sity of Kansas on May 13. His subject was "How Living Cells Manage Their Social Problems."

DR. J. S. L. BROWNE, of the Royal Victoria Hospital, Montreal, on April 26 lectured to the students and staff of the hospital of Duke University on "Studies of Sex Endocrine Physiology of the Female," and on May 3 Dr. David M. Davis, professor of urology at Jefferson Medical College, Philadelphia, lectured on "Chronic Prostatitis."

A CHAPTER of Sigma Xi was installed at the Oregon State College in May, with Dr. W. F. Durand, of Stanford University, national president of the society, acting as installing officer. Seventy-six faculty men and women became charter members. An all-school convocation, called to honor the Sigma Xi chapter, was addressed by Dr. Durand. His subject was "Power and Civilization." The installation ceremony was followed by a banquet, at which Dr. Linus Pauling, an alumnus of the college, and now head of the chemistry division of the California Institute of Technology, was the principal speaker. He spoke on "Hemoglobin and Magnetism." Dr. W. E. Milne, professor of mathematics, was toastmaster for the banquet, and Dr. F. M. Hunter, chancellor of the Oregon System of Higher Education, was a guest. Officers elected by the chapter are: F. O. McMillan, *president;* Dr. Don C. Mote, *vice-president;* W. E. Lawrence, *secretary,* and Dr. D. E. Bullis, *treasurer.*

THE program for the Symposium on Colloid Chemistry to be given at the University of Minnesota, Minneapolis, Minn., on June 10 and 11, and at Rochester, Minn., on June 12 has been completed and is being printed for distribution. Twenty-two papers will be presented at the University of Minnesota on June 10 and 11, and eight papers will be given at Plummer Hall of the Mayo Foundation at Rochester, Minn., on June 12. Professor Herbert Freundlich, of University College, London, will open the sessions at Minneapolis as well as those at Rochester. Dorothy Jordon Lloyd, of the British Leather Manufacturers' Research Association, will give the second paper at the first meeting of the symposium. The program of the first day will be largely devoted to problems related to bio-colloids, while the papers of the second day will concern themselves with subjects of general interest to colloid chemists. The meeting at Rochester will be of principal interest to those concerned with the colloid problems of physiology and medicine. While at the Mayo Clinic an opportunity will be offered to visit the laboratories and to learn something of the researches in progress.

DISCUSSION

THE VOLUME OF ENTOMOLOGICAL LITERATURE

WITHOUT meaning to suggest that research in entomology should be in the least abated, it seems timely to direct attention to the volume of literature already published concerning insects. What will be said here about entomological matter doubtlessly applies equally to other aspects of biological science. The *Zoological Record* and the *Review of Applied Entomology* were the sources of the data concerning the number of articles discussed below. Through the kindness of Dr. S. A. Neave and W. L. Sclater, who direct the preparation of these two aids, it was learned that their contents are not duplicated to exceed 10 per cent. On this basis, the number of separate entomological items published between 1913 and 1934, for which period both *Record* and *Review* are available, was not less than 100,935, or an average of 4,588 per year. Adding to this figure the titles cited in the *Record* alone for the years 1864 to 1912, the period preceding the advent of the *Review,* we have a total of about 175,000 articles and books, with an average yearly output for the 70 years from 1864 to 1934 of about 2,500 separately published items.

To this total should be added several hundred articles listed in the several volumes of the International Catalogue of Scientific Literature for 1904 and 1905 that seem not to have been included in the *Zoological Records* for those years. The final total of papers and books already put out by our force of workers is therefore truly overwhelming.

It is true that a considerable body of the published matter, and in particular that of the earlier years, has been absorbed in later publications dealing with the same subjects. Progressive digests have been provided in an inadequate number of revisional taxonomic papers, in bulletins concerning important harmful species, in books on economic entomology and in general texts. Most entomological books are designed largely for classwork. While these books contain useful digests, they do not presume to exhaust the accumulated knowledge concerning the species or features treated. On the other hand, there is a phase of insect literature which has not received even the abridged treatment accorded the outstanding economic species, and has suffered almost complete neglect from book writers. Reference is made here to the field of insect bionomics, with particular reference to the habits and developments of groups not primarily economic. Many thousands of published articles pertaining more or less to the bionomics of scavengers, weed-eaters, predators

and parasites of other insects and a host of forms now rated as secondary or potential pests have not been summarized in bulletin or book form for the use of student and professional entomologists. The publication of mountains of literature avails little for the increase of knowledge so long as the facts remain buried and scattered in the numerous serial publications and the diverse languages of the whole scientific world. It is obviously impossible for student or professor to assemble the data from so large a number of papers, and as a consequence many salient facts are never discovered and are never acquired for our use.

The abstract journals perform a very valuable service in providing the essence of individual articles, many of which would otherwise remain out of reach of most entomologists, owing to their distant origin and foreign language difficulties. But such abstracts are largely concerned with economic species or aspects, and moreover leave the subject-matter unassembled and uncorrelated and therefore still oblige the student or worker to expend much time in bringing it together. The usual result of this necessity is that the data remain unacquired by them. The writer believes, in the face of the mountainous mass of published matter, that entomology should encourage the preparation of occasional summary studies of its literature. These would be concerned either with species or aspects for which a considerable number of bionomic papers have already appeared but whose essence has not been assembled, organized, condensed and republished in the form of source books or comprehensive bulletins for the use of the entire profession. Needed are the services of a number of workers who have the facilities of a good library at their disposal, who enjoy some freedom from other duties, and are willing to forego research for a period of years to accomplish this task for the common welfare. The result would probably be more effective for the advancement of the science of entomology than an equivalent amount of time and energy devoted to the production of original papers. Dr. Schedl's comprehensive summary paper on the gipsy moth, a review of which appears in the *Journal of Economic Entomology* for April, 1937, exemplifies the type of species study to which reference is here made. The broader type of summary paper may, for example, deal with the bionomics of a group such as the scavengerous insects, the several phytophagous groups of the different orders, or the mammalicolous and avicolous parasites. It is true that the taxonomic muddles existing in many families and other categories of insects hinder studies of this type. Moreover, it is fully realized that many gaps exist in our knowledge of the habits of 90 per cent. or more of the insects, but these conditions do not warrant us in withholding the many already available salient facts from the reach of our students and professional men for the several more centuries necessary to develop knowledge to a state of completeness. Moreover, no one will deny that summaries of knowledge, be it ever so fragmentary, are not only instructive to students but serve to point out open areas in which research needs to be done and also afford an impetus to such investigations. What entomology wishes eventually to accomplish is the conversion of detailed facts into general principles or natural laws. These laws will not become established abruptly in a far-off day but take shape gradually as facts supplant the many black spaces of ignorance that still exist in entomological knowledge. Occasional summaries of the sort advocated herein will do more than any other single device toward the revelation of these natural laws in the insect class.

Persons who have attempted to prepare summaries of entomological literature of the types described above encounter bibliographical difficulties which more or less seriously interfere with their desire to make their work thoroughly complete. When hundreds or thousands of titles concerning the subject in hand have been assembled and their essence extracted and finally prepared in organized form for publication, no small number of omissions will be discovered sooner or later. In making selections of articles for his bibliography, the summarizer can judge what pertains to his subject only by the titles of articles listed in bibliographical aids. But numerous essential data are published in papers whose titles do not, and can not, give any hint concerning the inclusion of pertinent facts. As a result these data are overlooked and remain unincorporated in books, and in some instances will long, if not forever, remain buried in the mass of promiscuous publications. This situation does not exist so far as the literature of economic entomology for the years from 1913 to date is concerned, since it is quite adequately placed within reach of all by the complete classified indices of the *Review of Applied Entomology*. Even this excellent work would be made more useful by the addition to its index of such inclusive divisions as phytophagous, parasitic, predacious, scavengerous and references to other food habits of insects. Owing to the tremendous number of species comprehended by entomology, no one can remember to what food groups all the species belong; hence the summarizer is obliged to rely to some degree on the bibliography or abstract journal for such facts.

But the difficulties attending efforts to summarize all essential facts are particularly great in the literature for the years preceding 1913, previous to the advent of the *Review*. Yet they are no less so for all time in the groups which have only minor economic importance but still hold much interest for the bionomist. This situation seems to call for an extension of the

Review plan of indexing and abstracting to include (1) the species that now have only bionomic value and (2) the entire literature published before 1913, the year in which the *Review* began its appearance.

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SELECTION OF FOOD BY THE CILIATE CHILODON

THE work of Schaeffer[1] indicates that amoeboid protozoa are capable of selecting their food. The same investigator[2] also found that such was the case with the flagellate, *Jenningsia diatomophaga*. However, as stated by Bragg[3] (p. 433), "the ability of a ciliated protozoon to select its food is still open to question." From his own observations, Bragg concludes (p. 441) "that *Paramecium trichium* has a limited ability to select its food, (but) that the individuals vary in the amount of selective action which they show. . . ." Calkins,[4] on the other hand, doubts that the continuously feeding *Paramecium* is capable of exercising any selection.

A pertinent observation in this regard was made by the writer upon the feeding habits of an unidentified species of *Chilodon* (continuous feeder). In water which had been fertilized with 0.45 gram of fish meal per liter, and which contained, in numbers per cubic centimeter, 5,152,000 cells of *Scenedesmus,* 124,000 cells of *Chlamydomonas* and 1,900 *Chilodon,* it was found that the ciliates had gorged themselves upon *Chlamydomonas.* Very few individuals, however, were found to have ingested *Scenedesmus,* and then only sparingly, although these algae were present in much greater numbers. Thus, it would appear that, under these conditions at least, *Chilodon* is definitely capable of selecting its food. The degree of selection was greater than that observed by Bragg for *Paramecium,* although, as indicated by that author, individuals varied in the selective action exhibited.

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THE CHEMICAL ATOMIC WEIGHT OF CARBON

IN the 1937 report[1] of the International Committee on Atomic Weights, the chemical atomic weight of carbon was raised from 12.00 to 12.01. This change was made on the basis of the precision combustions of hydrocarbons by Baxter and Hale,[2] whose result confirmed the higher value indicated by gas density and mass spectrographic evidence. In view of the present interest in the atomic weight of carbon it has seemed advisable to make a preliminary report on a determination of atomic weight of this element by the analysis of benzoyl chloride according to the classical method of titration with silver. So far as we can determine, this is the first time acyl halides have been used for this purpose.

Benzoyl chloride was prepared from purified benzoic acid and phosphorus trichloride. The first of these substances was obtained by the oxidation of toluene with alkaline permanganate and was purified by crystallization from water, and finally by sublimation. Phosphorus trichloride was twice distilled in vacuum in an all glass apparatus and the middle fraction was taken for the preparation. The benzoyl chloride was purified by repeated fractionation in evacuated apparatus constructed entirely of pyrex glass. Samples for analysis, weighing approximately 14 g, were collected in small glass bulbs.

For analysis the carefully weighed sample bulb was broken under a 50 per cent. aqueous solution of pyridine under which conditions rapid hydrolysis of the benzoyl chloride occurred. After the collection of the glass fragments in the usual way, the solution was acidified with nitric acid, and the chloride balanced with pure silver. The endpoint was determined nephelometrically.

The analyses of five samples, covering eight distillations, have yielded a value for the atomic weight of carbon very close to 12.010. Since these samples represent the extreme fractions, it seems unlikely that the final value will deviate greatly from this figure.

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THE PUBLICATION OF TROLAND'S PSYCHOPHYSIOLOGY

THE fourth volume of the series of the late Professor Leonard Troland (Harvard University) covering psychophysiology remains unpublished because the publishers of the earlier volumes feel that they should have a guarantee of about $2,500, to be repaid from sales. One of Professor Troland's colleagues has expressed willingness to put the manuscript into shape for publication, and said: "Troland considered this final volume the final and best statement of his views. None of Troland's other books have been subsidized, and most of them have made money, but I can appreciate the (publisher's) attitude towards the fourth volume in a period like the last three or four years—a

1 Asa A. Schaeffer, *Trans. Tenn. Acad. Sci.,* 1912–13, p. 59; *idem., Jour. Exp. Zool.,* 20: 529, 1916; *idem., Jour. Animal Behavior,* 7: 220, 1917.
2 *Idem., Trans. Amer. Micros. Soc.,* 37: 177, 1915.
3 Arthur N. Bragg, *Physiol. Zool.,* 9: 433, 1936.
4 G. N. Calkins, "The Biology of the Protozoa," p. 607. Philadelphia, 1933.

1 *Jour. Am. Chem. Soc.,* 59: 219, 1937.

2 *Jour. Am. Chem. Soc.,* 58: 510, 1936; 59: 506, 1937.