

material, even from his last years, can be found in PC. However, this requires a personal visit to the Paris Herbarium and a good portion of patience and luck.

The author explicitly states that the group does not constitute a natural unit. In addition, he also treats two species from the *ferruginea* group, which normally have rusty-red apothecia sometimes changing to blackish-brown or black.

The influence of polluted air on the lichen vegetation has been studied for more than a century. The literature on this topic has been exceedingly abundant during the last few decades. A comprehensive survey of the various kinds of research carried out in this field was presented in 1973 under the title of "Air pollution and lichens" (ed. Ferry et al.). Cf. review in Bot. Notiser 1974 p. 155.

Many years ago Arnold (*Zur Lichenenflora von München*, 1891–1901) drew attention to the fact that various species of lichens are lacking or are on the decline in the central parts of Munich. The recent work by Dr P. Jürging (Lehrstuhl für Landschaftsökologie, München) gives a broad account of the "air hygienic" situation in the Munich area during the past decade. Following Sernander's classical terminology he has distinguished several zones, viz. "Flechtenwüste", "Innere Kampfzone", "Mittlere Kampfzone", "Äussere Kampfzone" and "Normalzone". His map from 1968 has been followed up by later studies from 1973–1974 showing that certain species of foliose lichens recorded as extinct have reappeared owing to improved air conditions in the central part of the city. The map from 1968 should be compared with maps showing the precipitation of dust and the emission of sulphur dioxide in the same area and at the same time.

Fumigation experiments were performed in nature using some of the most important pollutants, viz. SO<sub>2</sub>, HCl, HF, NH<sub>3</sub> and CO. The techniques used and the damage caused to the relevant lichen species are discussed in some detail.

The author has studied the behavior of certain epiphytic lichen species in areas with varying pollution. He has mainly chosen foliose lichens that are sensitive to varying extents, e.g., *Anaptychia ciliaris*, *Evernia prunastri*, *Hypogymnia physodes*, *Lobaria pulmonaria*, *Xan-*

*thoria parietina* and several species of *Parmelia*, *Physcia* and *Ramalina*. It is remarkable that he draws very little attention to *Lecanora conizaeoides*, otherwise known as the most resistant lichen in polluted areas. The reason is that he seems to consider *L. conizaeoides* to be an ecological modification of *L. varia* caused by the special conditions in urban areas.

Holland is known as one of the most polluted areas in Europe. This fact has been noted in various works, not the least by Dr J. J. Barkman, the eminent specialist in the sociology of epiphytic mosses and lichens. One of his students, Dr T. De Wit, (Rijksinstituut voor Natuurbeheer, Leersum, Holland) has published a thesis which gives a comprehensive survey of the present relation of air pollution to lichen vegetation in this country.

A large number of species of epiphytic lichens on trees throughout the Netherlands have been listed using a 5 km square grid as a basis. Distribution maps of 20 lichen species are given. Comparison with data from around 1950 reveals a decline almost everywhere in the country. The area between Rotterdam and Amsterdam has become especially impoverished.

As in the preceding work results of fumigation experiments are presented. In addition to the gases used by Dr Jürging, Dr De Wit has also used C<sub>2</sub>H<sub>4</sub>, O<sub>3</sub> and a combination of SO<sub>2</sub> and O<sub>3</sub>. Even low concentrations of these air pollutants cause significant morphological damage to the lichen species investigated.

Ove Almborn

Brodo, I. M. & Hawksworth, D. L. 1977: *Alectoria and allied genera in North America*. Opera Botanica 42. Stockholm. 164 pp., 1 + 67 figures and distribution maps. ISBN 91-546-0211-1. ISSN 0078-5237. Price SKr 87:– (libraries SKr 145:–).

The first attempt to provide a monograph on the North American species of the lichen genus *Alectoria* was made by Howe (1911) who accepted 10 species. Du Rietz (in a preliminary *Synopsis Lichenum*, 1926) recognized 19 species all over the world. In the following decades Gyelnik, Räsänen, Motyka and others (all notori-

ous splitters) "revised" the genus, or parts of it, in various ways. Their work resulted in the publication of numerous more or less vague and superfluous taxa. The present volume by I. M. Brodo (Ottawa, Canada) and D. L. Hawksworth (Kew, England) is a necessary clearing-up in this jungle.

There is a tendency today to divide large lichen genera into smaller perhaps more "natural" units of generic rank. Poelt et al. have segregated *Physconia* and *Physciopsis* from *Physcia* and *Heterodermia* from *Anaptychia*. Hale has recently proposed a subdivision of *Parmelia* (s. latissimo) into 10 genera. Following this trend Brodo and Hawksworth have split the old *Alectoria* into 4 genera, viz. *Alectoria* Ach. s. str. (8 species in North America), *Bryoria* gen. nov. (the name derived from *Bryopogon* and *Alectoria*; 27 species), *Pseudophebe* Choisy (2 species) and *Sulcaria* Bystr. (1 species). Useful characters for the delimitation of these genera have been found, for example, to be the cortical structure and the presence or absence of certain chemical compounds.

*Alectoria* s. str. comprises *A. nigricans*, *ochroleuca* and *sarmentosa* (with ssp. *vexillifera*), etc. Under *Bryoria*, which is divided into 5 sections, we meet with the well-known species *B. chalybeiformis*, *bicolor*, *nitidula*, *simplicior*, *implexa*, *fremontii* and others. *Pseudophebe* will hopefully be the permanent generic name for *P. minuscula* and *pubescens*, which for many years have vacillated between *Alectoria* and *Parmelia*. *Sulcaria* is represented by the new species *S. badia*, which is tentatively placed here in addition to *S. sulcata* and *S. virens*, both known from Asia only.

*Alectoria nidulifera* Norrl. is recorded as *Bryoria furcellata* (Fr.) comb. nov. The Friesian epithet, which is older, can be avoided under

*Alectoria* as the combination *A. furcellata* exists for another species. Unfortunately, this procedure has not been possible under *Bryoria*. *A. jubata* is treated as a *nomen confusum* (Art. 69 in the Code of Nomenclature) and *A. proluxa* is considered a synonym of the same taxon.

Among the 38 species recorded from North America 9 are described as new. A great many combinations transferring both North American species and others to the accepted genera are made.

Each species is described in detail often with photographs and always with distribution maps. The numerous taxa described by previous workers have been carefully checked and typified which has resulted in long lists of synonyms. In addition to the maps there are fairly exhaustive lists of localities seen by the authors and represented in the major North American Herbaria.

The taxonomic treatment is preceded by comprehensive and well-illustrated chapters on Anatomy and morphology, Chemistry, Taxonomic concepts, Ecology, Distribution, and Importance to man and nature.

As many of the species treated are widely distributed in the Northern Hemisphere this monograph will also be most useful to the European reader.

The authors have worked jointly on this project since 1970. This method has been somewhat unusual among lichenologists, but has evidently many advantages. Errors and omissions caused by one author can be corrected by the other. The reviewer sincerely recommends this form of cooperation for future monographic works on lichen taxonomy.

Ove Almborn