



**A.** Sporocarps (bar = 1 mm). **B.** Spores (bar = 10  $\mu$ m). **C.** Spores (bar = 10  $\mu$ m). **D.** Peridium, showing stained areas, with spores (bar = 250  $\mu$ m) [Photographs: A. Michaud].

**Lamproderma echinosporum** Meyl., *Bulletin de la Société Vaudoise des Sciences Naturelles* **55**: 240 (1924).  
[*Index Fungorum* 263733]

*Diagnostic features.* Nivicolous species of *Lamproderma* have dark, often blackish, metallic, iridescent, shiny, separate, globose or nearly globose and stipitate to sessile sporocarps. Sporocarps of *Lamproderma echinosporum* are sessile or substipitate and on a narrow base. It may be distinguished from other similar nivicolous species of *Lamproderma* by its spore ornamentation, with large irregularly distributed spines.

*Sporocarps* as individual sporangia, scattered or in small groups, 1.0–1.5 mm diam., ovoid to globose, mottled with numerous depressed, dark areas (a feature of those *Lamproderma* species which have a stained peridium), dark brown to blue, dull or slightly iridescent, sessile or substipitate, the stalk, when present, c. 1 mm long and shiny brownish black. *Hypothallus* confluent or discoid, thin, transparent reddish brown. *Peridium* membranous, thin, usually persistent, splitting irregularly, stained with orange-brown areas

visible with the compound microscope. *Columella* black, usually attaining 66% of the total sporocarp height, often branching at the apex. *Capillitium* forming a distinct, dense net with abundant free ends, dark brown throughout, colourless only at the extreme tips, composed of threads of  $\pm$  uniformly 2–4  $\mu\text{m}$  diam., usually not expanded in the axils, often covered with numerous nodules *c.* 5–10  $\mu\text{m}$  diam. *Spores* in mass dark brown, individually dusky brown, globose, 13–16  $\mu\text{m}$  diam. including ornamentation in the form of large irregularly distributed spines up to 1  $\mu\text{m}$  long.

**ASSOCIATED ORGANISMS & SUBSTRATA:** **Plantae.** *Pinus uncinata* Ramond ex DC. (bark, twig); *Rubus* sp.; *Vaccinium myrtilillus* 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. *Lamproderma echinosporum* 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. There are records varying in altitudinal range from 110 to 2000 m above mean sea level, but the species is most often found from 1100 to 1800 m.

**GEOGRAPHICAL DISTRIBUTION:** NORTH AMERICA: Mexico, USA (California, Colorado, Washington). SOUTH AMERICA: Argentina. ASIA: Japan. AUSTRALASIA: New Zealand. EUROPE: Austria, Czech Republic, France, Germany, Italy, Norway, Spain, Switzerland, 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:** 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.** Over 1000 records from 1924 to 2007. The species has been recorded in March, April, May, June, July, August, with the main fruiting season in the northern hemisphere from April to June. **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](http://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://wdcn.nig.ac.jp/wfcc/datacenter.html>).

**NOTES:** *Lamproderma echinosporum* 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.

**LITERATURE & OTHER SOURCE MATERIAL:** BOZONNET, J.M., MEYER, M. & POULAIN, M. Espèces nivales de *Myxomycetes*. *Bulletin de la Société d’Histoire Naturelle du Pays Montbéliard* 1991: 51–72 (1991). DENNISON, M.L. The genus *Lamproderma* and its relationships. I. *Mycologia* 37(1): 80–108 (1945). ING, B. *The Myxomycetes of Britain and Ireland An Identification Handbook* (Slough, UK: Richmond Publishing): 374 pp. (1999). JOHANNESSEN, E.W. New and interesting *Myxomycetes* from Norway. *Nordic Journal of Botany* 4(4): 513–520 (2008). KOWALSKI, D.T. The species of *Lamproderma*. *Mycologia* 62(4): 621–672 (1970a). KOWALSKI, D.T. Concerning the validity of *Lamproderma echinosporum*. *Madroño* 20: 323–326 (1970b). KOWALSKI, D.T. The myxomycete taxa described by Charles Meylan. *Mycologia* 67(3): 448–494 (1975). LADO, C. & RONIQUIER, A. Nivicolous myxomycetes from the Pyrenees: notes on taxonomy and species diversity. *Nova Hedwigia* 89(1–2): 131–145 (2009). MEYLAN, C. Recherches sur les Myxomycètes du Jura en 1921–22–23. *Bulletin de la Société Vaudoise des Sciences Naturelles* 55: 237–244 (1924). MITCHELL, D.H., CHAPMAN, S.W. & FARR, M.L. Notes on Colorado fungi IV: *Myxomycetes*. *Mycotaxon* 10(2): 299–439 (1980). MORENO, G., SÁNCHEZ, A., CASTILLO, A., SINGER, H. & ILLANA, C. Nivicolous myxomycetes from the Sierra Nevada National Park (Spain). *Mycotaxon* 87: 223–242 (2003). MÜLLER, H. Bemerkenswerte Myxomycetenfunde im Thüringen. *Zeitschrift für Mykologie* 71(2): 211–220 (2005). RONIQUIER, A. & RONIQUIER, M. How ‘alpine’ are nivicolous myxomycetes? A worldwide assessment of altitudinal distribution. *Mycologia* 101(1): 1–16 (2009). YAMAMOTO, Y., MURAKAMI, M. & KOBAYASHI, M. [Several nivicolous myxomycetes of Gunma prefecture]. *Myxomycetes Bulletin of the Japanese Society of Myxomycetology* 25: 64–68 (2007).

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

- **On-line databases.** *Global Biodiversity Information Facility*, <http://data.gbif.org>, 983 records.
- **Personal communication.** M. Meyer.

See also the following internet pages:

- <http://eumycetozoa.com>;
- <http://slimemold.uark.edu>;
- [www.discoverlife.org/mp/20m?kind=Lamproderma+echinosporum](http://www.discoverlife.org/mp/20m?kind=Lamproderma+echinosporum).

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