regarded the animal kingdom as a single series grading from the lowest primitive animal up to man.' This is a mistake. Hertwig could never have carefully read what Lamarck did say, or have known that he was the first to throw aside a serial arrangement and to sketch out a two-branched genealogical tree of the animal kingdom as he knew it. Lamarck, on the contrary, says, referring to the existing animals: 'I claim that they form a branched series,' etc.

The translation uses the word 'rudimental' for vestigial. On page 180, in enumerating the classes represented in the Cambrian period, the brachiopods are omitted, and only six classes in all are enumerated, whereas there are the remains of the representatives of thirteen or fourteen.

The portion on 'Special or Systematic Zoology' is a very useful summary of the characters of the phyla, classes and orders, and in some cases of the suborders and families. Of course, in the matter of classification zoologists even now differ very much. While in the first edition of the original work (1892) the animal kingdom is divided into only seven phyla, there are in the present translation ten. Professor Kingsley has made important changes from the German edition in the classification of the arthropods. He has done well to assign the sponges to a separate phylum (Porifera). The Mollusca are made to precede the Arthropoda. We are unable to follow the translator in placing the Trilobita among the Crustacea, and in separating the Gigantostraca (why not Merostomata, which has the priority by many years?) from the Trilobita. On the other hand, the Merostomata are not included in the Arachnida as is done by some English zoologists. For Trilobitæ Trilobita is preferable, as it is the original spelling of McLeay in 1840. Trilobitæ is the term given by a later author.

The Myropoda are very judiciously treated, and we quite agree with Professor Kingsley in breaking up the old group Myriopoda into two groups, placing the Diplopoda, with the 'Pauropida' (*sic*) apart from the Chilopoda. With the classification of the insects we should have some fault to find; certainly the Rhynchota should not be placed in so high a position between the Hymenoptera and Diptera. The Lepidoptera are divided into six suborders, a singular arrangement allowed to remain over from the German text, without change. More modern views might have been adopted in the translation.

A few slips or errors remain to be noticed which could be corrected in a second edition, which we doubt not will soon be called for. Did not Ledermüller speak of 'Infusionsthiere' a little previous to Wrisberg, who called the infusoria 'Animalcula infusoria'? The use here and there of the word 'ringing' for segmentation is not happy. In the too brief account, to be very useful, of *Pithecanthropus* mention is made of 'a molar tooth,' whereas three have been found.

There is a commendable absence of typographical errors. We have only noticed 'trocophere,' page 316; 'correllate,' page 389; 'chelefer,' page 450, and 'Pauropida,' on page 497. The copy we have before us is rather faintly printed, and the cuts are not always evenly printed.

A. S. Packard.

EUCALYPTS CULTIVATED IN THE UNITED STATES.

Bulletin 35 of the Bureau of Forestry, U. S. Department of Agriculture, is a handsome volume devoted exclusively to Professor McClatchie's valuable memoir on the 'Eucalypts Cultivated in the United States.' It is profusely and beautifully illustrated, well printed on good paper and every way worthy of all concerned in its production. Above all, it is a timely publication, particularly so when the need of southern California is considered in the matter of fuel. With the extraordinary increase of population in this part of the state follows a corresponding increase in the demand for fuel. The supply furnished by the native trees, red and white oaks, juniper, mesquit, etc., is rapidly diminishing; already the eucalypts, principally *E. robusta* and *E. globulus,* contribute one half or more of the wood fuel. Coal, gas, gasoline and kerosene are largely used; nevertheless, the demand for fire-wood is constantly increasing. Not infrequently the daily papers notice the

planting of new areas in various places, some of large extent; it is very doubtful, however, whether the increase in acreage devoted to the eucalyptus is sufficient to meet the wants of even the immediate future. The present prices are not likely to decline. At $10 to $11 for the native woods, per cord of 96 cubic feet (that is to say, three tiers of stove lengths, eight by four feet otherwise) and $7.50 to $9 for eucalyptus or gum-wood, as it is popularly called, there is a handsome profit in the cultivation of the latter, for after the first cutting these trees sprout or start again from the stump, and a second cutting can be made in five or six years. The above prices are the retail figures; the discount to the 'wood yards,' is probably not more, on an average, than one dollar per cord, while the retail prices at the 'yards' are much higher than those above stated, for small quantities. The numerous species of these invaluable trees include forms adapted to a great number of purposes in the mechanical arts. It is principally as fuel, shade trees and wind-breaks that they have been used in this country. I have not learned of an instance of their use in the manufacture of lumber. To a limited extent certain species have been used as piles in wharf structures, and it is not unlikely that these may be found to be immune against the ravages of *Chelura* and *Teredo*. The medicinal value of *E. globulus* and other species is above dispute and has been for many years; their use in this direction deserves to be widely extended. The experience of the writer at various times in serious gastric troubles has proved to him their unquestionable medicinal virtues. Again, the bulk of testimony is in their favor when the neutralizing of malarial atmospheric conditions is considered; their beneficial action, or rather the action of certain species, can easily be shown. As Professor McClatchie says: 'The eucalypts probably serve more useful purposes than the trees of any other genus grown on the globe, except possibly the various palms.'

In the professor's memoir some forty or more species are described in a popular way, their characteristics, climatic requirements and uses given. These forms are illustrated by numerous finely executed half-tone engravings, and otherwise presented in a very useful way by grouping of species according to climatic adaptation and uses. Then follow a 'key' and technical botanical descriptions. The bibliography and index close the volume.

Both the bibliography and the history of *Eucalyptus* culture in California are open to criticism. The highly creditable work of Mr. Elwood Cooper and Mr. Abbot W. Kinney in promoting by precept and practice *Eucalyptus* culture in southern California is justly praised. Of the former, in referring to a lecture delivered by him in Santa Barbara in 1875, it is said: 'This was probably the first address on the subject in America.' By turning to the 'Proceedings' of the California Academy of Sciences it will be seen that on the first day of July, 1872, the writer read a paper, 'On the Economic Value of Certain Australian Forest Trees and their Cultivation in California,' the lecture being printed in full in Volume IV. of the Academy's proceedings, the same is contained in the 'Annual Report of the State Board of Health for 1872,' and about the same date a pamphlet edition of 2,500 copies was published and distributed gratuitously. In connection with this, see also the New York *Nation* for August 22, 1872. Subsequently to the Academy's Proceedings the late Dr. Albert Kellogg contributed a paper on the eucalypts; still later a paper on 'Forest Tree Culture in California' was read before the American Forestry Association at the Cincinnati meeting, April, 1882, and published in the report of that meeting. The late Colonel Warren's *California Farmer*, the first agricultural paper published on the West Coast, contained, first and last, many articles on the foregoing subject. Professor McClatchie's memoir has but little, very little, to say about *Eucalyptus* culture in California north of Tehachapi, or, in other words, latitude 35°; yet north of this general line hundreds of thousands of these trees have been planted throughout a far larger territory, embracing more diversified climatic conditions than southern California.

The extensive plantings made by the Southern Pacific Railroad in the San Joaquin Valley region over twenty years ago and the lessons indicated thereby are not mentioned. General Stratton's forty-five acres in *E. globulus* and *E. viminalis* planted in 1869 in Alameda County, probably the first artificial forest west of the Rocky Mountains, seems to have escaped notice. The late B. B. Redding, for many years land agent of the Central Pacific Railroad, and Professor E. W. Hilgard, of the University of California, and others have written and preached much on the general text.

A useful addition to Professor McClatchie's memoir and one in harmony with its general scope would be a climatic map similar to that published some years ago by the Southern Pacific Railroad Co. In this the thermal zones of the state are exhibited; these zones are governed by topographic features and can not be understood by reference to latitude. One word more as to the propagation of the eucalypts from seed. Judging by my own experience from imported seed, *E. amygdalina* and *E. robusta* germinated as readily as radish or turnip seed, when sown in a cold frame.

Rob't E. C. Stearns.

Los Angeles,
February 21, 1903.

SCIENTIFIC JOURNALS AND ARTICLES.

The April number of the *Botanical Gazette* contains two cytological papers. The first is the beginning of an article on 'Oogenesis in *Saprolegnia*,' by Professor Bradley M. Davis, in which he presents newly observed facts regarding the formation of the egg and the behavior of the cœnocentrum. The concluding part of the paper will be devoted to theoretical considerations. The second is by Professor David M. Mottier, on the 'Behavior of the Chromosomes in the Spore Mother-cells of Higher Plants and the Homology of the Pollen and the Embryo-sac Mother-cells.' He describes mitoses in the microspore and megaspore mother-cell of typical angiosperms, and homologizes these processes. The occurrence of a single megaspore is regarded as a derived condition, four being the primitive number. In continuing his notes on North-American grasses, Mr. A. S. Hitchcock describes as a new species *Willkommia texana*. In view of the fact that the concluding paper in Professor F. O. Bower's important series on the 'Morphology of Spore-producing Members' is not likely to be published in full for some months, the editors have published in advance an abstract of the memoir, which contains a general discussion of the results reached in the four previous papers of the series, and of their bearing on a theory of sterilization in the sporophyte. MacDougal's memoir on the 'Influence of Light and Darkness upon Growth and Development of Plants' and Graebner's volume on the 'Heaths of Northern Germany,' are reviewed, together with other current literature. Among 'Notes for Students' Mr. J. Arthur Harris contributes a review of recent teratological literature.

The May number of the *Biological Bulletin* of the Marine Biological Laboratory contains the following articles:

Helen Dean King: 'The Formation of the Notochord in the Amphibia.'

Leo Loeb: 'On the Coagulation of the Blood of some Arthropods and on the Influence of Pressure and Traction on the Protoplasm of the Blood Cells of Arthropods.'

S. J. Holmes: 'Phototaxis in Volvox.'

SOCIETIES AND ACADEMIES.

THE SAN FRANCISCO SECTION OF THE AMERICAN MATHEMATICAL SOCIETY.

The third regular meeting of the San Francisco section of the American Mathematical Society was held at Stanford University on April 25, 1903. Fifteen members of the society were present. Professor Haskell was elected to succeed Professor Wilczynski on the program committee. The following papers were read during the two sessions of the section:

Professor E. J. Wilczynski: 'Invariants of systems of linear partial differential equations, and the theory of congruences.'

Dr. D. N. Lehmer: 'Preliminary report on a table of smallest divisors.'