



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

Diacheopsis metallica Meyl., *Bulletin de la Société Vaudoise des Sciences Naturelles* **57**: 149 (1930). [*Index Fungorum* 270993]

Diagnostic features. The genus *Diacheopsis* is distinguished by small, sessile sporocarps with a shiny metallic surface. Within the genus, *D. metallica* is distinguished by its nivicolous habit and by spore size.

Sporocarps as individual clustered or sometimes scattered sporangia, flattish, pulvinate or irregularly subglobose, occasionally slightly elongated, 1.5–3 \times 0.8–2.0 mm, sessile on a broad base, purple-brown, shiny, metallic, iridescent with green, blue or purple reflexions, or sometimes dull. *Hypothallus* a thick, reddish brown layer. *Peridium* persistent, often wrinkled, thin, membranous, transparent, firmly attached to the capillitial tips. *Capillitium* arising from the sporocarp base, branched and anastomosed, dense when viewed with a hand lens, but when viewed with a compound microscope forming a lax network of hollow, colourless to brown tubules, c. 1.5 μ m wide, with wider, usually triangular, nodes. *Spores* in mass black to purple-brown, individually purple-brown to dusky brown, uniformly coloured, globose, spinose, (12–)13–

16 µm diam. including ornamentation which is sparse and irregular, the spines being c. 0.7 µm tall. *Plasmodium* not observed.

ASSOCIATED ORGANISMS & SUBSTRATA: *Plantae*. *Plantae* indet. (stem); *Vaccinium myrtillus* L.

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. *Diacheopsis metallica* 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. *Diacheopsis metallica* has been recorded at altitudes varying from 60 to 4000 m above mean sea level, with most between 1000 and 2000 m.

GEOGRAPHICAL DISTRIBUTION: NORTH AMERICA: Canada (British Columbia), USA (California, Nevada, Oregon, Utah, Washington). ASIA: Japan, Russia (Respublika Buryatia, Sverdlovskaya oblast). AUSTRALASIA: New Zealand. EUROPE: Austria, France, Russia (Perm oblast), Switzerland.

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: None reported.

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.** Nearly 200 records from August 1928 to 2003. The species has been recorded in January, April, May, June, July, August, September, October, November, with the main fruiting season in the northern hemisphere from April to June. *Diacheopsis metallica* has been described as probably the most common and widespread member of its genus (<http://nzfungi.landcareresearch.co.nz>). **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://wcdm.nig.ac.jp/wfcc/datacenter.html>).

NOTES: *Diacheopsis metallica* 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. KOWALSKI (1975*a, b*) reported that a search for type material of this species in the fungal dried reference collection of Lausanne (LAU) found only one preserved microscope slide, possibly from the type collection. This slide, studied by Charles Meylan, was examined by MORENO *et al.* (2006), who designated a neotype. They also compared European and American collections of *Diacheopsis metallica* with *Diacheopsis kowalskii* and concluded that the two species are distinct due to differences in spore size and capillitium morphology. In some reference collections, specimens labelled as *D. metallica* may, in fact, be *D. kowalskii*.

LITERATURE & OTHER SOURCE MATERIAL: BOZONNET, J.M., MEYER, M. & POULAIN, M. À propos de *Diacheopsis metallica* Meylan. *Beiträge zur Kenntnis der Pilze Mitteleuropas* **6**: 29–33 (1990). KOWALSKI, D.T. The myxomycete taxa described by Charles Meylan. *Mycologia* **67**(3): 448–494 (1975*a*). KOWALSKI, D.T. The genus *Diacheopsis*. *Mycologia* **67**(3): 616–628 (1975*b*). KUHNT, A. Nivicolous Myxomyceten aus Deutschland (unter besonderer Berücksichtigung der Bayerischen Alpen). Teil V [Nivicolous myxomycetes from Germany (with special attention to the Bavarian Alps). Part V]. *Mycologica Bavarica* **11**: 49–64 (2010). MEYLAN, C. Note sur un nouveau genre de myxomycetes. *Bulletin de la Société Vaudoise des Sciences Naturelles* **57**: 147–149 (1930). MITCHELL, D.W. The *Myxomycota* of New Zealand and its island territories. *Nova Hedwigia* **55**(1–2): 231–256 (1992). MORENO, G., SINGER, H., SÁNCHEZ, A. & ILLANA, C. *Diacheopsis metallica* and *Diacheopsis kowalskii*: comparison of two distinct myxomycete species. *Mycological Progress* **5**(3): 129–135 (2006). RONIQUIER, A. & RONIQUIER, M. How ‘alpine’ are nivicolous myxomycetes? A worldwide assessment of altitudinal distribution. *Mycologia* **101**(1): 1–16 (2009). YAMAMOTO, Y. & TAMAYAMA, M. [*Diacheopsis metallica*, a new record from Japan]. *Myxomycetes Bulletin of the Japanese Society of Myxomycetology* **13**: 5–6 (1995).

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

- **On-line databases.** *Global Biodiversity Information Facility*, <http://data.gbif.org>, 179 records. *USDA Fungal Database*, <http://nt.ars-grin.gov/fungalatabases/index.cfm>, 4 records.
- **Personal communication.** M. Meyer.

See also the following internet pages:

- <http://eumycetozoa.com>;
- <http://slimemold.uark.edu>;
- www.discoverlife.org/mp/20m?kind=Diacheopsis+metallica.

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