

species may arise in a pathological structure, though in our opinion he establishes his contention.

The book is undoubtedly a stirring contribution to botanical science, and ought to stimulate research in many directions, and although it escapes the responsibilities of being a great work, it is certainly one that must be on the shelves of every investigator of first rank who has anything to do with the anatomy or pathology of plants. We cordially welcome this interesting book as a pioneer work of what will grow to be an immense subject.

COMETS AND THEIR TAILS.

Comets and their Tails, and the Gegenschein Light.

By Frederick G. Shaw. Pp. 70. (London: Baillière, Tindall, and Cox, 1903.)

THE theory of comet's tails has not yet arrived at its ultimate destiny, which we suppose is that of becoming an orthodox branch of applied mathematics; and consequently it still possesses a fascination for the world at large. True, the phenomena have been discussed by Prof. Bredichin, in a succession of papers that now go back nearly thirty years; but the origin of the forces required for Bredichin's theory is very obscure, and the net result is to excite rather than to remove conjecture. During the last few years the general mental ferment over the new views of the constitution of matter has given a fresh stimulus to speculators in this part of astronomy, and a considerable literature has already gathered round the suggestions of J. J. Thomson, Arrhenius and Deslandres.

Mr. Shaw, whose book now lies before us, is not a follower of any of these schools; he holds that the comet's tail is caused by the rays of the sun being altered (by concentration and refraction) by their passage through the cometic atmosphere, and thus rendered more capable of being reflected from the meteoric matter in the neighbourhood. In other words, the tail does not really exist; it is merely a local illumination of the general circumambient dust of space. The idea bears some resemblance to the now frequently accepted explanation of the lighting-up of the Nova Persei nebula.

After stating this theory, and offering a general justification, the author proceeds to examine the records of the great comet of 1858 in the light of it. For this purpose he uses G. P. Bond's monograph to a considerable extent, a mistake which occurs in the first plate of the Harvard astronomer's account being unfortunately twice reproduced; the point chiefly dwelt on is the sympathy between the phenomena of the nucleus and those of the tail.

The work as a whole is brief, its tone is very modest, and it is not claimed that the theory has been worked out in detail. It is therefore scarcely fair to blame the author for the difficulty which one finds in attempting to explain by causes of this kind the singularly complex character of cometary appendages. But any theory of the kind must offer some explanation of their most constant and remarkable features, such as the multiplicity of tails, their curvature, and the "broken" appearances often seen; and it may be

doubted whether the author's theory in its present state is capable of meeting these demands. "So-called secondary tails, &c.," he accounts for "by irregular ebullitions of gas from the comet," presumably giving rise to special fields of refracted rays.

But at the root of the whole matter lies the question of whether refraction in the cometic envelope is likely to take place at all on a scale comparable with that required by Mr. Shaw's hypothesis, and at present observation seems to negative this possibility.

The latter part of the book is devoted to the *Gegenschein*, for which a similar explanation is given—the refraction being in this case produced by the earth's atmosphere, and the phenomenon being due to the reflection of this refracted light from meteoric dust. An interesting criticism of Barnard's views is given.

OUR BOOK SHELF.

Physical Chemistry for Physicians and Biologists.

By Ernst Cohen. Authorised Translation from the German by M. H. Fischer. Pp. ix+343. (New York: Henry Holt and Co., 1903.)

PHYSIOLOGISTS and pharmacologists have from the first been ready to adopt and apply the recent theories of physical chemistry. Indeed, the eagerness with which these theories have been received by biologists has frequently led to their misapplication, inasmuch as the conditions existing in the animal organism are so widely different from those for which the theories were developed, that direct adoption of purely physicochemical results is in nine cases out of ten inadmissible. In the book before us we have a series of seventeen lectures delivered by an energetic worker in pure physical chemistry to an audience of physicians. The physicochemical principles bearing on biological problems are expounded, the chief methods of experiment adequately described, and, what is of most importance, a critical account is given of many of their applications. These applications include, for example, disinfection in the light of the theory of electrolytic dissociation, the pharmacology of complex mercury salts and of uric acid solvents from the same point of view, the taste of dilute solutions, osmotic analysis, and the toxicity of electrolytic solutions. The book is admirably adapted to its purpose, and may be heartily recommended.

Trapper "Jim." By Edwyn Sandys. Pp. ix+441; illustrated. (New York and London: Macmillan and Co., Ltd., 1903.) Price 6s. net.

ALTHOUGH, as indicated by its title, this admirable little volume is devoted rather to sport and trapping than to natural history, yet it contains scattered through its pages such excellent descriptions of the wild life of the United States that the naturalist cannot fail to find much valuable information with regard to the habits of many of the mammals and birds mentioned. Specially interesting are the notes on the various species of American hares, and it will come as a revelation to many that the so-called "jack-rabbit" (*Lepus callotis*) is probably the fleetest member of all its tribe. Many references are made to the need for the cultivation of a true sporting instinct among hunters, that is to say, to the enjoyment of the sport itself, as distinct from making a "big bag." The name of Mr. Sandys is too well known as a writer on the sport and popular natural history of North America to stand in need of any commendation on our part, but we may safely say that his popularity will certainly be enhanced by his latest effort.

R. L.