technique. Experience followed with the centrifuge method, introduced shortly previous by Lohman, with such rich results. By 1912 Gran had combined this procedure with a satisfactory technique for preservation, and provided his fellow students with a tool, by means of which the whole water mass, top to bottom, can be as precisely examined for its content of microscopic plankton as for its temperature or for its salinity. Use of this tool far and wide, from seaside laboratory and deep-sea expedition, has vastly enlarged our knowledge of the quantitative distribution of planktonic organisms, and Gran has himself introduced it to American waters.

By that date Brandt's theoretic application, to the sea, of Liebig's law of the minimum, had been widely accepted as a working hypothesis, while Nathanson's suggestion that updrafts of chemically rich water from the deeps bring fertility to the surface zone where plants can live was exciting attention. These threads Gran drew together, showing that the seasonal cycle of plankton production in North-European seas is explicable only on the assumptions that variability in the chemical fertility of the water is in fact a controlling factor; that different water masses and depths do differ in this respect, and that the fertility of the surface waters alters from season to season.

Evidence for his far-reaching concept had so far been indirect, no adequate methods having been available for measuring the richness of the water in the substances presumably concerned. But the introduction by Atkins and Harvey of improved chemical technique brought ample confirmation for studies of the relationship between plankton and chemistry of the water, at many hands (including Gran's own), in different seas, it was soon proved that the picture outlined earlier by Gran and his associates was essentially correct; or, as Gran puts it, that "most of the differences in the productivity of various areas in the sea can be explained from the distribution of the nitrates and phosphates." So close, in fact, was the parallelism found between the ups and downs of the planktonic plants and of the nutrient substance most easily measured, and so attractive to the human mind is simplicity to account for complexity, that many of us were tempted to think we had found the uni-

versal cure-all for our perplexities. Chiefly to Gran and to his students do we owe our present realization that, though the underlying principle prevails, such simplicity never exists in the sea, but that the basic balance is everywhere confused by disturbing factors, in much more complex interaction. Most recently and in our own home waters Gran has shown how one particular type of oceanic circulation, highly favorable to plant growth when moderately developed, may be highly detrimental when too active.

Time does not allow me to speak of Gran's career in more detail. I can only mention his investigations of the causes for the fertilizing effect which land drainage appears to exercise upon the sea, his experiments on the total production of organic matter in sea water and on the cultural requirements of marine plants, though these have far-reaching implications.

But I hope I have said enough to show that the growth of knowledge of the fertility of the sea bears always the impress of Gran's guidance, in amassing facts, in developing hypotheses and in testing theory against observation with such sureness of vision that he now stands, acknowledged, a leader among students of the ocean. In this, he has done no small thing. It is for this that the Academy delights to honor him with this beautiful medal.

HENRY B. BIGELOW
WOODS HOLE OCEANOGRAPHIC INSTITUTE

PRESENTATION OF THE HENRY DRAPER MEDAL FOR 1934 TO JOHN STANLEY PLASKETT

IN 1872, Dr. Henry Draper, of New York, employing a small reflecting telescope he had himself constructed, secured the first successful photograph of a star's spectrum. Then with the advent of the far more sensitive dry plates this new method of learning of the chemistry and physics of the stars was to have a very fruitful development. Unfortunately, Dr. Draper did not live to realize how important was to become this new research field he had opened. But Mrs. Draper continued to be keenly interested and gave substantial encouragement to the new astrophysical studies which to-day bring us so much intimate knowledge of the stars. And so we have among other memorials the Henry Draper Fund of the National Academy of Sciences, which seeks to aid and encourage this branch of research. And it is my duty and pleasure to say a few words touching upon the academy's action in awarding this year the Henry Draper Medal to Dr. John Stanley Plaskett, director of the Dominion Astrophysical Observatory, Victoria, Canada.

Dr. Plaskett's life-work has been very closely in the field in which Dr. Draper was so prominent a pioneer.

Dr. Plaskett's consistent and fruitful program of stellar velocity observations, which he has conducted with exceptional skill and energy, and the important conclusions he and his colleagues have deduced from this rich observational material have afforded substantial scientific grounds for this award to him. Moreover, our medalist must be credited with outstanding success in another direction; for it was due to his foresight, conviction and diplomacy that the Canadian National Government became persuaded the people of Canada should have a large reflecting telescope. Thus the great Dominion Astrophysical Observatory—with its excellent 72-inch reflector—stands as a memorial to his vision and his steadfastness of purpose. Thus Dr. Plaskett has won a high standing and this splendid observatory has already developed traditions and a position of high repute among the world's leading observatories.

V. M. SLIPHER
LOWELL OBSERVATORY

PRESENTATION OF THE DANIEL GIRAUD ELLIOT MEDAL FOR 1932 TO JAMES P. CHAPIN

JAMES PAUL CHAPIN is one of those fortunate human beings who was born with that affinity for birds which characterizes the true bird-lover. The very term itself suggests the character of the relation that exists between a person so blest and the forms of life which so strongly attract him.

One never hears of a mammal-lover or a snake-lover, a fish-lover or even a butterfly-lover. But love of birds is as definite a heritage as that of the musician or the artist. This legacy, a gift perhaps from the remote ancestors to whose untutored minds birds were signs and symbols of the mysterious manifestations of nature, has been the dominant influence of Chapin's life. As a child it sent him to the fields and woods. As a boy of sixteen years it prompted him to enter the department of taxidermy of the American Museum of Natural History. There he acquired the technique of what was to become his profession. But he soon discovered that while a bird-lover is born the ornithologist is made, and the following year (1906) he entered Columbia University to acquire the general training and the broad knowledge of biology on which his studies of birds might be based.

In his junior year he left college to accompany the American Museum's expedition to the upper Congo, where he secured the most valuable and best-prepared collection of birds that has been made there, together with an unequalled knowledge of their habits.

Returning to New York benefited by his five and a half years' residence in the heart of darkest Africa, Chapin at once resumed his studies at Columbia, received his A.B. in 1916, his A.M. in 1917. In the

latter year he enlisted in the American army and served in France as zone major for the duration of the war.

After receiving his discharge from service, Chapin returned to Columbia for his doctorate and, escaping the lure of Drosophila, was given his Ph.D. for a thesis on his African bird studies, the only degree in ornithology that the university has granted.

There followed additional years of study before the publication of the book (the first of three volumes) for which Chapin is now honored.

The work of a man exceptionally qualified by desire, natural gifts and experience gained in nature, the museum and the classroom, it records in detail observations on habits and distribution, the result of prolonged field-work; it discusses questions of taxonomy and of nomenclature from the standpoint of the skilled systematist who has access to many specimens and is familiar with the literature of his subject, and it treats with the authority of the trained biologist those problems which arise in attempting to explain the relation of an animal to its environment.

Here, Mr. President, is an outline of the facts and factors which have induced the members of your committee to recommend the award of the Elliot Medal to James Paul Chapin.

FRANK M. CHAPMAN

AMERICAN MUSEUM
OF NATURAL HISTORY

PRESENTATION OF THE PUBLIC WELFARE MEDAL TO AUGUST VOLLMER

IT is a commonplace to-day to remark on the disparity between our knowledge and control of the physical forces of nature, and our knowledge and control of social forces.

Three centuries of scientific effort have won basic understandings of physical behavior, and have replaced superstition and appeal to authority by rational viewpoints. But it is vastly more difficult to make progress in the understanding of social forces, and the solution of social problems. Here prejudice is more deeply intrenched; selfishness and provincialism more completely determinant of mental attitude.

However great these difficulties may be, we have faith that surely, even if very slowly, knowledge and mastery are to be gained through the method that we term scientific.

To-night we honor a man whose service has been given to a social problem of critical importance in that difficult field, and who is applying to that problem the spirit and the technique of science.

Crime is a disease of society and August Vollmer a clinician who has stimulated the application to the problems of criminology and police administration of all that can be gathered from the realms of exact knowledge. His achievements have been noteworthy and of wide influence. They constitute, using the language of the purpose of the award of the Marcellus Hartley Medal, "eminent service to the public, performed without a view to great monetary gain, and by methods which are truly scientific."

Vollmer's work began and continued for many years in the police department of Berkeley, where, with but limited resources, pioneering demonstrations of scientific techniques were made. After a few years at Chicago, he returned to Berkeley, where now, as professor of police administration, he is engaged in the effort to bring the university's resources to the improvement of the administration of criminal justice.

By these years of effort, Vollmer has shown the way to the elimination of graft and spoils in police administration, has elevated the standards of personnel, and inspired his co-workers with pride in and ambition for their profession. He has stimulated the search of all fields of science to bring them to bear on the problems of crime detection and prevention. It is not too much to say that he has been instrumental in the veritable remoulding of a profession.

Such results bear testimony to Vollmer's qualities. He brought to his work persistence, intelligence and human sympathy without sentimentality. His unselfishness and modesty have been important factors in the acceptance of his demonstrations, and of his wide-spread influence.

These achievements in the difficult and once unpromising field of police administration have far-reaching results. Respect for law and order grows with the efficiency and character of their formal guardians, and every successful performance of a difficult function stimulates the faith and confidence of a people in its government.

MAX MASON

ROCKEFELLER FOUNDATION

ABSTRACTS OF PAPERS PRESENTED AT THE WASHINGTON MEETING OF THE NATIONAL ACADEMY OF SCIENCES

Lability of the basal metabolism of the dairy cow: FRANCIS G. BENEDICT AND ERNEST G. RITZMAN. The basal metabolism of five Holstein (ca. 600 kg.) and four Jersey (ca. 300 kg.) cows, ranging in age from 3 to 15 years, was measured in 24-hour periods on the fourth and fifth days after the withdrawal of food. At this