

complete deductively formulated theory, someone—a Jesus or a Mahomet or a Nietzsche, knowing nothing of science—will announce that it is bad, and a new doctrine will arise. It is all very tiresome, but it is the way things are. And the reason is that ultimately ethics cannot be built on the philosophy of science, but the philosophy of science must rest on an ethical judgment. It is sensible to ask if it is good to pursue the philosophy of science, and a negative answer would not automatically brand the speaker as either dishonest or insane: it is not sensible to ask if it is the philosophy of science to pursue the good. Professor Northrop claims that his prospective universal ethics will lead to peace, but what if peace is bad, as some moralists assert? Professor Northrop does what he professes to abhor—he *presupposes* that peace is good. He has overlooked something else besides the principles of reasoning, but whereas the latter oversight makes, say, a 10 per cent. cut in the effectiveness of his philosophy of science, the former makes at least a 90 per cent. cut in the effectiveness of his philosophy of ethics.

There is excessive repetition in the book—evidently because it is an insufficiently edited collection of separate addresses. The writing is distinguished by a limited vocabulary—the reader will fervently hope never to meet the word “*attendant*” again in his life; “*attendantly*” he is scarcely likely to encounter—and one feels that the pace could sometimes be accelerated with advantage; but one common and supreme fault the writing has not—it is not ambiguous. For this outstanding virtue all must be forgiven. For a Professor of Philosophy Professor Northrop has an amazingly wide and accurate knowledge of science. The chief exception is thermodynamics, his account of which is conspicuously inaccurate and illogical. This, however, is a trifle. No blemishes can obscure the fact that he has found the only unassailable foundation for a philosophy of science, and it is greatly to be hoped that he will give his line of thought the further consideration it requires and deserves.

THE STUDY OF LICHENS. By C. T. INGOLD, D.Sc., F.L.S., Professor of Botany in the University of London, Birkbeck College. Being a review of *Natural History of the Danish Lichens* by Olaf Galløe, Ph.D. Parts I–VII published, Parts VIII–X to appear later. (For number of pages and illustrations see “Books Received” list, p. 206.) (Copenhagen: Einar Munksgaard, 1927–48. Dan. Kr. 40.— per Part.)

THE nature of the association of fungus and alga that constitutes a lichen has given rise to considerable academic discussion. Does the fungus parasitise the alga? Does the alga live a life of beneficial

slavery (helotism)? Is it an example of symbiosis—the “*living together for mutual good*” of the hard-boiled teleologist? The relative merits of parasitism, helotism or symbiosis can be left safely to the academic botanist who can usually count the lichens he knows in the field on the fingers of one hand. It is quite clear that the lichen fungi live at the expense of the associated algæ and the name given to the association is immaterial. Apart from the discussion of lichens as dual organisms, they have received scant attention at the universities. This is a very great pity. Ecologists are becoming increasingly aware of the importance of a knowledge of the taxonomy of lichens and, since ecology has become such a popular branch of academic Botany during the past quarter of a century, we may look forward to lichens receiving considerably more attention in the future in university courses. For this reason alone the appearance of a major work on the taxonomy of lichens is very welcome.

Dr. Olaf Galløe has devoted a life-time to lichenology. His work on the *Ecology of Danish Lichens* was published over forty years ago, this was followed by the *Lichen Flora and Lichen Vegetation of Iceland* in 1920, and the present monumental work will no doubt be considered his greatest contribution to his chosen subject. Part I of this work was published in 1927 and subsequent volumes were issued from time to time until 1939 when Part VI appeared. Then came the interruption of the World War, so that publication of Part VII was delayed until 1948. The work is not yet finished—there will be three further volumes—and it is greatly to be hoped that nothing will happen to delay the completion of this important work. The parts published so far are purely taxonomic, but the author indicates that the final volume will be concerned with “a survey of the taxonomy and general natural history of Danish lichens.”

Dr. Galløe's work is in no way a compilation, for it is entirely original. Although it will ultimately deal with all known Danish species, the author is at pains to point out that it is not a “*Flora*” and includes no data on distribution. He has taken a strong and individual line in dealing with species. He says “The description of species is based on one single individual which I describe morphologically and anatomically in full detail.” Sometimes, in variable species, he describes several individuals, but each separately. His attitude to nomenclature may shock some museum taxonomists, but it is rather refreshing. He remarks: “I have first examined the single specimen as carefully as possible, and then I have endeavoured to find in the literature . . . as detailed a description as possible. . . . If there I have succeeded in finding a good description which

seems to correspond minutely to the individual examined by me, I have given it the name used in the work quoted. . . . I have entirely omitted any discussion of synonyms." It is, perhaps, the natural attitude of the worker interested primarily in the organisms he is studying rather than in the ramifications of the literature of the subject.

All Danish species of lichen are illustrated and all the figures are original. Most of the plates are of very high quality. Many are in colour and these, though restrained, are often of surprising beauty. The author's success in depicting the surface texture of a lichen thallus is truly amazing.

In lichens chemical tests have been widely used as an aid to identification, but Dr. Galløe does not view them with favour (except perhaps the KOH test), considering them to be somewhat capricious.

Part I deals with the genus *Lecidea*, but also contains a brief and rather extraordinary discussion on the evolution of lichens. It is clear that Dr. Galløe's views on evolution are somewhat heterodox. Perhaps this can best be illustrated by a brief quotation: "It has been thought that there may exist a kind of psychic condition which co-operates in the development of species. . . . I personally have no doubt that psychic processes take place side by side with material processes though there is no likelihood of this ever being proved. I . . . am most inclined to the view that the faculty present in the organism of choosing in many cases between several possibilities is of a psychic immaterial nature." One cannot help feeling that few botanists will agree with Dr. Galløe in this. It is more usual to find a botanist who thinks even of himself as "a being who moves in predestinate grooves, not even a bus, just a tram," and who would certainly not allow more freedom of choice in a lichen!

However, this valuable work is not to be judged on the philosophical views of its author. The real question is: will it help the serious student to identify the lichens he finds? There can be little doubt that the answer is in the affirmative.

The British student wishing to identify a lichen will turn in the first instance to Lorrain Smith's excellent British Museum Monograph, but Dr. Galløe's work will be of considerable value to him in checking a determination, especially as, in all probability, the majority of the Danish species also occur in this country. The ten parts of the *Natural History of the Danish Lichens* should certainly find an honoured place in the botanical section of the libraries in all universities and museums.