

place and enable Prof. Bütschli to give a decisive opinion upon many points on which authorities have hitherto differed. Many of the illustrations in the admirably engraved plates are also original.

We may perhaps remind our readers that it is to Prof. Bütschli that we owe the first important paper in the recent development of our knowledge of the karyokinetic figures of dividing cell-nuclei. It is his investigation which demonstrated the identity of the changes in the nuclei of Ciliate Infusoria with the curious fibrillation of normal tissue-cells when in course of division, and more than any others have given a wide basis to the recent generalisations on this subject.

Our author is not only extremely fair and scrupulous in citing all discoverable authorities for the facts which he sets forth as to the structure, &c., of Protozoa (our English microscopists of all ranks will find themselves cited and fairly considered), but he exhibits admirable judgment, temper, and caution in his treatment of vexed questions. He has wisely withheld his full discussion of the classification of the Radiolaria until such time as Haeckel's *Challenger* work on the group is published. In the meantime his analysis of the various forms of skeleton which occur in that group is a masterly essay on a very difficult subject.

With regard to the question of the chlorophyll corpuscles of some Protozoa—considered by Brandt as parasitic Algæ—we gather that Prof. Bütschli leans to the acceptance of that view; but we shall look for a more definite judgment from him in relation to that question when he has to discuss such forms as the Ciliata, *Stentor*, *Bursaria*, and *Ophrydium*.

It is noteworthy that Prof. Bütschli includes the Volvocina and the "Protococcus" forms in the Flagellata, being convinced of their relationship here in spite of their "holophytic" nutrition.

It would be impossible here to point out the numerous new views of importance which are advanced in Prof. Bütschli's work. It must be sufficient to say that the book is absolutely invaluable to every student of microscopic life, and is perhaps the most remarkable attempt yet made by a distinguished original observer to co-ordinate and render available for use the entire series of works of his predecessors in a large and important field of study.

E. R. LANKESTER

#### PHÆNOLOGY

*Resultate der wichtigsten pflanzen-phänologischen Beobachtungen in Europa, nebst einer Frühlingskarte.* Von Dr. H. Hoffmann, Professor der Botanik in Giessen. Anhang, Dr. Egon Ihne, *Die Norwegischen, Schwedischen, und Finnländischen Beobachtungen.* (Giessen: J. Ricker'sche Buchhandlung, 1885.)

THIS work, the results of forty years' labour, forms a most important contribution to the literature on the subject of phænology.

The work begins with an introduction, in which is explained the importance of phænological observations, particularly with regard to comparative climatology and biology. Then follows an investigation of the degree of accuracy to be obtained by this kind of observation, succeeded by a discussion as to how many years such

observations ought to be continued for obtaining useful and trustworthy information for comparative investigation. A table is then given of those plants and their phases which the author, after forty years' observations, thinks the most proper for adoption with a view to international reception. The number is fifty-three, and they are arranged according to the calendar, to facilitate observation; which system appears with regard to accuracy preferable to an alphabetical arrangement.

A short notice follows of the most important general results of the work with respect to climatology and biology, abstracted from the observations from the whole of Europe. At the end of the introduction the author points out the next tasks for phænological researchers.

The remainder of the book contains an alphabetical list of all phænological stations throughout Europe (about 2000), with the geographical situation and elevation above sea-level. Under each station are given in an alphabetical arrangement the mean dates of the simple phases known from the place, with the number of years of observation.

It is to be seen that from a great number of these but one or two years' observations have been published, whereas others extend to above thirty years. These dates are to be employed for comparing any single place with all the others. The mean dates are given as completely as possible, because such comparisons are the chief object of the author for publishing this work. They are extracted and calculated from a vast number of lists published in a great many periodicals and works of all nations.

With regard to spring flowers, the author himself has followed the plan of comparisons, giving under each station an indication of the number of days the single species open their flowers, sooner or later than at Giessen, the residence of the author, from which place, generally speaking, the most comprehensive observations have been published. In a "spring map" of Europe at the end of the book the results of these investigations are entered, by which the mean progress of spring through different countries may be seen at a glance.

#### OUR BOOK SHELF

*Louis Pasteur, his Life and Labours.* By his Son-in-Law. Translated from the French by Lady Claud Hamilton. (London: Longmans, Green, & Co., 1885.)

The name of M. Pasteur, owing to his many brilliant and eminently practical discoveries, has been for some years so prominently before the general public that a popular and connected account of his life and labours cannot fail to be interesting and instructive reading to every educated member of the community. In this respect the present volume must be considered a signal success and a valuable addition to popular scientific literature. But the importance of the book reaches a step further, for it gives to the scientific world an authentic account of the development and progress of M. Pasteur's discoveries, since it is written by one who has been and is still living with M. Pasteur in the bonds of intimate friendship, and who has received his information directly from M. Pasteur himself. While to the general reader the achievement of a discovery is the only and great point of interest, to the scientific reader it is only one of many, the history of a discovery being one of them, and not the least important one, for it reveals methods and manner, and it gives us a true insight into the working of the