the details of an extensive and carefully written book which contains much that is admirable. It is a valuable book and every administrator of an electrical laboratory should own his copy and carefully ponder its words; but as a handbook for general use in the electrical engineering laboratory and amongst undergraduate college students in electrical engineering, it does not meet the American requirements.

The book is of fine 'get up' and is notably free from errors. The selection of references for short bibliographies which are scattered through the book, and the arrangement of tables at the end of each chapter, enlist favor for the author's judgment. But it seems doubtful wisdom, in a table showing the electromotive force of the Clark cell, to print the data to five significant figures (four decimals) when the values are confessedly not known with accuracy to four figures. Other tables are of similar character. For instance, on page 420, the electrochemical equivalents and data derived therefrom are given throughout to five significant places, though the original data depend upon ratios of atomic weights, many of which are not accurately known to three significant figures.

In reading the book one is impressed by its strong points, which are worthy of its author and in entire harmony with his reputation. But one leaves it seriously disappointed that the author, notwithstanding the promise of his preface, so signally fails to meet (at least as far as American practice is concerned) the special needs of the electrical engineering laboratories. We venture to hope that the second volume, which the author foreshadows in his preface, will more nearly meet those needs.

DUGALD C. JACKSON.

Die Vegetationsverhältnisse der Illyrischen Länder. Von Dr. GUNTHER BECK VON MANNAGETTA. Band IV. *Die Vegetation der Erde.* A. ENGLER and O. DRUDE. Leipzig, Wilhelm Engelmann. 1901. 8vo. Pp. xv, 533; 8 plates, 18 cuts and 2 colored maps.

The present work constitutes the fourth volume of the magnificent series of phytogeographical monographs founded by Engler and Drude. Like its predecessors, it is written by a lifelong student of the vegetation concerned. It differs from them chiefly in the nicer balance that is struck between floristics and ecology, showing how fully the author has kept abreast of the latest movements in phytogeography. The present volume is also unique in the series on account of the systematic treatment of formations, and especially on account of the consideration given the fungi and algæ. It not only maintains the high standard of the preceding volumes, but adds to it in these and other points.

The introduction treats of the history of the botanical investigation of Illyria, from the first recorded visit, that of Brasavolo (1500–55), to the present time. For a country with so few resident botanists, the number of botanical explorers is something remarkable. The thoroughness with which the flora and vegetation have been studied may be indicated in some degree by the fact that the bibliographical list, which contains very few general works, comprises nearly seven hundred titles contributed by more than two hundred workers, among whom Beck von Mannagetta, Borbás, Adamović, Ascherson, Baldacci, Farkás-Vukotinović, Fiala, Formanek, Freyn, Hirc, Kerner, Pančič, and Wettstein are prominent.

The entire work comprises four parts: I., 'A Sketch of the Physical Geography of the Illyrian Countries'; II., 'The Vegetation'; III., 'The Regional Floras and their Composition'; IV., 'The Relationship of the Flora to that of Adjacent Lands, and the Developmental History of the Flora since Tertiary Times.' The Illyrian lands comprise southern Croatia, the Quarnero Islands, Dalmatia, Bosnia, Hercegovina, Montenegro, northern Albania, Sandzak Novipazar and Servia, constituting a fairly natural region except on the south. The greater part lies in the drainage basin of the Danube; the western litoral, a relatively narrow strip, drains into the Adriatic. A peculiar hydrographic feature is found in the lost streams (Karstflüsse), which

produce periodic swamps. Standing waters, lakes, etc., are not especially characteristic, being merely broadened stream beds, as a rule. The orographic and geological features of the country are considered somewhat briefly under coast formation, litoral, islands and mainland. The climate varies from subtropical along the Adriatic to boreal in the higher mountains. The summer months along the coast are very hot, and often entirely without precipitation. The total rainfall for this region is 90 cm. From October to December, the scirocco brings heavy rains. Frost and snow are rare. Further inland, the climate differs chiefly in its colder winters, greater precipitation, 140–190 cm., and in the fact that its prevailing wind, the bora, is a cold north wind. In the hill and mountain land, the summers are hot, but not dry. The winters are severe, the temperature often sinking to — 30° C. The precipitation varies from 70 cm. to 150 cm., much of which falls as snow during the winter. In the higher mountains, the snowfall begins in October, and the snow mantle persists from November to April. The total precipitation is 152–229 cm., the greater part falling as snow during December and January.

The plant formations of the Mediterranean region are grouped in the following series: thicket and forest formations, treeless formations and culture formations. The sole thicket formation is the evergreen 'Macchie,' a xerophytic, chaparral-like vegetation of the Dalmatian coast. In the formational list, the plants are grouped in two main divisions, upperwood (Oberholz) and undergrowth. The upperwood comprises evergreen trees with entire leaves, *Arbutus unedo, Myrtus italica* and *Viburnum tinus;* with pinnate leaves, *Pistacia;* and with acicular leaves, *Juniperus oxycedrus, J. phœnicea* and *Erica arborea;* a very few deciduous trees, *Coronilla* and *Ligustrum,* and such woody plants as *Ephedra* and *Spartium.* A number of evergreen and deciduous lianes are also found here, such as *Smilax, Rosa, Rubus, Clematis* and *Lonicera.* The species of the undergrowth are turf-builders, *Oryzopsis, Diplachne, Carex;* bulb and tuber plants, *Allium, Gladiolus, Orchis;* hapaxanthous herbs, *Trifolium, Linum, Arabis, Torilis, Helianthemum;* and pleiocyclics, *Genista, Teucrium, Silene, Anemone, Inula,* etc.

The cryptogams also receive more consideration than is usual. The principal mosses are *Weisia, Fissidens, Trichostoma, Bryum* and *Hypnum;* and the lichens, *Cladonia, Endocarpum* and *Psora.*

The strand pine formation, with a single facies, *Pinus halepensis,* is a characteristic open formation of the islands and of the immediate vicinity of the coast. The underwood (Unterholz) contains species of *Juniperus, Erica, Quercus, Pistacia, Myrtus, Laurus,* etc.; the undergrowth, *Dorycnium, Erythræa, Allium, Genista* and *Brunella.* On the pine trunks occur *Frullania, Cladonia, Parmelia physodes, P. saxatilis, P. caperata, Lecanora subfusca, Lecidea parasema,* etc. On certain foothills of the Dalmatian mountains, the black pine formation (*Pinus nigra*) replaces the strand pine. The laurel formation (*Laurus nobilis*) occurs on the Dalmatian coast from Fiume to Castelnuovo, though examples of it are not frequent. The laurel is associated with *Quercus, Castanea, Ostrya,* and *Pistacia;* the underwood also is almost entirely deciduous, consisting of *Carpinus, Corylus, Ficus, Cotinus* and *Fraxinus.* The density of the foliage restricts the undergrowth mostly to a few ferns, except in the more open places. The litoral oak formation contains many facies, of which five are deciduous oaks, and one, *Quercus robur,* is evergreen. The underwood contains many evergreens of the macchie and pine formations, and about an equal number of deciduous trees and shrubs, *Carpinus, Cotinus, Cornus, Cratægus, Pyrus, Prunus* and *Rhamnus.* The undergrowth, which is not very well developed, is much the same as that of the other Mediterranean woody formations. The turf and herb formations of the coast region are the following: (1) the Dalmatian rockfield formation, with an extremely varied vegetation, consisting largely of *Salvia officinalis, Inula candida, Phlomis fruticosa, Helichrysum italicum, Marrubium, Euphorbia,* etc.; (2) the dune formation, comprising

Medicago marina, Eryngium maritimum, Echinophora spinosa, Polygonum maritimum, Agropyrum, Juncus, etc; (3) the strand cliff formation, *Crithmum, Lotus, Statice* and *Inula;* (4) the halophytic strand formation, *Atropis, Atriplex, Salicornia, Suæda, Salsola,* etc.; (5) the saltmarsh formation, *Juncus, Scirpus, Carex, Althæa* and *Tamarix;* (6) the strand meadow formation, and (7) the freshwater swamps.

The forest formations of the interior are the following: (1) the oak-ash formation *Quercus, Fraxinus, Acer, Ulmus* and *Prunus,* a very widely distributed and extensive vegetation, with several closely related oak formations; (2) the formation of the black pine (*Pinus nigra*), resembling the Mediterranean formation in few points other than the single common facies; (3) the birch formation (*Betula alba*) found here and there throughout the interior; (4) the stream bank formation (*Alnus* and *Salix*); (5) the poplar formation (*Populus alba, P. nigra*) of the broad moist valleys. The only extensive thicket formation is of a mixed character, containing *Corylus, Juniperus, Populus, Carpinus, Acer, Cratægus, Fraxinus,* etc. The herbaceous formations of a closed character are the heath, the mountain meadow, the meadow, and the swamp meadow. The open formations are those of the rockfield, the sandbanks, and the swamps, pools and streams.

The vegetation of the mountain region is treated in exhaustive fashion. The tabular statement of the positions of the various formations in the different ranges, found from pages 287 to 304, cannot be too highly commended. In itself, it is a notable contribution, showing in graphic fashion the zonation and alternation of the mountain vegetation. The forests comprise the red beech formation (*Fagus silvatica*), the pine formations (*Pinus leucodermis, P. peuce*), the fir formation (*Picea omorica*), the spruce and fir formation (*Picea vulgaris, Abies alba*), and the mixed formation, containing *Picea, Abies, Pinus, Fagus, Acer, etc.* The subalpine thickets are composed largely of *Pinus mughus, Rhododendrum, Juniperus, Alnus, Salix* and *Fagus.* The herbaceous vegetation comprises the subalpine herb, the alpine mat, and the peralpine rockfield formations.

The marine vegetation is considered briefly under the headings, litoral region and sea region; no formational limitation is attempted. The special consideration of the floristic of the vegetation is found in the third and fourth parts. The two charts, one showing the distribution of the formations over the entire country and vertically on the mountains, the other the vegetation regions, are excellent, and are of the greatest service in gaining a knowledge of the general features of the vegetation. The whole book impresses one with its modernness and thoroughness. The author moreover has been exceptionally happy in picturing formations by description, a fact which has caused the lack of numerous illustrations to be much less noticeable.

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SOCIETIES AND ACADEMIES.

AMERICAN MATHEMATICAL SOCIETY.

A REGULAR meeting of the American Mathematical Society was held at Columbia University on Saturday, April 26. The President of the Society, Professor Eliakim Hastings Moore, occupied the chair, yielding it during the afternoon session to Professor Thomas S. Fiske. Thirty-seven members were in attendance at the two sessions. The Council announced the election of the following persons to membership in the Society: Professor C. E. Biklé, Columbia University; Professor F. W. Duke, Hollins Institute, Va.; Dr. J. G. Hardy, Williams College; Professor H. L. Hodgkins, Columbian University; Dr. J. N. Ivey, Tulane University; Dr. J. H. McDonald, University of California; Dr. H. C. Moreno, Stanford University; Dr. T. M. Putnam, University of California; Dr. E. W. Rettger, University of California; Mr. W. H. Roever, Harvard University; Professor Irving Stringham, University of California; Dr. S. D. Townley, University of California; Mr. H. E. Webb, Stevens School, Hoboken, N. J.; Mr. A. W. Whitney, University of California. Three applications for admission to membership were received.