A Short Note on some Soil Algae from New Guinea

By Anne Johnson

Small samples of soil from the Australian Territory of New Guinea were received together with bryophytes collected by Professor H. B. Gilliland in 1960. These samples were kept in polythene bags and, owing to transport difficulties, did not reach this laboratory until one year after their dispatch. The soil was carefully separated from the bryophytes which have been described in a previous paper. Two sets of soil cultures were set up:—

(i) moist cultures, i.e. samples of soil placed in sterile petri-dishes and exposed to continuous light;

(ii) liquid cultures in nutritive medium, following the method of John (1942).

In both types of culture there was vigorous growth of algae and there was considerable correspondence between algae which appeared in moist and liquid culture of the same sample.

Four samples were obtained from localities on the Daulo Pass, 6,000–8,000 ft.; while a fifth was obtained from Chimbu. In all cases the soil was collected from 1–2 cm. of the surface.

Chlorophyceae
Chlorococcales
Chlorellococum humicolum (Naeg.) Rabenh.
Liquid culture, soil from Chimbu.

Scenedesmus obliquus (Turp.) Kutz
Liquid culture, soil from Chimbu.

Dactylococcus stage of Scenedesmus obliquus (Turp.) Kutz. (see Grintzesco (1902))
Liquid culture, soil from Daulo Pass, 6,000–8,000 ft.

Cyanophyceae

Chroococcales
Chroococcus varius A. Br.
Liquid culture, soil from Daulo Pass, 6,000–8,000 ft.

Chamaesiphonales
Dermocarpa hemisphaerica Satchell & Gardner
Moist culture, epiphytic on Lyngbya mesotrichia Skuja from Daulo Pass, 6,000–8,000 ft.

Nostocales
Lyngbya mesotrichia Skuja
Moist culture and liquid culture from Daulo Pass, 6,000–8,000 ft.

Phormidium jadinianum Gomont
Moist and liquid culture from Daulo Pass, 6,000–8,000 ft.
Symploca elegans Kutzing ex Gomont
Moist culture, soil from Chimbu.

Nostoc linckia (Roth) Bornet ex Born. et Flah.
Moist and liquid culture, soil from Daulo Pass, 6,000–8,000 ft.

Nostoc microscopicum Carm. ex Born. et Flah.
Moist culture, soil from Daulo Pass, 6,000–8,000 ft.

Scytonema pseudopunctatum Skuja
Moist culture, soil from Daulo Pass, 6,000–8,000 ft.

Discussion

The pH of the samples of soil from the Daulo Pass and Chimbu was about 5.3 when they reached the laboratory. The pH of the nutritive solution used in the liquid culture was 5.6. There was no change in the pH of the moist culture over a two month growing period. Most of the liquid cultures showed a gradual rise of pH to 6.2 in some cases. In a few liquid cultures with sparse growth there was little change in pH.

While cultures of soil algae are of little direct value from an ecological point of view, they are almost essential in obtaining a complete algal flora of a soil (Tiffany, 1951). In the soil, algae are so very small and widely dispersed they are easily overlooked. In the moist cultures, samples of soil were given additional light over 24 hours/day which led to enhancement of algal growth; while in liquid cultures additional nutrients were also supplied. These cultures tell us little of the relative abundance of the different algae in the natural habitat, but they do indicate which species of algae are present in these particular soils.

The results given above indicate the occurrence of eight species of blue-green algae but only two species of Chlorophyceae. No diatoms were recorded. This may be due to the scarcity of diatoms in the habitat, or to the fact that the method of culture is unsuitable for diatom growth. Their complete absent even from moist cultures suggests the former. Lund (1945) has indicated that diatoms are absent in acid soils.

The relative large numbers of species of Cyanophyceae in tropical soils was noted for Ceylon by Fritsch (1907, 1907*) and in Lahore and Simla by Ghose (1923). This was considered to be due to their preference for high temperatures, damp atmosphere. Their blue-colour may act as a screen against intense light while lowland forms are able to withstand desiccation. Highly mucilaginous blue-green algae (e.g. Nostoc spp.) are most suited to damper upland conditions. Fritsch (1907) found slimy forms at Nuwara Eliya and Hakgalla at a height of 6,000 ft. and more.
References


