

Dictyostelium mucoroides from Subantarctic Campbell Island

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Abstract: *Dictyostelium mucoroides* is reported from subantarctic Campbell Island, where it was isolated from two samples of soil/litter collected on the island in the spring of 2000. This is only the second record of a dictyostelid from the subantarctic, with the same species recorded from subantarctic Macquarie Island in 1995.

Keywords: cellular slime molds, dictyostelids, New Zealand

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Introduction

Campbell Island (52.54° S, 169.14° E) is an isolated subantarctic island located approximately 700 km northeast of Macquarie Island and about the same distance from mainland New Zealand. The climate of Campbell Island is cool maritime, with variations in daily and annual temperatures small. The mean annual temperature is 7 C, with daily temperatures rarely going above 12.1 C. The island has a fairly complete cover of vegetation that is similar to but much less biodiverse than the vegetation of Macquarie Island. There are almost three times as many species of vascular plants on Campbell Island as compared to Macquarie Island, and the former has a few woody plants which are absent on the latter. Giant megaherbs are the most conspicuous vascular plants present (Fell 2002).

Materials and methods

Sampling

A total of 60 samples of soil/litter were collected from several localities on Campbell Island in the Spring of 2000. All samples, each approximately 30–50 g, were collected and placed in sterile whirl-pack plastic bags. Samples were mailed to the laboratory at Shepherd University and processed as soon as possible, as recommended by Cavender and Raper (1965).

Isolation and Cultivation

The isolation methods were those described by Cavender and Raper (1965). Each sample was weighed, and enough sterile distilled water added to obtain an initial soil/water dilution of 1:10. This mixture was shaken to disperse the material and to suspend the cells of dictyostelids present. A 5.0 ml volume of this initial dilution was added to 7.5 ml of sterile, distilled water to create a 1:25 dilution of sample material. Aliquots (each 0.5 ml) of this suspension were added to each of two 95 x 15 mm Petri dishes prepared with hay (leached and dried, mostly *Poa* sp.) infusion agar (Raper 1984). This produced a final dilution of 0.02 g of soil per plate. Approximately 0.4 ml of a heavy suspension of 12–24 hr *E. coli* was added to each culture plate, and plates were incubated under diffuse light at 20–25 C. A pH measurement was taken of each diluted soil sample. Each inoculated plate was examined at least once a day for several days following appearance of initial aggregations, and the location of each aggregate clone marked. Aggregations, pseudoplasmodia, and sorocarps appeared from 2 to 10 days following inoculation of the plates. Isolates of interest were subcultured from spores on low nutrient agar with *E. coli* and also spores were conserved in tubes of silica gel granules at 4 C as described in Raper (1984)

Results

The pH of the 60 diluted Campbell Island soil samples ranged from 4.8 to 7.4. Dictyostelids (cellular slime molds) were observed in each of the two plates prepared from two of the 60 samples processed. Those two samples had measured pH values of 7.2 and 7.3. A total of 128 clones, all corresponding to *Dictyostelium mucoroides* were enumerated. Refrigerated tubes of silica gel tubes containing spores collected from these plates were transferred to the laboratories of the AmebaGone corporation in Madison, Wisconsin for further study. AmebaGone determined the conserved spores of the Campbell Island *D. mucoroides* to be still viable as of June 2017.

Discussion

The biodiversity of dictyostelids is known to be very low at the highest latitudes in the Northern Hemisphere. For example, Cavender (1978) and Stephenson et al. (1991) reported only two species from tundra in northern Alaska. Presumably, the slow rate of decomposition of organic material because of low temperatures, the resultant low numbers of bacteria upon which dictyostelids feed, the often saturated ground in places where the terrain is relatively flat, and the typically low pH of the soil pose severe constraints on their survival.

True tundra doesn't exist in the Southern Hemisphere, but tundra-like vegetation exists on Campbell Island and Macquarie Island because of the harsh environmental conditions. *Dictyostelium mucoroides*, the dictyostelid recorded from the two islands, is perhaps the most common and widespread species throughout the world. Moreover, it is the species most commonly isolated from samples of tundra soil, so its occurrence in the subantarctic might not be surprising.

The low frequency of occurrence of *Dictyostelium mucoroides* in the samples from Campbell Island suggest that it is not especially common, which was also the case on Macquarie Island. Interestingly, the question could be asked as to how dictyostelids can be dispersed to isolated islands, since their spores do not appear to be wind-dispersed as is true for many other groups of microorganisms. However, it is known that ground-feeding birds can transport viable spores of dictyostelids in their guts (Suthers 1985).

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