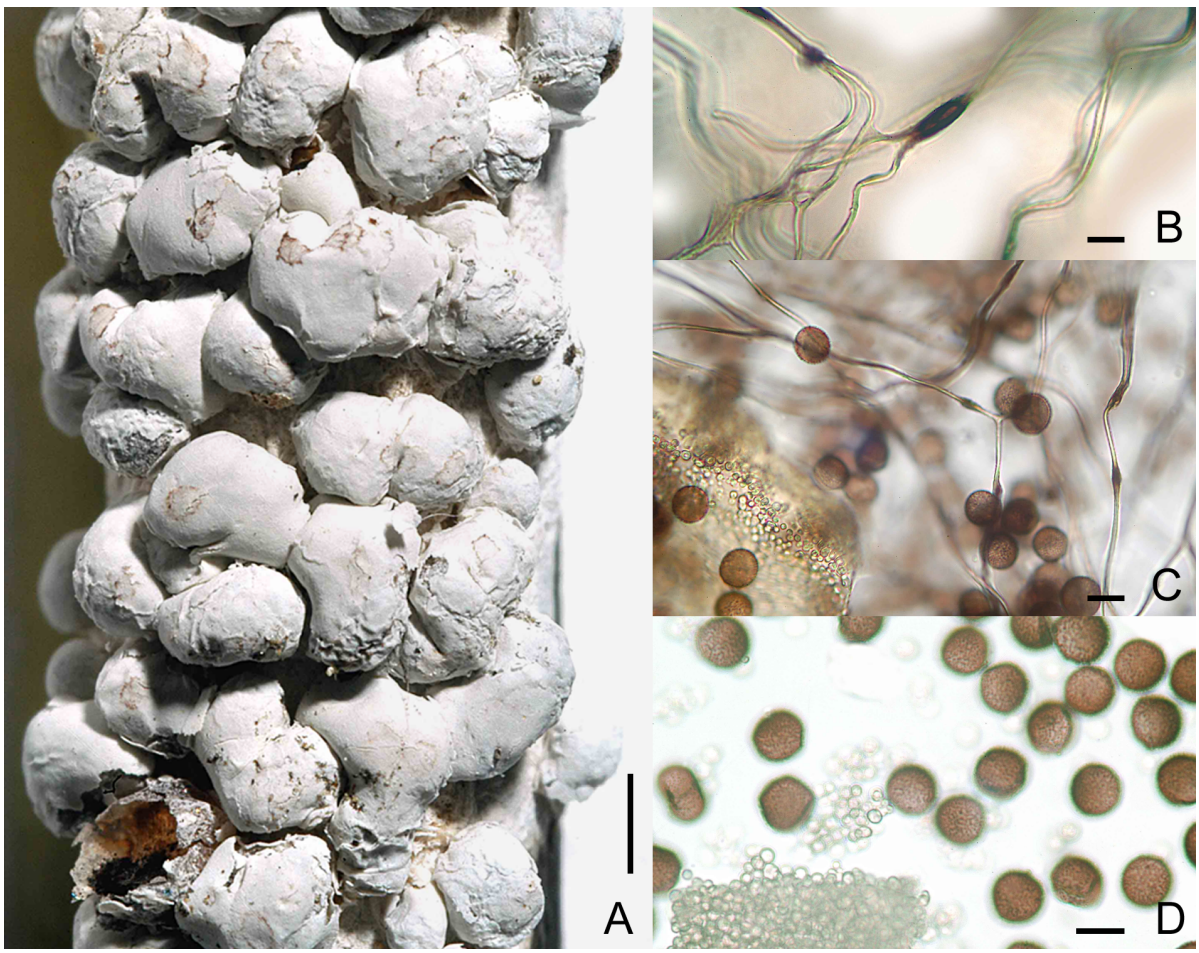
IMI Descriptions of Fungi and Bacteria
No. 1832

DIDERMA ALPINUM



A. Sporocarps (bar = 1 mm). **B**. Capillitium (bar = 10 µm). **C**. Capillitium and spores (bar = 10 µm). **D**. Spores (bar = 10 µm) [Photographs: A. Michaud].

Diderma alpinum (Meyl.) Meyl., *Bulletin de la Société Vaudoise des Sciences Naturelles* **51**: 261 (1917). [*Index Fungorum* 356474]

Diderma globosum var. *alpinum* Meyl., *Annuaire du Conservatoire et du Jardin Botanique de Genève* **15–16**: 310 (1913). [*Index Fungorum* 136908]

Diderma microcarpum Meyl., *Bulletin de la Société Vaudoise des Sciences Naturelles* **55**: 240 (1924). [*Index Fungorum* 461890]

Diderma alpinum f. *microcarpum* (Meyl.) G. Moreno, H. Singer & Illana, in Moreno, Singer, Illana & Sánchez, *Cryptogamie* Mycologie **24**(1): 57 (2003). [*Index Fungorum* 488976]

Diderma alpinum var. *macrosporum* Meyl., *Bulletin de la Société Vaudoise des Sciences Naturelles* **58**: 319 (1935). [*Index Fungorum* 256517]

Diderma alpinum f. *macrosporum* (Meyl.) H. Singer, G. Moreno & Illana, *Mycotaxon* **89**(2): 319 (2004). [*Index Fungorum* 488067]

Diderma globosum var. *europaeum* Buyck, *Bulletin du Jardin Botanique National de Belgique* **58**(1–2): 199 (1988). [*Index Fungorum* 133497]

Diderma alpinum f. *europaeum* (Buyck) H. Singer, G. Moreno & Illana, *Mycotaxon* **89**(2): 319 (2004). [*Index Fungorum* 488066]

Diagnostic features. The genus *Diderma* can usually be distinguished in the field by the matt calcareous or egg-shell-like character of the peridium. The nivicolous members of this genus are easily confused, but *Diderma alpinum* can sometimes be distinguished by the combination of an obvious and continuous hypothallus uniting all sporocarps, a smooth peridium, a light-coloured delicate capillitium with dark spindle-shaped bodies, and spores 11–13 µm diam.

Sporocarps as individual but clustered sporangia, 0·7–1·7 mm diam., or closely appressed and forming short plasmodiocarps, 1·6–2·0 × 0·5–0·7 mm, sessile, pulvinate or irregularly subglobose and flattish (but sometimes forming more complex structures with lobes and hollows), white and calcareous, but dark, glossy brown when lime is lacking. *Hypothallus* either scarcely developed or conspicuous and then calcareous, white to ochraceous yellow. *Peridium* with irregular dehiscence, with two layers, the outer white and calcareous layer readily separating from the inner, smooth, pinkish white to grey membranous layer, and the base lined with an orange membrane. *Columella* greyish white to pale ochraceous orange, variable in shape, pulvinate and then occupying much of the base of the sporocarp, or ± globose and then up to 1 mm diam., arising from the peridium base. *Capillitium* abundant, hoary to violaceous white, consisting of delicate, radiating and sparsely anastomosed, sinuous threads *c.* 1 µm diam., which sometimes bear scattered darker nodules and dark brown spindle-shaped structures, branched and paler towards the periphery. *Spores* black in mass, individually purple-brown to violaceous, globose, (10–)11–13(–14) µm diam., distinctly spinulose. SEM shows the ornamentation to be formed by baculum-shaped structures with irregular, ± coralloid apices. *Plasmodium* white.

ASSOCIATED ORGANISMS & SUBSTRATA: **Plantae**. *Alnus viridis* (Chaix) DC.; *Deschampsia alpina* (L.) Roem. & Schult. (leaf), *D. cespitosa* (L.) P. Beauv. (leaf); *Empetrum nigrum* L.; *Juncus trifidus* L. (leaf); *Larix* sp.; *Nardus stricta* L. (leaf); *Plantae* indet. (bark, detritus, litter, stem); *Rubus* sp.; *Vaccinium myrtillus* L. (stem).

INTERACTIONS & HABITATS: The ecological rôle played by myxomycetes (see Notes below) remains poorly understood. In general, these organisms are thought to be mainly saprobic, feeding only during their vegetative (also called 'plasmodial') state, and not feeding when in their fruiting state. They may be encountered on living plant material (e.g. leaves and twigs) in both vegetative and fruiting states, but in such cases the plant material is only a substratum, not a source of nutrition. When myxomycetes are found in their vegetative state specifically on dead plant material, that material may be both a substratum and a source of nutrition. It is also possible that, in their vegetative state, myxomycetes feed on dead animal remains, living and dead bacteria, fungal hyphae and spores, and other organic material. Nothing is known about interactions between the present species and other organisms, but its associated organisms, ecological preferences and geographical distribution suggest that, in interactions, it is similar to this general picture. *Diderma alpinum* is one of the so-called 'nivicolous' or snowline myxomycetes, found on both living and dead plant material next to melting snow patches in mountainous habitats, typically where there is high insolation in spring. In the 'nivicolous' habitat, snow cover prevents abrupt soil temperature changes between night and day, provides free water and a ground-level microclimate beneath or near the melting snow favourable for development of vegetative and fruiting stages. RONIKIER & RONIKIER (2009), reviewing this ecological group, found they were typically montane, i.e. upland forest zone, in distribution rather than subalpine or alpine. *Diderma alpinum* has been recorded at altitudes varying from 560 to 2460 m above mean sea level.

GEOGRAPHICAL DISTRIBUTION: AFRICA: Morocco. NORTH AMERICA: USA (Alaska, California, Colorado, Montana, Utah, Virginia, Washington). SOUTH AMERICA: Brazil. ANTARCTICA: Macquarie Island. ASIA: India, Japan, Nepal, Uzbekistan. AUSTRALASIA: Australia (Tasmania, Victoria), New

Zealand. EUROPE: Austria, Finland, France, Germany, Greece, Italy, Poland, Russia (Moscow oblast), Slovenia, Spain, Switzerland, UK, Ukraine.

ECONOMIC IMPACTS: Lack of information makes it impossible to place a monetary value on the ecological rôle of this species. There are no reports of it causing economic damage to crops or other organisms of value to humans, or of its use by humans. Each year, a few field meetings are organized in Europe devoted to the study of nivicolous myxomycetes, which therefore collectively generate low levels of nature tourism.

INFRASPECIFIC VARIATION: Several subspecific taxa have been described at form and varietal ranks. Following SINGER *et al*. (2004), *D. alpinum* f. *microcarpum* has sporocarps <1 mm diam., *D. alpinum* f. *macrosporum* has spores >14 µm diam., *D. alpinum* f. *alpinum* has a columella which is subglobose to globose, and *D. alpinum* f. *europaeum* has a columella which is flat to broadly convex.

DISPERSAL & TRANSMISSION: By spores. Insects may play a significant rôle in dispersal, as myxomycete spores are regularly found in their faeces. Other forms of spore dispersal probably include wind and melt water.

CONSERVATION STATUS: **Information base**. Over 1000 records from 1913 to 2009. The species has been recorded in February, March, April, May, June, July, September, October, December, with the main fruiting season in the northern hemisphere from May to June. Listed as 'data deficient' for New Zealand (*www.doc.govt.nz/upload/documents/science-and-technical/TSOP23.pdf*). **Threats**. This species is threatened by climate change. The strong association between 'nivicolous' myxomycetes and melting snow patches suggests that their distribution is likely to be strongly and negatively affected by global warming as winter snow cover diminishes in mountain regions. This is likely to result in these species gradually moving to higher altitudes and then becoming isolated at the tops of high mountains with no opportunity to move to higher latitudes. **Evaluation**. Using IUCN criteria (IUCN SPECIES SURVIVAL COMMISSION. *2006 IUCN Red List of Threatened Species*, *www.iucnredlist.org*. Downloaded on 15 May 2006), the species is assessed globally as near threatened. **In situ**. There are no known conservation plans or activities specifically prepared for this species. **Ex situ**. No preserved living strains of this species are listed by the *World Federation of Culture Collections* (*http://wdcm.nig.ac.jp/wfcc/datacenter.html*).

NOTES: *Diderma alpinum* is a myxomycete, i.e. a member of the protozoan phylum *Mycetozoa*. Although not strictly fungi, myxomycetes (also known as 'slime moulds') have been studied traditionally by mycologists. MITCHELL *et al.* (1980) and other authors have considered *D. alpinum* to be conspecific with *D. niveum* (Rostaf.) T. Macbr. but, while it closely resembles that species, it is usually plasmodiocarpous, closely appressed and slightly flat; unlike *D. niveum*, the hypothallus is also usually conspicuous and calcareous, and the capillitium usually paler. It is also more likely to occur in a glossy, limeless form than *D. niveum*. Many authors have suggested that it is merely a plasmodiocarp form of the commoner species but the separating features are constant.

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Sources additional to those already cited from literature and the internet include:

- **On-line databases**. *Cybertruffle*, *www.cybertruffle.org.uk/robigalia*, 2 records.
  Fungal Records Database for the British Isles, *http://194.203.77.76/fieldmycology/*, 5 records.
  Global Biodiversity Information Facility, *http://data.gbif.org*, 850 records.
  USDA Fungal Database, *http://nt.ars-grin.gov/fungaldatabases/index.cfm*, 10 records.
- **Personal communication**. M. Meyer.

See also the following internet pages:

- *http://eumycetozoa.com*;
- *http://slimemold.uark.edu*;
- *www.discoverlife.org/mp/20m?kind=Diderma+alpinum*.

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