

peck instinctively and did not offer to take food spread before them. The natives seemed well aware of this peculiarity, and in the particular instance recorded a native induced the young birds to peck by tapping on the ground with a pencil near the food. They seemed attracted by the sound and movement, and were thus induced to peck at the food. F. A. LUCAS.

#### SCIENTIFIC LITERATURE.

##### BRONGNIART'S PALEOZOIC INSECTS.

*Recherches pour servir à l'histoire des Insectes fossiles des temps primaires, précédées d'une étude sur la nervation des ailes des Insectes.* Saint Etienne, 1893. 2 v. 4°. Text, 493 pp.; Atlas, 44 pp., 37 folding plates.

These volumes, which are primarily devoted to the carboniferous insects of Commentry, France, form the most important work that has ever been published on paleozoic insects. Our knowledge of the older hexapods has heretofore been obtained piecemeal, and generally by exceedingly fragmentary researches; while here we are introduced at once to a wealth of material equalling, if it does not surpass, all previous knowledge of paleozoic insects. Mr. Brongniart had indeed published a few of his interesting finds in previous minor papers and had given also a summary account of the Commentry fauna in a brochure in 1885; but as the latter contained almost no details, and was merely a sketch of his classification (here modified in a few particulars), it had slight value except as a forecast of what is now realized.

Cockroaches form in all Carboniferous deposits the major part of the insect remains, and many hundreds of specimens have been obtained at Commentry. Leaving these out of account because reserved by the author for future publication (a few figures only without descriptions being given), the fauna of Commentry consists, according to Brongniart, of Neuroptera, Orthoptera and Homoptera; these he divides into 12 families or larger groups, ten of which are regarded as extinct, and they include 48 genera and 97 species, a number of species just about double that of the previously known European Carboniferous hexapods, exclusive of course of cockroaches.

The variety, novelty and striking character of the forms revealed is as interesting as their number. No one of them, indeed, can be regarded as extraordinary as *Eugereon*; but we are introduced to long-winged giants regarded by Brongniart as the precursors of the Odonata, but which in spread of wings make our largest dragon-flies appear as pigmies; one, *Meganeura*, has a spread of considerably more than two feet, and one specimen of this, which I have had the good fortune to see, is so well preserved that four nearly perfect and fully expanded wings are in place attached to the thorax; others have saltatorial hind legs as fully developed as in our existing Locustarians, but with very different wing neurulation. *Thyspanura* (before known fossil only from the Tertiary) are indicated—unfortunately not figured—which have but a single caudal seta; more than fifty specimens of this have been unearthed. Insects are found with a broad lobate expansion on either side of the prothorax, recalling some living Mantidæ (*Chœradodis*, etc.), but which, being filled with apparent nervures, Brongniart regards with too great confidence as prothoracic wings. Others, and these include a variety of types, have lobate appendages at the sides of all the abdominal segments, like the branchial gills of the larvae of some existing Neuroptera, persistent through life in Pteronarcys. There are also gigantic Mayflies, and Neuroptera of large size with caudal setæ more than six inches long. And, finally, we may mention undoubted cockroaches which show a straight, slender, Locustarian-like ovipositor half as long as the abdomen, an additional and striking difference to distinguish them from modern cockroaches.

Brongniart begins his work with a somewhat detailed historical review of discoveries in the field of paleozoic insects, with an appended bibliography, and follows it by an extended study of the neurulation of existing Neuroptera, Orthoptera and Fulgoridæ (180 pp.), as a basis for his attempt to classify the Carboniferous forms; 12 of the plates are also given to the illustration of the wings of modern insects. In this study he follows with some modifications the guidance of Redtenbacher, apparently unaware of some later studies on the subject,

and the descriptions are almost entirely independent of each other without definite comparisons.

The third part of the work (184 pp.) is given to his subject proper; it is somewhat unequal in character, being much more detailed and careful in the earlier portion than in the later. Here, too, one looks in vain for comparisons or for any definite reasons for the inclusion of some of the insects in the groups in which they are placed, by references to the earlier portion of his work. The classification is entirely novel and bears little relation to that employed by the present writer, which is an extension of that of Dohrn and Goldenberg. This is not the place for a discussion of the relative merits of the two, which may be left to the impartial student of the future; but in giving up the term Palæodictyoptera for the bulk of paleozoic insects, as indicating the far greater affiliation of insects in paleozoic time than subsequently, Brongniart overlooks the fact that while his discoveries show a wider diversity of forms among paleozoic insects and more definite points of relationship between them and later types than we have ever had before, they but emphasize and further illustrate the reasons for which the name was proposed. General statements previously made regarding paleozoic insects as a whole are in no way weakened by this great extension of the field, and this renders the importance of these generalizations even greater and their validity surer than before.

The work is most luxuriously issued and the plates all that could be desired, excepting that many of those illustrated by heliogravure (in the most artistic manner, indeed) need to be supplemented by drawings showing the precise origin of each of the veins; these are often obscure in the best photographic picture, since they very often cannot all be seen in any single view, or their contrast to the stone is insufficient for clear results. Why the title page should bear the date 1893 is difficult to understand, for the second signature (p. 12) contains a long extract first published in America in February, 1894, and the earliest copies of the work only reached this country in June, 1895. Except in the separate 'Explanation of the Plates' in the atlas, no reference to the figures

occurs in the text, which is a great inconvenience.

SAMUEL H. SCUDDER.

*Revision of the Shrews of the American Genera Blarina and Notiosorex.* By C. HART MERRIAM, N. Am. Fauna, No. 10, December 31, 1895, pp. 5-34, pll. 1-3.

*The Long-tailed Shrews of the Eastern United States.* By GERRIT S. MILLER, JR. Ibid., pp. 35-56.

*Synopsis of the American Shrews of the Genus Sorex.* By C. HART MERRIAM. Ibid., pp. 57-98, pll. 4-12.

The shrews are among the most difficult of mammals to discriminate specifically, owing to their general similarity in color, size and general external appearance. Hence resort must be had to the teeth, which, though minute, often afford trenchant characters. No group of American mammals has hitherto been in a more thoroughly unsatisfactory state, as regards either the number and distribution of the species or the names they should properly bear. Hence the three papers on the American Shrews that constitute No. 10 of 'North American Fauna' are a particularly welcome contribution to the literature of North American mammalogy. Two of these papers are by Dr. C. Hart Merriam and the other is by Gerrit S. Miller, Jr., and jointly they comprise a careful revision of the whole group. The work is based primarily on the collections brought together by Dr. Merriam under the auspices of the United States Department of Agriculture, the only outside material used being mainly the type specimens of previous authors, which in most cases have been accessible to the authors of the papers under notice.

Formerly shrews were rare in collections; generally they were so difficult to obtain that only chance specimens were secured. That such is no longer the case is evident from the large number of specimens now accessible for study in most large collections of mammals, very successful methods of trapping these obscure and mainly nocturnal animals having been discovered within comparatively recent years. Thus the Department of Agriculture collection alone numbers upwards of 2,000 specimens, brought together largely within the last six or eight years.

The North American species of shrews fall rather naturally into two principal groups, which in popular language are known as the short-tailed shrews and the long-tailed-shrews. The former, comprising the genera *Blarina* and *Notiosorex*, are strictly North American; the latter, referable to *Sorex* proper (with, however, several subgenera), belong to a genus widely dispersed over the northern hemisphere. Of the short-tailed shrews, the genus *Notiosorex* comprises, as now known, only a single species, with a range from near the southern border of the United States southward over a large part of Mexico; *Blarina* has a much wider distribution, ranging, in eastern North America, from about the southern border of Canada southward through Mexico to the mountains of Guatemala and Costa Rica, but in the United States is mainly restricted to the region east to the Great Plains. It is divisible into two subgenera—*Blarina* proper, and *Cryptotis*, chiefly in reference to the number of the teeth, which are 32 in the former and 30 in the latter. In general the species of *Blarina* are much the larger, and are more northern in distribution, this group being 'absolutely restricted to the United States,' all of the Mexican and Central American species belonging to the subgenus *Cryptotis*, which in turn is almost unrepresented north of the Carolinian Fauna.

It is a singular fact in the history of the genus *Blarina* that a representative of both of its sections was made known by Say in 1823, from the same locality, namely, from Engineer Cantonment, near the present site of Omaha, Nebraska, and that they were the first forms of the group made known to science. Say named them respectively *Sorex brevicaudus* and *Sorex parvus*. The latter name especially has ever since been a stumbling block in the way of systematists, but, thanks to Dr. Merriam, is no longer, his large series from the type locality enabling him to define it and establish its relations to the various names given later to shrews from other parts of the country. It thus proves to antedate *cinereus* of Bachman, while several species provisionally separated from it by Baird are now referred to it as synonyms.

*Blarina*, according to Dr. Merriam, is represented by 20 species and subspecies, of which

6 are from the United States and 14 from Mexico and Central America; all of the latter and two of the United States forms are referred to to the subgenus *Cryptotis*, leaving only 4 for the subgenus *Blarina*. Most of the Central American and some of the Mexican species are more or less isolated mountain forms, modified from a few formerly more widely dispersed types. Of the 12 new forms here described, 9 are from Mexico, 2 from Florida and 1 from Dismal Swamp, Virginia.

Mr. Miller's paper relates to the long-tailed shrews of the eastern United States, and admirably clears the way for Dr. Merriam's immediately following general synopsis of American species of the genus *Sorex*. At the outset Mr. Miller attacks sundry vexed questions of synonymy resulting from the description of three species of this group by Dr. Richardson, nearly seventy years ago. Fortunately Richardson's types are still extant in the British Museum, and Mr. Miller has recently had, through the kindness of Mr. Oldfield Thomas, the Curator of the Department of Mammals in the British Museum, opportunity to carefully study these invaluable types. As a result Richardson's names may now be considered as properly allocated, and we can with some confidence assign names to our shrews; for until Richardson's names were settled many later names could only be applied tentatively. Mr. Miller treats at length of 7 species, 1 of which is described as new.

Dr. Merriam, in his 'Synopsis of the American Shrews of the genus *Sorex*,' recognizes 42 species and subspecies, of which 21, or just one-half, are described as new in the present paper. Of this number 34 are referred to *Sorex* proper, 1 to the subgenus *Microsorex*, 4 to the subgenus *Neosorex*, and 3 to the subgenus *Atophyrax*. The shrews of the subgenus *Sorex* range from the Arctic Circle southward over the continent-at-large, or such parts of it as are congenial to their peculiar needs, to the mountains of Guatemala; *Atophyrax* is restricted to the northwest coast region, ranging from western British Columbia to California; *Microsorex* and *Neosorex* occupy a middle transcontinental belt near the northern boundary of the United States, *Neosorex*, however, extending farther southward

along the principal mountain ranges. The long-tailed shrews in general prefer forested or semi-wooded regions, and a rather northern or alpine habitat; they are hence not generally dispersed south of the northern parts of the United States; farther southward and in the drier portions of the continent they are limited to mountainous districts.

This admirable series of papers is illustrated by twelve plates and some additional cuts in the text giving carefully-drawn figures of the skulls and dental characters of most of the species. Fauna No. 10 thus marks an epoch in the history of this hitherto little-known and difficult group of American mammals.

J. A. A.

*Indianische Sagen von der nordpazifischen Küste Amerikas.* FRANZ BOAS. Berlin, A. Asher & Co. 1895. 8vo., pp. 363.

This is, undoubtedly, the most comprehensive collection of northwestern Indian myths now in existence and, considering the length of time, the hardships and privations experienced in obtaining them, and the large number of tribes that had to be visited, is a work unique of its kind. Boas had published these myths previously in the 'Transactions of the Berlin Society of Anthropology,' and this explains the fact that they are worded in German and not in English. Most of the stories that were obtained from full-blood Indians in their vernacular had to be translated into Chinook Jargon before they were rendered in German.

Dr. Boas begins with the myths, legends and traditions of the numerous Selish tribes of British Columbia, then presents what he obtained on Vancouver Island and the mainland opposite, and terminates the volume with the tales from the Haida on Queen Charlotte Islands and the Tlingit of southeastern Alaska. The stories have the most varied contents: Origin of the deities and powers ruling the universe and the earth, creation of sun, moon and stars, origin of the elements and seasons, of the tribes of men, animals and plants, of the rocks and islands. Men and women often originate from animals, especially from fish, and the number and variety of the 'fishy' progenitors is so great that no other but a fisher race

could have produced a similar folklore. The making of the sun is mostly represented as a liberation of it from a box or inclosure which held it in captivity, and the liberator is the raven, who in his bold flight cuts through the dense cloudiness enveloping the ocean and the seashore or permits it to ascend again to the sky, after night had imprisoned it for a long while. The raven also provides the organisms, when lifeless still, with souls, and is regarded as the animating principle in nature. In the myths of the Eastern tribes the raven is of great significance, being the presager of calamities and death.

The most painstaking portion of Boas' work lies in the appendix from pages 329 to 363, where in a statistical essay the attempt is made to trace one and the same myth through various parts of North America. There are, *e. g.*, nineteen myths in the Northwest found similar to Micmac, eleven to Ponka, twenty-five to Athapaskan—even among the Aino of north Japan elements were discovered comparable to those of the northwest coast. To follow up all these details in Boas' volume, is of the highest interest; the number of linguistic families to which the legends belong are five in number (see Table, p. 329), Selish, Wakash (or Nutka), Tsimshian, Haida and Tlingit—the first and the second of these showing a large number of dialectic sub-divisions.

As a fair instance of the mythic imagery which forms the make-up of the northwestern religions, we may present the world's creation as related by the Tsimshian Indians on Skeena river and the coast of the mainland. They assume that the earth is level and disk-shaped, resting upon a pillar which is held upright by an old woman. Any movement of the old woman causes an earthquake, but the hillocks and sinuosities on the earth's surface were produced by a flood, which scattered all the human beings over the most distant parts of the earth to people them. Whoever wants to visit the sky has to pass through the moon's house, and its headman is called 'Disease.' The west side of the moon's house is guarded by a number of mischievous dwarfs, who are hermaphrodites and likely to attack and kill visitors. When Gamdigyëtlñë-eq started to reach the sky, his

friends tried to dissuade him from making the attempt. He told them, "When I get up there you will see that the sun is stopping in its course." He shot an arrow into the blue sky, saw it fly and it stuck fast in the firmament. Another arrow he sent into the notch of the first, another one into the notch of the second and thus was formed a long chain of arrows solid enough for him to climb up. His bow served him to fill a gap in the aerial road. Reaching the moon's house, he was not molested by the dwarfs, but well received by the chief of the moon's dwelling, who washed and cleaned him thoroughly and gave him moral advice what to do after his return to the earth. A board was then removed and Gamdigyētlñē-eq could see the whole earth extended below him as a cyclorama, he then descended again on the arrow-ladder, which fell to pieces after the descent was accomplished and the upholding bow removed from the base.

Boas' book forms an interesting parallel to his 'Chinook Texts' previously reviewed in SCIENCE, but differs from it by the absence of aboriginal Indian texts.

*Names and their Histories*, alphabetically arranged as a handbook of historical geography and topographical nomenclature. By ISAAC TAYLOR, M. A., Canon of York. London, Rovington, Percival & Co., 34 King St. 1896. pp. 392. 12mo.

To collect the geographic terms which serve to compose a country's local names, and then follow these terms through their compounds as we find them used in the toponymy of a given country, is a method not often followed as yet. Isaac Taylor, M. A., in his '*Names and their Histories*,' has given full swing to this synthetic method in the appendices, and, we must say, with laudable industry and good success. He presents his interesting information not in the form of dry sentences and axiomatic paragraphs, but in the didactic shape of lectures, which do not show any purpose of cramming the listener's brain with erudition and quotations derived from documents one thousand years old. Taylor's easy, unobtrusive prose conveys to the public only what is necessary to know, by giving the earlier historic forms of the local names and from them deducting their

signification. The treatise on nomenclature is subdivided in seven chapters, pages 303 to 390, and contains the following items: Indian nomenclature (of East India), Turkish nomenclature, Magyar names, Slavonic nomenclature, French village names, German nomenclature, English village names.

When the student of geography has passed through these propædæutics and become acquainted with the elements of topography in every group of dialects, he finds it many times easier than before to retain so many foreign appellations, often unwieldy and jaw-breaking, because their meaning is now familiar to him. Of the Turkish names the majority are of a vocalic utterance and well sounding, a great help to memory. Thus Buyuk-dere is the 'great valley;' Tash-bunar, the 'stone-well;' Bunar-bashi, the 'head of the well' (or 'spring'); Kara Dag, the 'black mountain;' Mustagh, the 'ice mountain;' Daghestan, the 'mountainous land;' Kara-kum, 'black sand;' Yildiz, the 'northern' (palace); Yeni-bazar, the 'new market.' The names of the seven territories have been studied for many years back by linguists, and Taylor having made use of the writings of his predecessors, can be relied on.

The first part of the volume gives in 302 pages a large number of geographic names from all parts of the globe in alphabetic sequence, each with its historic and linguistic illustrations. Here also Taylor strives to be on a level with the popular understanding and avoids long arguments, wherever these would lead him into dry erudition and scholarly distinctions. Many names are referred to historically, but their derivation is not given because it could not be given with safety; of others the derivation is given as 'probable' only, as of Nazareth, which is supposed to mean a 'watch-tower,' and of Cuba, said to mean 'middle province.' Of a large number the signification is certain, as Damascus 'the place of industry,' Dundas, 'southern fort,' from Gaelic dun-deas; Zimbabwe the 'great kraal,' Sligo called after 'shells found there in heaps,' Lampedusa, 'oyster bank,' Liverpool, a pool where a waterfowl, called 'liver, lever' was found. Seville is Phœnician and means 'plain, lowland,' Marsala the 'port or harbor of Ali.' Among those

names which Taylor has explained erroneously we notice Arkansas, Arawak and Tallahassee.

A. S. G.

*The Sun.* By C. A. YOUNG. New and revised edition. New York, D. Appleton & Co.

The revised and slightly enlarged edition of Prof. Young's '*Sun*' will be read by all with great interest. The first edition of this justly popular work appeared in 1881. Since that time many advances have been made in our knowledge of the sun; new methods of observation have been developed. Prof. Young tried to keep pace with this progress by the addition of notes and appendices in the various editions that have appeared during the interval. He now finds, however, that such expedients are inadequate, and he has, therefore, revised the work and made it representative of the science of to-day.

In general form and appearance the book remains the same as in the first edition. There are, however, a number of new cuts, and the various subjects, treated of in a single chapter, are more clearly separated. Many 'headlings' are introduced into the text, thus greatly aiding a clear understanding of the subject-matter.

Among the most prominent features of the new edition we note the introduction of the latest work on the solar parallax. Gill's methods and results are most carefully treated. Again the great advance in solar spectroscopy is represented by the work of Rowland; the photography of the prominence by that of Hale; the identification of helium by Ramsey. The progress made in the spectroscopic study of the sun is most readily brought out by a comparison of our present knowledge with that of 1881. In the first editions of his work, Prof. Young mentions twenty-one elements as known to exist in the sun. In all of these 860 lines had been identified. Prof. Rowland has now tried sixty elements; thirty-six of which he finds in the sun; sixteen he does not find there and the remaining eight are doubtful. Of one element alone, iron, he has identified more than 2000 lines; more than twice as many as were known in all the elements fifteen years ago.

A careful comparison of the last chapters, the summaries, of the two editions leaves us with

a feeling of disappointment, of expectation unfulfilled. Our advance in the knowledge of solar physics has not been so rapid as we fondly imagined. During the last decade and a-half no new great principle, no law, has been discovered. We have improved our methods of observation; we have collected more data; but we know little more of the actual condition of the sun itself than we did in 1881. The first edition of Professor Young's book ends with a statement of the four most important and fundamental problems of solar physics which were at that time pressing for solution. Fifteen years have since elapsed and these four problems are still unsolved, are still pressing for solution.

C. L. P.

*Elements of Modern Chemistry.* By CHARLES ADOLPHE WURTZ. Fifth American Edition. Revised and enlarged by Wm. H. Greene, M. D., and Harry F. Keller, Ph. D. 12 mo. Pp. 788. Philadelphia, J. B. Lippincott & Co. 1895.

The appearance of the fifth revised and enlarged edition of the translation of this well-known work may be taken as evidence that many have found it useful. The writer believes, however, that a better *elementary* treatise might have been made, if the translators had followed less closely the plan of the original. The introduction is clear and satisfactory. In the next twenty-seven pages we find a discussion of the laws of definite and multiple proportions, equivalents, the laws of Gay-Lussac, Ampère and Avogadro, the atomic theory, the laws of isomorphism and specific heats, nomenclature \* \* \* \* \* oxygen acids, metallic hydroxides, oxygen salts, nomenclature of non-oxygenized compounds, alloys and amalgams. The study of hydrogen and the other elements is then begun. It needs no argument to prove that this order of subjects is not elementary.

The succession of topics in the study of the compounds of carbon is also unsatisfactory. The order is the following: constitution of organic compounds, formation of hydrocarbons \* \* \* \* \* monatomic radicals and polyatomic radicals, including general remarks

about diatomic alcohols, acids and ammonias.  
\* \* \* \* \*

The substances first studied are cyanogen, the ferrocyanides, the sulphocyanides, the cyanamides \* \* \* \* \* urea and some of its compounds. Having mastered these simple subjects, the student is ready for methane and its derivatives. About one-half of the volume is given to the compounds of carbon. The facts are clearly presented, a good selection of compounds has been made, and recent work and theories receive due attention.

The same good judgment has been shown in discussing the other elements and their compounds. A more careful revision of the text would have removed some inaccurate statements. The synthesis of oxalic acid in 1868 can no longer be called recent, nor is it true, as stated on page 236, that nitrogen forms only one compound with hydrogen.

The use of such trivial names as potassa, caustic potassa, soda, gelatinous alumina and others is often exasperating and sometimes leads to incorrect statements. Soda is defined as sodium carbonate, but on page 353 we are told that soda produces, in salts of lead, a precipitate that is soluble in an excess of the reagent. With the general correctness and clearness of statement no fault can be found, and, as an elementary book of reference, this new edition should win new friends.

L. B. HALL.

*Principles of Metallurgy.* By ARTHUR H. HIORNS. Macmillan & Co., New York. 1895. 12mo., 388 pp., 144 illustrations, cloth binding. Typography and paper of good quality.

It was the authors intention to prepare for those who do not have ready access to the journals of scientific and industrial societies an abridged account of the modern methods of extracting metals from their ores. An object worthy of attainment but in this instance not crowned with success.

The arrangement of the work is as follows: The physical and chemical properties of the metals and their alloys occupy the opening chapters, after which several chapters are devoted to general metallurgy, discussing furnaces, fluxes and fuels. Iron and steel occupy

the greater part of the work, followed by chapters on silver, gold, lead, copper, zinc, tin, aluminum, mercury, antimony and bismuth. While each division of the subject contains much of value, the work is to be criticised from the fact that much of the greater value is omitted. By greater value is meant modern practice. There is not a chapter that could not be improved in this respect.

Metallurgy has been defined as the 'art of making money,' and consequently is an eminently practical subject. A treatise therefore should be devoted mainly to modern methods, subordinating historical descriptions and data, a plan quite the reverse of that given by Mr. Hiorns.

Metallurgical processes are of such rapid development that characteristic factors of any one time often become obsolete in a decade, and a work bearing the date of 1895 should present the methods brought up to at least within a few years. The present work quite fails in this respect also. Many errors have been perpetuated from previous works, and a number of illustrations are given of furnaces which have not been used for twenty years and more. American practice is painfully weak, and since we are the greatest individual producer of silver, gold, lead, iron, copper, zinc and mercury, this criticism is of great weight. Some glaring errors in this respect are as follows:

Under blast furnace practice for pig iron the furnaces quoted as embodying modern ideas are not water-cooled and they have exterior fore hearths. In view of the magnificent practice at the Edgar Thompson works where, two years ago a single furnace produced over six hundred tons of cast iron in twenty-four hours, the type of furnace as given by Mr. Hiorns is decidedly ancient.

Under the metallurgy of lead the shaft furnaces given are all of the old type; not one of them is water-cooled. Under zinc the English method is quoted as in use, although Dr. Percy remarked in a lecture that years ago he sought for evidence of this process, but failed to find even the ruins of the furnace foundations. Under steel the American modifications of rapid blowing and low silicon irons are entirely ignored, etc.

As an elementary treatise suitable for students of tender years this work presents the English practice in a general way with sufficient thoroughness to afford a popular understanding of the subject.

American practice is so lamentably weak that the work is of little practical value to our students. With extensive cutting and the addition of much new material it might be transformed into a work of value, but, as Kipling would say, "that is another story."

J. STRUTHERS.

#### SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF WASHINGTON, 256TH MEETING, FEBRUARY 22.

C. HART MERRIAM spoke of *The American Weasels*, describing at some length the various species, their habitats and relationships.

F. E. L. Beal read a paper on *the Food of the Bluejay*, being the results of the examination of about 300 stomachs of this species collected in every month of the year and fairly representing all parts of the bird's range. The food is found to consist of animal and vegetable matter in the proportion of about one of the former to three of the latter. The animal matter is composed largely of injurious insects. The alleged habits of the jay of eating the eggs and young of other birds is only partially confirmed. Of the whole number of stomachs only two, taken in the breeding season, contained shells of eggs and one the remains of a young bird. One stomach taken in February contained the remains of a bird, and several taken at various times contained shells of eggs, apparently those of domestic fowls. The vegetable food consists principally of grain, mast and fruit. Of the first two mast is the favorite, being the most important element of the yearly diet. Corn is the favorite grain. The fruit consists for the most part of wild species.

David White discussed *the Structure and Relations of Buthograptus, Plumulina and Ptilophyton from the North American Palæozic*. After describing the structure of these genera in detail, the speaker stated that it would seem that all the forms considered may belong to one type of nonvascular, feather-like, or plumose organisms,

which consist of a hollow or cellular thin-walled rachis, or axis, destitute of any central strand, forking but seldom in some species, perhaps in all, and possibly divided by transverse septa into cells, though this is not clearly shown in any individual case. To this axis are articulated by round or oval joints, two or more series of more or less elongate, very thin-walled, bladder-like sacs, which, for convenience, are called pinnules. With rare exceptions, these sacs are quite regularly arranged with respect to one another, their parallelism in the impressions giving the feathery appearance to the pinnæ. Similar relations obtain in all the species considered. The pinnules appear to have been eventually deciduous, falling away from the lower portion of the rachis. Although several of the species appear at first glance to very strongly resemble hydroids, the speaker followed Dawson and Lesquereaux in considering these organisms to be vegetable in their nature.

Sylvester D. Judd described a *Peculiar Eye of an Amphipod Crustacean, Byblis serrata*. He said that this crustacean, which belongs to the family *Gammaridæ*, has totally different eyes from *Gammarus*. This peculiar eye of *Byblis* reminds one of the vertebrate eye, for both agree in having a biconvex lens and a fluid filled space with the retina below. A section through the chief axes of the eye of *Byblis* would first show a large lens, which has been secreted in concentric shells by a thickened layer of lentigen, which is on either side continuous with the thinner hypodermis, which is gorged with scarlet pigment that envelopes the eye like a cornucopia, thus shutting out all rays that might reach the retina without first passing through the lens. Under the lentigen is a crescent-shaped humor space. Below and proximal to this space is a layer of columnar cells, which is continuous on either side with the hypodermis. This layer of cells has secreted on its outer boundary, which borders on the space, a strong cuticula. Just proximal to this layer of cells, which has secreted the cuticula, are the omatidia (which of course lack the corneal cuticula). The most distal element of an omatidium is a granular columnar body (cell product). Below and proximal to this columnar