

botany, I am convinced that the great development of plant ecology, of which we have many indications, will not merely lessen the momentum of the swinging pendulum, but will draw the latter back towards a renewed and critical study of the British flora. That a revival of interest in systematic botany will come through the labors of those who are engaged in survey work and other forms of ecological study, is foreshadowed by the fact that Dr. Moss has undertaken to edit a "New British Flora," which will, I believe, largely fulfill the objects put forward by Professor Trail in his presidential address. I trust, however, that in addition to the ecologists, those botanists who are interested in genetics will contribute their share towards the completion of our knowledge of critical species, varieties and hybrids, all of which offer such intricate problems alike to the systematist and to the student of genetics.

De Vries prefaced his lectures on "Species and Varieties, their Origin by Mutation," by the pregnant sentence: "The origin of species is an object of experimental investigation," and this is equally true of the study of the real and presumptive hybrids of our British flora, which may be investigated either synthetically or, when fertile, also analytically, as in some cases their offspring show striking Mendelian segregation. Some good work has already been accomplished in this direction, but more remains to be done, and we have here an important and useful sphere of work for the energies of many skilled plant-breeders.

I would, therefore, like to plead for intimate collaboration between all botanists, hopeful that, as progress in the past has come through the labors of men of wide sympathies, so in the future, when studies are bound to become more specialized, there will be no narrowing of interests,

but that the various problems which have to be solved will be attacked from all points of view, the morphological, the physiological, the ecological and the systematic. Thus by united efforts and close cooperation of botanists of all schools and of all countries we shall gain the power to surmount the difficulties with which our science is still confronted.

F. E. WEISS

WORK AT THE MARINE BIOLOGICAL STATION OF SAN DIEGO DURING THE SUMMER OF 1911

BECAUSE a majority of the station's staff are still holding college positions and hence can be at La Jolla only during vacation time, the summer months are the most active of the year. This disadvantage must continue until the income is sufficient to maintain operations at sea and a considerable part of the work in the laboratory throughout the year.

On the biological side the most important event of the year is the final issuance of Mr. E. L. Michael's "Classification and Vertical Distribution of the Chaetognatha of the San Diego Region" (Univ. Calif. Public. Zoology, Vol. 8, No. 3, 165 pp.). In this the author not only records all the species so far taken in these waters and subjects the description and taxonomy of the group to a critical examination, but deals quantitatively with the large amount of data collected during the five years from 1904 to 1909.

The aim of the ecological aspect of the investigation was to ascertain the facts concerning the distribution, seasonal and vertical, of the organisms, and to see how far these are correlatable with and hence dependent upon the environmental factors of light, and of temperature and density of the water. Efforts were limited to these three environmental factors simply because the scope of the station's work up to this time has not made it possible to extend the hydrographic observations beyond these.

While it is impossible to summarize here

the results reached, a few, particularly significant, may be indicated.

Comparison of the distribution of the ten species occurring in the area "shows conclusively that the manner of distribution is correlated with the organization of the species. In other words, the distinctive manner in which each species is distributed is as much a *specific character* as is its structure." For example, each species appears to have its own depth of maximum abundance, spoken of by Mr. Michael as its "center of migration." This is certainly true of the more abundant species, and seems to be true of those which do not occur in sufficient numbers to render the results so far obtained entirely conclusive. From 15 to 20 fathoms is found to be the center of migration of *Sagitta bipunctata*, the most abundant species, while between 100 and 200 fathoms is the center for *S. serratodentata*. These results strengthen the growing idea of species characters in the habits of organisms, and so are of considerable general importance.

The correlations of distribution with temperature and also with density, which are distinctly indicated if not fully proved, are, in several ways, rather unexpected and surprising, particularly as regards density correlations. If these results are borne out by further observations they will still further emphasize the complexity of *orderly interrelations* that prevail between organic beings and their surroundings.

Professor Kofoed has this summer published numbers IV. and V. of "Dinoflagellata of the San Diego Region" (Univ. of Calif. Publ. Zoology, Vol. 8, Nos. 4 to 6, 106 pp.). By far the more extensive of these is No. 4 dealing exclusively with *Gonyaulax*.

It is hardly to be supposed that all the species occurring in the area have now been recorded. Nevertheless, the author has felt his experience with the group to be extensive enough to justify him in giving the genus a thorough overhauling. This he has done largely on the basis of local material but also partly on that of collections from other parts of the world. Of the 25 species recognized as

belonging to the revised genus 14 are recorded from the San Diego region, four of which are new. One species formerly included in *Gonyaulax*, *G. jollifer*, has been made the basis of a new genus, *Spiraulax*.

The author is, warrantably it seems, particularly impressed with "the all-pervading character of specific differences in both morphological and physiological details" among these organisms.

Special attention is given to *G. polyedra*, the species chiefly responsible for the "red-water" and wonderful display of phosphorescence that occurs in this region at times.

It would appear that Professor Kofoed is well ready for the next steps—study of the distribution, reactions, propagation, etc., of these organisms.

Dr. C. O. Esterly, who up to this time has been able to do little more than describe and record the great number of species of copepods of the region, has now taken seriously in hand the problems of seasonal and vertical distribution in this group. The summer has enabled him to advance the task well beyond the points indicated by his two recent papers, "The Vertical Distribution of *Eucalanus elongatus* in the San Diego Region during 1909" (Univ. Calif. Public Zoology, Vol. 8, No. 1) and "Diurnal Migration of *Calanus finmarchicus* in the San Diego Region during 1909" (*Intern. Rev. d. ges. Hydrobiol. u. Hydrogr.*, Bd. 4).

Treatment of the data relative to the distribution of some of the species of *Salpa* is now under way by Mr. Michael and the Director and it is hoped that a report on this group may be ready some time during the winter.

In order to extend the migrational studies, on the one hand, to animals better endowed than the groups already treated, with the powers of vision and locomotion, and, on the other hand, to those less well provided with organs of light perception and locomotion, it is proposed to take up, as soon as possible, the schizopoda and the ctenophora.

Now that considerable headway has been made in investigating the distribution and

movements of pelagic animals as they occur in nature, the desirability of subjecting the same groups to laboratory experimentation is more obvious than ever. This aspect of the investigations can not be entered upon advantageously until the salt water supply system for the laboratory and landing facilities for boats shall have been completed. A large expenditure of money will be needed for these extensions, but vigorous efforts will be made to accomplish the work within the next twelve or eighteen months.

Although the hydrographic investigations by the station are held to be primarily in the interest of biological problems, at the present moment some of the results being reached are of themselves so important as to make them closely rival in interest the biological work itself. Dr. G. F. McEwen, who has charge of this side of the researches, has devoted himself almost entirely, during this and the preceding summer, to testing V. W. Ekman's theory of oceanic circulation so far as it applies to the phenomena of upwelling waters along the continental margins of the great oceans. The study has gone far enough to make it clear that radical modification will have to be made of the widely held supposition that the low summer temperature of the sea along the west coast of North America south of Point Conception, is due to a "California branch of the Japan Current." Just how far this modification will have to go can not be determined without extending the temperature observations much farther to sea, and as far south as the extremity of Lower California at least.

A particularly interesting point in connection with Ekman's theory is the relation which it assumes to exist between water temperature at the surface, as well as at different depths, and bottom topography. In a region like that in which we are operating, where there is a large area of continental shelf presenting numerous islands, banks, deep valleys and channels, that is, of varied bottom configuration, this element is specially important, not only in itself, but probably in its bearing on the distribution of pelagic organisms.

Mr. W. C. Burbridge, of Stanford University, who for the last two years has had in hand most of the laboratory work on water samples, has been more successful this summer than before in manipulating the rather complicated Fox apparatus for determining the gaseous content of the water. A large number of determinations were made, but the data have not yet been worked up, so it is impossible to say how valuable they are. The impression gained is that the method, even with its obvious and necessary limitations, will give results that can be safely and significantly used as one more factor in studying the environmental conditions of pelagic organisms.

During the summer the Station has entered into relations with the California State Game and Fish Commission for the economic study of the "spiny lobster" (*Palinurus interruptus*); and with the Bureau of Soils of the United States Department of Agriculture for estimating the quantity of "kelp" (*Macrocystis pirifera* and *Nereocystis Luetkeana*) on the coast south of Point Conception for such industrial purposes as these plants may be turned to.

Dr. B. M. Allen, of the University of Wisconsin, has charge of the former work, and his searching inquiry into the lobster fishery as it is now prosecuted not only on the California but also on the Mexican coast, has already brought to light various facts which, if followed up, should aid materially in formulating legislation for the preservation of this industry.

The work for the Bureau of Soils is in the hands of Mr. W. C. Crandall, now acting in the three-fold capacity of teacher of biology in the State Normal School at San Diego, secretary of the Marine Biological Association, and captain of the station's scientific boat, the *Alexander Agassiz*.

These industrial undertakings are, at present, aside from the main aims of the station. This, however, is in no wise due to lack of sympathy on the part of the chief patrons and the officials of the Biological Association with such undertakings, but entirely to the

circumstance that, under the present limitations of income, it seems wisest to make research the primary object. Consequently, whenever, as in these cases, it happens that equipment and experience can be made to serve industrial ends without considerable interference with research, the management is more than glad to thus extend the station's usefulness.

Worthy of record is the solution that has been reached, so far as the work itself is concerned, of the problem of manning the *Agassiz* satisfactorily to the purposes for which she exists. Considerable difficulty has been experienced heretofore in finding a man who should be at the same time seaman and scientist enough to get the best results from the operations at sea. Mr. Crandall, when not occupied in the school room, had spent much of his time on the boat looking after the scientific work. He finally decided that with a little more preparation he could manage the whole business, boat and all, more satisfactorily than it was being done. Consequently, he successfully took the examination for a license as master of a boat of the class to which the *Agassiz* belongs. The result is that the boat, under his command, is being operated more efficiently, smoothly and economically in proportion to the work done than ever before. The one serious difficulty is, of course, that school duties make it impossible for him to go with the boat at times when it is very important for her to be at sea.

Although in a number of respects conditions at present are such as to make it impossible to specially encourage outside investigators to come to the station for the prosecution of their special studies, still several who were willing to take their chances of finding enough to make the coming worth their while have been at La Jolla during the summer.

Dr. David Marine, of the medical research laboratories of the Western Reserve University, devoted six weeks to studying the endo-style of the lower chordates. His aim is to apply chemical and physiological tests to this structure for the purpose of finding whether

any of the reactions characteristic of the thyroid of man and the higher chordates, can be detected. It was not possible in so short a time to carry the work to definite results, positive or negative. It is certainly to be hoped that Dr. Marine may be able before long to push the study to a conclusion.

Professor H. B. Ward, of the University of Illinois, with three graduate students, spent about six weeks at the station on the very laudable mission of gaining a knowledge of the marine fauna and general biological conditions of the region. Incidentally Dr. Ward gave two popular lectures to appreciative audiences of La Jolla citizens, one on "Zoology in Relation to Human Welfare," and the other on "Public Health."

WM. E. RITTER

LA JOLLA, CAL.,
October 3, 1911

THE INTERNATIONAL EUGENICS CONGRESS

THE Eugenics Education Society has arranged for an International Eugenics Congress to be held in London from July 24 to 30, 1912, under the presidency of Major Leonard Darwin. It is proposed to group the papers into the following four sections:

1. *The Bearing upon Eugenics of Biological Research.* Facts of Heredity; Physiological Aspects of Heredity; Variations, their Nature and Causation; Race Mixture.
2. *The Bearing upon Eugenics of Sociological and Historical Research.* Historical Evidence with regard to changes in Racial Characters; Birth-rate and Death-rate Statistics; Effects of Medical and Surgical Treatment in Encouraging Unfitness.
3. *The Bearing upon Eugenics of Legislation and Social Customs.* Marriage Laws and Customs; Taxation; Economic Conditions; Insurance; Trades Unionism.
4. *Consideration of the Practical Applications of Eugenic Principles.* Prevention of the Propagation of the Unfit by Segregation and Sterilization; Voluntary Restriction of Propagation of the Unsound; The Encouragement of the Propagation of the Fit; Promulgation of the Eugenic Ideal; The Place of Eugenics in Educational Systems.