the optic lobes and the cerebellum, being derived from the procephalic neuromeres and having been carried caudally by the enlargement of the cerebral hemispheres and the optic lobes. Surely one might expect to find some indications of such a remarkable translocation in the ontogeny of the vertebrate brain, and yet one will look for it in vain. If it has occurred we must leave it to the neurologists to frame an explanation of the connections of the cerebellum.

This translocation is an essential part of Professor Patten's theory and with its accuracy and that of the supposed new-formation of the mouth the theory must stand or fall. While one may admire the ingenuity displayed in discovering unexpected homologies, one must acknowledge a feeling that in many cases they but create difficulties greater even than those they were intended to obviate. Nor does one find in the theory any explanation of the most essential feature of the vertebrate nervous system, namely, its arrangement in longitudinal zones corresponding to the nerve components. Indeed, the theory makes such an arrangement impossible, and yet an explanation of this arrangement and associated structural peculiarities must be an essential part of any acceptable theory of vertebrate phylogenesis.

But while the theory must be adjudged to be at least "not proven," it must be pointed out that Professor Patten in the study of the problem has added extensively to our knowledge of the morphology of the primitive arachnids and of the Arthrostraca, an account of the latter, based very largely on the study of material contained in Professor Patten's private collection, forming one of the most interesting chapters of the book. The concluding chapters are a discussion of the author's views as to the phylogeny of the various vertebrate and invertebrate groups, summed up in a concluding phylogenetic tree. Even though one may not agree with the author's conclusions, this portion, as well as the rest of the book, will be found well worth careful study by all morphologists.

It is to be regretted that the author has not taken more pains to render the reading of the book less tedious. Not but that the presentation is satisfactory, barring many annoying orthographical errors, and the numerous illustrations are excellent both in execution and reproduction. But rarely is a figure to be found on the page where it is referred to and the reader becomes wearied turning backwards and forwards to find the figure to which his attention is directed, only to discover, when he has located it, that he must turn again to the end of the book to find an explanation of the lettering employed. And even then he will not always find what he is looking for. The index, too, is decidedly inadequate.

J. P. McM.

SCIENTIFIC JOURNALS AND ARTICLES

The contents of the June issue of *Terrestrial Magnetism and Atmospheric Electricity* include:

"The Penetrating Radiation," W. W. Strong.

"Results of some Long Series of Magnetic Observatory Observations: Colaba (1846–1905), Pola (1847–1909) and Potsdam (1892–1900)," reviewed by D. L. Hazard.

"The Physical Theory of the Earth's Magnetic and Electric Phenomena, No. V.: On the Formation of the Earth's Magnetic Field," L. A. Bauer.

"Magnetic Declinations and Chart Corrections in the Atlantic Ocean according to the Observations on Board the *Carnegie*, June, 1910, to March, 1911," L. A. Bauer and W. J. Peters.

BOTANICAL NOTES

Laboratory botanists who are looking for a constant temperature apparatus will do well to read W. J. S. Land's paper on this subject in *The Botanical Gazette* for November, 1911, where the descriptions are illustrated by working drawings quite sufficient to enable a good workman to reproduce the apparatus at much less cost than otherwise.

Botanists will read "The Wilting Coefficient for Different Plants and its Indirect Determination," by L. J. Briggs and H. L. Shantz (Bull. 230, Bureau of Plant Industry, U. S. Dept. Agriculture), for two purposes: (1) The very considerable amount of valuable

physiological and ecological information contained in the paper, and (2) for the descriptions and illustrations of the very ingenious apparatus devised and used by the two investigators. For the latter especially the paper is to be very highly recommended to teachers of plant physiology who are in search of effective apparatus.

PLANT physiologists will find some surprising things in "A Preliminary Study of the Forced Curing of Lemons as Practised in California," by A. F. Sievers and R. H. True (Bull. 232, Bureau of Plant Industry, U. S. Dept. Agriculture, Feb., 1912). Lemons that ripen on the tree, known as "tree-ripes," constitute as a whole, "an inferior class of fruit, both as to appearance and keeping quality, and are largely consumed in near-by markets." They are therefore picked when full-grown but still uniformly green in color, and then cured in the packing house, and it is said that when so cured the lemon "has a better appearance, better keeping quality, and a considerably thinner rind." The reading of some portions at least of this bulletin is commended to plant physiologists.

WHILE the foregoing bulletin appeals to the plant physiologist, one from the California Experiment Station (No. 196) on the "Tolerance of *Eucalyptus* for Alkali," by R. H. Loughridge, is of especial interest to the ecologist. The increasing growth of *Eucalyptus* trees of various species raised the question of the possibility of utilizing the alkali lands for such plantings, and the experiment station was asked to furnish the necessary information as to the tolerance of different species of *Eucalyptus* for the ordinary alkali salts of the soil. It appears from this bulletin that it is possible to grow good trees of several species of *Eucalyptus* upon soil which has much alkali in it, and that there is a very considerable difference in the tolerance of the different species for alkali.

DR. B. M. DAVIS'S paper on the "Reduction Divisions of *Oenothera lamarckiana* and *O. gigas*" (*Ann. Bot.*, October, 1911) adds to the cytology of these related forms in which the number of chromosomes in the second is twice that of the first, the author affirming as one of his conclusions that "*O. gigas* is a progressive mutant, its peculiarities being clearly associated with the changes in its germ-plasm incident upon the doubling of its chromosome number." Seventy-nine figures on three double plates illustrate the paper.

DR. J. M. COULTER has been studying the endosperm of Angiosperms (*Bot. Gaz.*, November, 1911) and decides definitely in favor of its gametophytic nature in spite of the various nuclear fusions from which some have argued its sporophytic character. "The product of such fusions as do occur is merely an undifferentiated tissue, which practically continues the tissue of the gametophyte; that is, it is simply *growth* and not *organization*."

L. W. SHARP described (*Bot. Gaz.*, September, 1911) the embryo sac of *Physostegia* in which a curious lateral lobe develops in the antipodal region and in this eventually the endosperm forms, and into it also the embryo protrudes by the great elongation of the micropylar cell of the proembryo.

THE same author and W. H. Brown publish (*Bot. Gaz.*, December, 1911) their study of the embryo sac of *Epipactis* which differs in certain details from the usual structural sequence.

N. E. STEVENS in the December (1911) *Torrey Bulletin* publishes a paper on the "Dioecism of the Trailing Arbutus (*Epigea*)" in which he shows first that it is not properly heterostylous, in spite of the fact that there is much difference in the length of the styles. On the other hand, he found that it is functionally dioecious.

A VALUABLE SERVICE TO SCIENCE

THE Historical Department of Iowa has rendered a most valuable service to science by procuring the preparation and publication of a sketch of the life of the naturalist, Rafinesque, accompanied by a voluminous bibliog-

raphy of his many publications. In the volume entitled "Rafinesque, A Sketch of his Life with Bibliography," by Professor T. J. Fitzpatrick, we have placed before us a most readable account of the life of this gifted and eccentric man, who was so tireless a student and observer of nature. To this part of the book fifty pages are given, every page of which is full of interest. Born of French and German ancestry in a suburb of Constantinople in 1783, he lived mostly in France until 1802, when he came to America, remaining several years. Returning to southern Europe for a period, he finally came again to America, where he remained until his death in 1840.

The story of his life is told with absorbing interest and no one can run over these pages without feeling grateful to the writer who has made the eccentric hero of the story live again for us, and we may hope that many who read it will be inclined to think less harshly of his work, done, as it was, in a period when science was little recognized in this country.

The Bibliography will be a revelation to many scientific men who have known about Rafinesque only in a general way. All told the list includes 941 titles. The author says in his introduction that "the writings of Rafinesque are varied and widely scattered," and refers to the difficulty he experienced in collecting the material upon which his list is based. The list consists of titles, dates, places of publication and notes, the latter often very interesting as including historical facts not to be found elsewhere. Here and there one finds a photographic reproduction of a title page, often very quaint and old-fashioned.

After the regular bibliography a few pages are given to a list of 134 articles that refer to Rafinesque, some rather fully, and others only incidentally. The book closes with a short chapter on the portraits of Rafinesque.

One can not turn from a reading of this book of Professor Fitzpatrick's without feeling that in Rafinesque American science had a man of far more than ordinary ability, and that while eccentric and erratic he has still to be reckoned with as one who studied nature and found out many of her secrets, in the early days when naturalists were few and far between. And science owes much to the author and the Historical Department of Iowa for bringing together all this information and issuing it in this very attractive volume.

Charles E. Bessey
The University of Nebraska

Special Articles

The History of the Germ Cells in the Pædogenetic Larva of Miastor

Six years ago, when I began to study the origin of the germ cells in insects, an attempt was made to obtain specimens of the pædogenetic larvæ of certain flies belonging to the family Cecidomyiidæ. At that time I was informed by one of the best authorities on the Diptera that there were none in this country. Since then they have been discovered (October 5, 1910) by Dr. E. P. Felt and many features of their life history have been determined by him.[1] I am indebted to Dr. Felt for an abundant supply of these interesting larvæ, upon which work is now progressing.

As early as 1865 the fact that the germ cells (pole cells) of the pædogenetic Cecidomyiidæ are set aside very early in embryonic development was pointed out by Leuckart[2] and Metschnikoff.[3] Their brief descriptions were followed a year later by a more detailed account.[4] Eggs were found containing only two nuclei which were supposed to result from the division of the germinal vesicle. These nuclei continued to give rise to others by division

[1] Felt, E. P., "Miastor and Embryology," Science, Vol. 33, pp. 302–303, 1911; "Miastor Americana, Felt; an Account of Pedogenesis," Bul. 147, N. Y. State Museum, pp. 82–104, 1911; "Miastor," *Journ. Ec. Ent.*, Vol. 4, p. 414, 1911.

[2] Leuckart, R., "Die ungeschlechtliche Fortpflanzung der Cecidomyienlarven," *Arch. f. Naturg.*, Bd. 1, 1865.

[3] Metschnikoff, E., "Ueber die Entwicklung der Cecidomyienlarven aus dem Pseudovum," *Arch. f. Naturg.*, Bd. 1, 1865.

[4] Metschnikoff, E., "Embryologische Studien an Insekten," *Zeit. f. Wiss. Zool.*, Bd. 16, 1886.