Review

Source: *Journal of Ecology*, Vol. 5, No. 2 (Jun., 1917), pp. 113-114

Published by: British Ecological Society

Stable URL: <http://www.jstor.org/stable/2255646>

Accessed: 27-06-2016 05:39 UTC

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Journal of Ecology

whole of the enclosure will probably become dominated by healthy *Calluna* heath while the whole of the surrounding area becomes typical pure grass heath.

If the seeds of appropriate trees became deposited amongst the resulting *Calluna* on the protected area these trees would probably eventually dominate the *Calluna* on this area, and if the enclosed area were big enough a small patch of woodland surrounded on all sides by grass heath would ultimately be produced solely owing to the protection of this patch of ground from rabbit attack.

The exact details of the successive developmental phases of the progressive succession on this enclosed protected area inside the large rabbit-proof quadrat, from grass heath to *Calluna* heath and eventually to woodland, owing to the protection of this particular area from rabbit attack, will probably form a very interesting subject of observation.

NOTICE OF PUBLICATION ON FOREIGN VEGETATION

Braun, Josias. "Les Cévennes Méridionales (Massif de l'Aigoual), Étude Phytogéographique" [Études sur la Végétation Méditerranéenne I.]. Genève, 1915, pp. 207.

The *massif* of Mount Aigoual is a classical locality for the botanist, and has been the scene of "herborisations" since the sixteenth century. In recent years its vegetation has formed the subject of much study by Professor Flahault of Montpellier and his pupils. In 1903 a botanical garden¹—L'Hort de Dieu—was established 800 feet below the summit of the Aigoual (5093 feet), and to this Professor Flahault has given unwearied devotion. The memoir here noticed gives a systematic account of the plant communities (*groupements végétaux*) of the *massif*, as well as a description of the geography and climate.

Situation and Climate. The Cevennes, limiting the plains of Languedoc to the north, form a natural barrier between the Mediterranean vegetation and that of central and western France. The actual watershed between the Mediterranean and the Atlantic passes near the summit of the Aigoual *massif*. The climate of the upper regions is of course much wetter than that of the Mediterranean coast, the summit of the Aigoual itself receiving 2175 mm. of annual rainfall against 626 mm. at Palavas and 745 mm. at Montpellier. The most important differentiating factor is however the seasonal distribution of the rainfall in the Cevennes. 42 per cent. of the annual rain falls in the last three months of the year, while only 28 per cent. is received in the five months from April to August inclusive, and only 7 per cent. during July and August. This dry summer accounts for the strongly xerophilous vegetation of a region which receives the highest atmospheric precipitation in France. The author points out that Valleraugue and Le Vigan in the valleys of the Cevennes receive nearly three times as much rain as Belgium and yet the character of the Belgian flora is far more hygrophilous. Hence the ascent high into the

¹ A brief sketch of this garden was given by Mr Macgregor Skene, *New Phytologist*, **10**, 1911, p. 64, under the title "An Ecologist's Garden."

Cevennes of such characteristic Mediterranean plants, with coriaceous, strongly cutinised leaves, as *Quercus ilex*, *Arbutus*, *Phillyrea*, *Cistus*, *Smilax aspera* and *Rhamnus alaternus*. On the upper peneplain and on the slopes towards the Atlantic the distribution of rainfall resembles that of western and central France, the summer drought being less marked: correspondingly the Mediterranean types are almost wholly absent. The dominant wind is the dry and cold *bise* from the north-west. This plunges into the southern valleys of the Cevennes and debouches with fury on the littoral as the well-known *mistral*. The *marin* or *autan* is the southern and south-eastern wind laden with moisture from the Mediterranean and this brings most of the rain, while the less frequent westerly *aouro basse* or *traverse* brings fine and persistent rain from the Atlantic, but its effect does not cross the ridge. The author gives many valuable data on rainfall, temperature and wind.

Ecological concepts. The author takes the *association* as the fundamental unit. He minimises the importance of *dominants* as often ubiquitous, and lays stress on *constants* but particularly on *characteristics* as the most precise expression of the ecology of a community. Careful statistics give the constants, but observation alone (aided by experience) reveals the characteristic species, whose presence marks, according to the author, the more or less durable state of equilibrium between a community and its environment attained by the well defined fully evolved association. He insists on the importance of the geographical and genetic side of the study of associations. The *formation* he takes as independent of all geographical and historical considerations, "resting solely on the ecological principle," and (with Pavillard) denies the "genus-species" relationship between formation and association stated by the reporters (Flahault and Schröter) to the Brussels Congress of 1910. Consequently the author uses the term "groupe d'associations" for the unit of higher grade than the association. Within the association he distinguishes the *sub-association* (differing from the typical association by the absence of *special* characteristic species). The author adopts Raunkiaer's "spectrum" of biological forms but considers it not wholly satisfactory on the ground that the best bud protection is illusory if a plant begins its active growth at the outset of or during the unfavourable season, which may as well be a hot dry summer as the winter; and that nanism does not necessarily afford the best protection against extreme conditions, since temperatures are often more extreme on the ground than at a little distance above. The whole of the author's discussion of concepts is perspicacious and valuable. He clearly shows the influence of what may be called the floristic school of ecologists.

Systematic description. Sixteen groups of associations are described, some characterised by the edaphic habitat, others by the dominant plant forms. Each is described as of the "type" of a characteristic species, which may or may not be a dominant. Many of the associations described are semi-natural, i.e. they owe their existence to felling, grazing, irrigation, etc. Sheep grazing has had a very destructive effect in the upper regions.

The altitudinal stages of vegetation are represented by that of *Quercus ilex* (up to 600 m.), of *Q. sessiliflora* (600 to 1050 m.) and of *Fagus* (1050 m. to the summits). The last differs markedly in character and climate from the two lower stages. A great number of species do not descend below its lower limit, and outside the beechwoods themselves (which have been largely destroyed though active afforestation is now proceeding) such types as *Calluna*, *Genista pilosa*, *Deschampsia flexuosa*, *Nardus*, *Festuca spadicea* and *Agrostis vulgaris* dominate the communities. The beech stage on the Aigoual massif is in fact an islet of northern vegetation corresponding to an almost oceanic climate characterised by a lower temperature and much greater atmospheric moisture, with abundant rain, frequent mists even in July and August and an average of only about a fortnight of drought. The small beech forest of Sainte Baume in Provence on the other side of the Rhone valley, and situated at an even lower elevation on a very steep northerly exposure is another instance of the same kind.