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Algal Vegetation of Dolomite Rocks

Die Algen-Vegetation der Sudtiroler Dolomitenriffe. by L. Diels

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by the metabolic products present in fir humus, including various oils, esters, tannin, formic acid, etc. These substances were added to ordinary soil and were found to retard growth, both in seedlings and in older plants, usually in a marked degree; in many cases the presence of these bodies even in moderate concentration caused death of the seedlings, though older plants were able to recover after a time. The author also tried the effect of the vapour of the ethereal oils upon the aerial parts of the plants (*Impatiens*, *Brassica*, *Lepidium*, etc.) and obtained similar results. He next investigated the influence of these substances on the soil-inhabiting lower organisms and found that they injuriously affected the growth and fermentative activity of yeasts, and either reduced greatly the numbers of bacteria present or strongly inhibited their development and activity; the bacteria tried included the ammonifying and nitrifying species. It would therefore appear from the author's results that the meagre growth of plants in coniferous woodland may be in large measure attributed to the toxic action of the oils and other metabolic substances produced by conifers and found in the humus formed by these trees.

ORGANIC MATTER OF THE SEA BOTTOM

Boysen-Jensen, P. "Studier over Havbundens organiske Stoffer." *Danske Biol. Sta.*, Copenhagen, **22**, 1914, pp. 1-36.

The author has investigated the relative contributions of the plants of the *Zostera* belt on one hand and the plankton organisms on the other to the accumulated organic matter of the sea bottom in various parts of the Danish seas. He finds that *Zostera* is much richer than the plankton organisms in pentosan compounds (a class of carbohydrates), the sea bottom organic matter being intermediate in this respect. Apparently this bottom material is almost exclusively derived from *Zostera* in the case of the more land-locked waters (bays and lagoons), while the plankton organisms play a more important part as source of this material in the more open coast waters, as in the Kattegat. Calculations of the amounts of plankton and *Zostera* produced per sq. metre in the Danish waters inside the Skaw showed that the production of phytoplankton was about 100 gm. and that of *Zostera* about 120 gm. per sp. m. Apparently only a small part of the plankton production is deposited on the sea bottom, this deposition occurring evenly, and the result of these calculations agrees well with that of the chemical analyses. The bottom organic matter contains more nitrogen than does the *Zostera*, and it was found that the latter contained more nitrogen in the later than in the earlier stages of its decomposition—a result which may be explained either by the more rapid destruction of the non-nitrogenous than the nitrogenous substances, or by the occurrence of nitrogen assimilation, or by a combination of both these processes.

ALGAL VEGETATION OF DOLOMITE ROCKS

Diels, L. "Die Algen-Vegetation der Südtiroler Dolomitenriffe." *Ber. d. deutsch. bot. Ges.*, **32**, 1914, pp. 502-526.

The author has made a minute and careful study, with interesting results, of the lithophytic algal vegetation of a dolomite rock-wall, sloping south-southeast and situated at an altitude of about 1300 m. in the Weisslahn valley, Tyrol; the rocks in other localities were also examined with similar results. The vegetation (lithophyte formation)

of these bare dolomite rocks consists almost exclusively of algae; the somewhat general view that encrusting lichens form the characteristic pioneer rock vegetation was found not to apply to these rocks at any rate. The author found algae growing in the rock at a depth of 4–8 mm. from, and quite unconnected with the vegetation of, the surface and he therefore draws a somewhat sharp distinction between the superficial and the embedded forms, called respectively epilithophytes and endolithophytes.

The epilithic forms live in a layer of altered dolomite, acted upon from without by water with dissolved carbon dioxide and from within by water containing lime, which on evaporation is left behind. The pioneers are Cyanophyceae (blue-green algae) of the genus *Gloeocapsa* (sections *Cyanocapsa* and *Xanthocapsa*), and since the violet forms predominate the author calls this pioneer association a Cyanocapsetum; it invariably appears where the rock-face is streaming with water during the wet months of the year. The members of the Cyanocapsetum prepare the substratum, partly by binding together detritus particles, lime fragments, etc., partly by their own decay, for the settling-in of filamentous Cyanophyceae of the genus *Scytonema*, which give rise to a Scytonemetum, more or less completely displacing the Cyanocapsetum. The fact that lichens rarely settle on these rock-faces is attributed by the author to the vertical position of the rocks and the resulting rapid run-off of water from them.

The endolithic vegetation begins with the formation of streaks or bands below the surface, the commonest alga found being a *Gloeocapsa* with a thick colourless gelatinous envelope. This form evidently plays the part of pioneer, and after a time there become associated with its colonies various other *Gloeocapsa* species, also a *Nostoc* and a *Lyngbya*, while in some places another member of the Chroococcaceae, a species of *Aphanothece*, plays the same part as the *Gloeocapsa*. Later, there come in an undetermined green algal form and *Trentepohlia aurea*, the latter growing chiefly in the upper layers and forming a suitable substratum for penetrating fungi, so that the beginnings of lichen formation are frequently observed at this stage. The endolithic algae apparently enter at very fine cracks in the rock surface, which they enlarge and cause to become branched, partly by the mechanical pressure exerted in their growth, partly by chemical action of a doubtless complex nature. Dolomite is relatively transparent, so that plants at a depth of 6–8 mm. receive sufficient light for photosynthesis; the algae in this deep zone are arranged in layers parallel with the surface and at right angles to the incident light. The better lighted outer part of the sunken zone is occupied by *Trentepohlia*, the inner part by the Chroococcaceae and Pleurococcaceae. The endolithic forms probably obtain their nitrogen from atmospheric ammonia and nitric acid.