NOTICES OF WORK ON FOREIGN VEGETATION

VEGETATION OF PORTUGAL

Chodat, R. "Voyage d'études géobotaniques au Portugal." *Le Globe* (Geneva), **52**, 1913, 87 pages.

So far as floristic composition is concerned the vegetation of Portugal is not markedly different from that of Spain, but its distribution is peculiar. The vegetation of Spain is distributed in clearly marked zones, but over the whole of the coastal half of Portugal except the hottest parts of the two southernmost provinces (Algarve and Alemtejo), the plants of northern Europe flourish side by side with cacti, palms, aloes, tree-ferns and other (largely introduced) subtropical plants. This is largely due to the fact that the moisture-laden winds from the Atlantic penetrate a considerable distance inland but do not reach the interior of Spain. By far the greater part of Portugal is occupied by ancient (Archean and Palaeozoic) rocks and by eruptive masses probably belonging to various periods; all the higher mountains consist of these rocks, and only near the coast and in the plain of the Tagus are later deposits found. The climate is equable and temperate, the daily variation in temperature probably nowhere exceeding about 13° C., probably due to the very heavy rainfall received by Portugal as one of the westernmost countries of Europe and the one most exposed to the Atlantic. The rainfall may be as heavy as 500 cm. in a year, the annual average being from 100 to 150 cm.

The author gives an interesting account of a phytogeographical tour in the course of which all the main provinces of Portugal were visited. He begins with a sketch of the vegetation of the large southern province of Alemtejo—immediately north of the most southerly and small province of Algarve—and notes that *Pinus pinea* here reaches its northern limit, while the macchia formation is extraordinarily well developed and has a rich associated herbaceous flora. The macchia of the Serra de Ficalho (limestone) reaches a height of 2 m. and consists of myrtles, *Arbutus unedo*, *Asphodelus* spp., etc. On the Palaeozoic areas of this province there are characteristic shrub communities, of broom-like plants, including almost pure *Cistus ladaniferus* associations on the schist of the Serra d'Ossa, and the *Ulex* formation or "tojal" which includes numerous associated woody plants (*Arbutus*, *Erica umbellata*, *Lonicera etrusca*, *Adenocarpus intermedius*, *Rhamnus oleoides*, *Myrtus communis*, *Pinus pinaster*, etc.). After a return to Lisbon the second part of the tour included the Serra de Cintra and the "heath-steppes" near Cascaes, both lying to the north-west and west of the capital and near the coast, and the author discusses the remarkable mixture of Mediterranean and Central European species found in this region. The next section included a visit to the extensive pine forests near the coast north of Cintra, consisting of *Pinus pinaster* with isolated bushes of *Quercus lusitanica*, and an examination of the fixed and mobile portions of the extensive dunes and inland sandy areas which have been planted with various conifers and are characterised by the abundance of *Genista* and *Ulex* species—*G. tournefortii* and *G. hirsuta* being of Spanish origin, while of the 24 European species of *Ulex* 18 occur in Portugal, all save *U. europaeus* being here confined to the coast. Other interesting forests visited were the Pinetum of Ponte da Portella, near Coimbra, and the neighbouring ancient convent forest of Busaco, the latter a magnificent remnant of the primitive Atlantic forest vegetation which owes its preservation in large measure to the terrifying papal bulls issued in the

seventeenth century. The author points out the interesting analogies existing between the forest-macchie of Portugal and the laurineous forest of the Canary Islands, as well as their differences; after the severance of the land-connections between North Africa, Portugal and the Atlantic Islands in the Tertiary, various trees formerly common to this region died out of Europe, and in the forest-macchie the eastern and western elements are represented by *Rhododendron ponticum* and by *Prunus lusitanica* and *Davallia* respectively. On the steep precipices on the Douro near Oporto an uninterrupted macchia of arboreous *Erica* spp., laurels and *Genista* and *Ulex* species was examined. Finally, the maritime formations of Portugal are discussed; perhaps the most notable feature of these is the extraordinary number of *Armeria* species found—no less than 23 of the 45 known European species, and about 12 of them endemic. In a concluding general sketch of the vegetation, the author points out that despite the very high rainfall, especially in the north, the vegetation of Portugal is markedly xerophytic, probably because the precipitation diminishes too abruptly from the coast inland. An indication of this is seen in the total absence from Portugal of the beech, which the author calls "an Atlantic tree par excellence." The most widely distributed and abundant shrubs are all of a xerophytic facies—species of *Cistus*, *Erica*, etc.; while the trees are mostly conifers and evergreen or subevergreen oaks.

VEGETATION OF THE BORMIO REGION (LOMBARDY)

(I) **Furrer, E.,** und **Longa, M.** "Flora von Bormio." *Beih. z. Bot. Centralbl.*, **32**, Abt. 2, 1915, pp. 1–112, 1 map.

(II) **Furrer, E.** "Vegetationsstudien aus dem Bormioschen." *Vierteljahrschr. Naturf. Ges. Zürich,* **59**, 1914, 78 pages, 1 map.

The paper cited first consists of a list of the species growing in the Bormio district, thus forming a floristic supplement to the second paper which is concerned with the distribution of the vegetation. The list gives full data as to habitats, vertical and horizontal distribution, etc., of the 1124 species found (22 pteridophytes, 7 gymnosperms, 216 monocotyledons, 869 dicotyledons). The Bormio district forms part of the Italian province of Sondrio, occupying the extreme north of that country and including the Valtellina or valley of the Adda. The area investigated comprises about 200 sq. km., forms part of the Italo-Rhaetic Alps, abuts on Tyrol and southeastern Switzerland, and its lowest altitude is about 1000 m. The flora is essentially a central Alpine one, the species characteristic of the outlying chains being poorly represented as is also the deciduous forest flora.

In the second paper cited the author after describing the physiography, geology and climate of the district and comparing its flora with those of the neighbouring regions (southeastern Alps, Etsch and Inn drainage areas) gives a detailed account of the plant communities and the successions presented by them. The only deciduous forest represented in the area is that of *Alnus* (*Alnetum incanae*) which ascends to about 1600 m., the alder being associated with *Salix purpurea*. The coniferous forest formation is divisible into (1) *Picea excelsa* forest, frequently with *Larix* and *Pinus cembra* from 1700 m. upwards—the two latter trees extending to the forest limit at 2250 m.—and with *Linnaea borealis* as a characteristic species in the ground flora; (2) *Pinus montana* forest, the erect form of this tree occupying the flatter ground up to 2000 m., with undergrowth of dwarf shrubs like *Vaccinium* spp., *Rhododendron ferrugineum*, *Erica carnea*, *Juniperus*