



A. Sporocarps (bar = 1 mm). **B.** Sporocarps (bar = 1 mm). **C.** Columella and capillitium (bar = 1 mm). **D.** Capillitium and spores (bar = 20 μ m) [Photographs: A. Michaud].

Lamproderma ovoideum Meyl., *Bulletin de la Société Vaudoise des Sciences Naturelles* **57**: 370 (1931, publ. 1932). [*Index Fungorum* 273173]

Lamproderma carestiae var. *ovoideum* (Meyl.) Kowalski, *Mycologia* **67**(3): 470 (1975). [*Index Fungorum* 352882]

Diagnostic features. Nivicolous species of *Lamproderma* have dark, often blackish, metallic, iridescent, shiny, separate, globose or nearly globose and stipitate to sessile sporocarps. *Lamproderma ovoideum*, perhaps the most common nivicolous member of this genus, has ovoid sporocarps and may be distinguished by spore size and ornamentation from other nivicolous species of *Lamproderma* with similar sporocarps.

Sporocarps clustered or scattered as individual sporangia, black, shiny, iridescent, ovoid, 0.8–1.2 mm broad, 1–1.8 mm high, stalked, the stalk black, usually broad and triangular at the base, up to 0.5 mm, taking the total height up to 2 mm. *Hypothallus* dark brown at the centre, light brown at the margins, often confluent with adjacent hypothalli. *Peridium* black, usually persistent, at least in the lower part which forms

a cup after dehiscence. *Columella* cylindrical, occasionally thickened at the apex, attaining up to 75% the height of the sporangium, black, usually with membranous expansions in the upper part. *Capillitium* arising from the length of the columella with stout branches, rigid, dark brown to black, forming a dense net at the periphery, with many pointed paler free tips. *Spores* in mass black, individually dark brown, globose, 13–16 µm diam., spinulose. SEM shows the spore ornamentation to be formed of densely arranged baculum-shaped structures which rarely fuse into small crests. *Plasmodium* not observed.

ASSOCIATED ORGANISMS & SUBSTRATA: **Plantae.** *Empetrum nigrum* L.; *Larix* sp.; *Nardus stricta* L.; *Rubus* sp.; *Vaccinium myrtillus* L. **Protozoa.** *Physarum vernum* Sommerf.

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 ovoideum* 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 15 to 2600 m above mean sea level, but the species is most often found from 1100 to 1600 m.

GEOGRAPHICAL DISTRIBUTION: NORTH AMERICA: USA (Colorado, Oregon). ANTARCTICA: Macquarie Island. ASIA: Japan. AUSTRALASIA: Australia (New South Wales, Tasmania), New Zealand. EUROPE: Austria, Finland, France, Germany, Italy, Poland, 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, but all are now recognized as separate species: *Lamproderma ovoideum* var. *cucumer* Meyl. is a synonym of *L. cucumer* (Meyl.) Nowotny, *L. ovoideum* f. *globosum* Meyl. is a synonym of *L. sauteri* Rostaf., and *L. ovoideum* var. *piriforme* (Meyl.) Meyl. is a synonym of *Lamproderma piriforme* (Meyl.) Mar. Mey. & Poulain.

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 1932 to 2007. The species has been recorded in March, April, May, December, with the main fruiting season in the northern hemisphere from April to June. It is very common and abundant in the Alps. **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://wfdcm.nig.ac.jp/wfcc/datacenter.html>).

NOTES: *Lamproderma ovoideum* 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: DENNISON, M.L. The genus *Lamproderma* and its relationships. I. *Mycologia* **37**(1): 80–108 (1945). FIORE-DONNO, A.M., MEYER, M., BALDAUF, S.L. & PAWLOWSKI, J. Evolution of dark-spored myxomycetes (slime-molds): molecules versus morphology. *Molecular Phylogenetics and Evolution* **46**: 878–889 (2008). HOLDEN, E.M. Fungi. In P. Shaw & D.B.A. Thompson (eds), *The Nature of the Cairngorms Diversity in a Changing Environment* (Edinburgh, Scotland: Stationery Office): 145–176 (2006). ING, B. *The Myxomycetes of Britain and Ireland An Identification Handbook* (Slough, UK: Richmond Publishing): 374 pp. (1999). KOWALSKI, D.T. The species of *Lamproderma*. *Mycologia* **62**(4): 621–672 (1970). 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). MACBRIDE, T.H. & MARTIN, G.W. *The Myxomycetes A Descriptive List of the Known Species with Special Reference to those Occurring in North America* (New York, NY: Macmillan): ix, 339 pp. (1934). MEYLAN, C. Les espèces nivales du genre *Lamproderma*. *Bulletin de la Société Vaudoise des Sciences Naturelles* **57**: 359–373 (1932). MORENO, G., SÁNCHEZ, A., CASTILLO, A., SINGER, H. & ILLANA, C. Nivicolous myxomycetes from the Sierra Nevada National Park (Spain). *Mycotaxon* **87**: 223–242 (2003). NEUBERT, H., NOWOTNY, W. & BAUMANN, K. *Die Myxomyceten Deutschlands und des angrenzenden Alpenraumes unter besonderer Berücksichtigung Österreichs 3: Stemonitales* (Gomaringen, Germany: Karlheinz Baumann Verlag): 391 pp. (2000). POULAIN, M. & MEYER, M. Les *Lamproderma* (*Myxomycota*, *Stemonitales*) du group *ovoidesum*. *Bulletin Mycologique et Botanique Dauphiné-Savoie* **176**: 13–30 (2005). RONIQUIER, A., RONIQUIER, M. & DROZDOWICZ, A. Diversity of nivicolous myxomycetes in the Gorce mountains – a low-elevation massif of the western Carpathians. *Mycotaxon* **103**: 337–352 (2008). RONIQUIER, A. & RONIQUIER, M. How ‘alpine’ are nivicolous myxomycetes? A worldwide assessment of altitudinal distribution. *Mycologia* **101**(1): 1–16 (2009). STEPHENSON, S.L., SEPPELT, R.D. & LAURSEN, G.A. The first record of a myxomycete from subantarctic Macquarie Island. *Antarctic Science* **4**(4): 431–432 (1992). STEPHENSON, S.L. & SHADWICK, J.D.L. Nivicolous myxomycetes from alpine areas of south-eastern Australia. *Australian Journal of Botany* **57**(2): 116–122 (2009). TERAUDS, A. & STEWART, F. *Subantarctic Wilderness: Macquarie Island* (Sydney, NSW: Allen & Unwin): 176 pp. (2009). YAJIMA, Y., UCHIDA, A. & KONDO, N. List of nivicolous *Myxomycetes* in Shiretoko peninsula, eastern Hokkaido. *Bulletin of the Shiretoko Museum* **30**: 3–5 (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>, >1000 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+ovoideum.

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