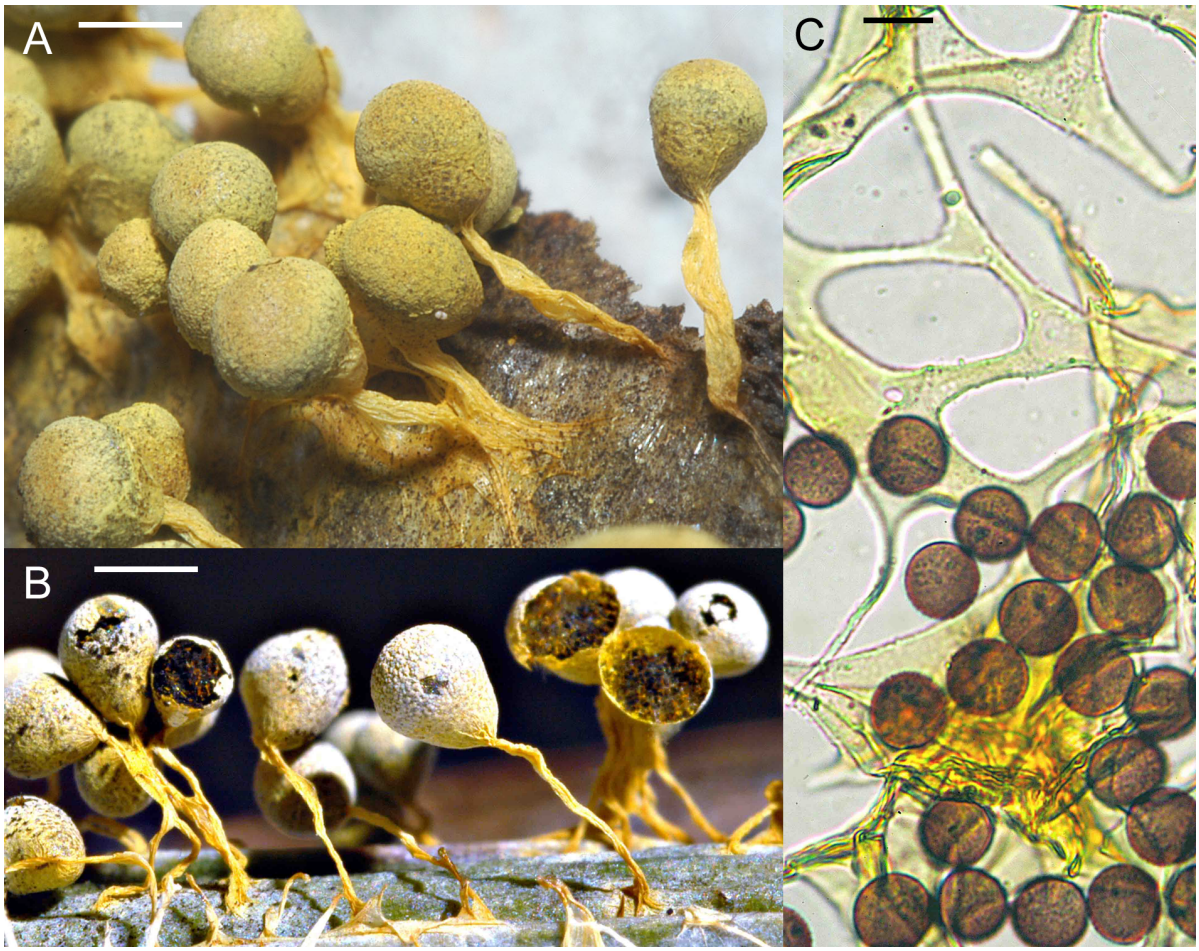
IMI Descriptions of Fungi and Bacteria
No. 1838

PHYSARUM ALBESCENS



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

Physarum albescens Ellis ex T. Macbr., *North American Slime-Moulds* Edn 2: 86 (1922). [*Index Fungorum* 320440]

Leocarpus fulvus T. Macbr., *North American Slime-Moulds*: 82 (1899). [*Index Fungorum* 207009]

Physarum fulvum (T. Macbr.) G. Lister, *Monograph of the Mycetozoa* Edn 2: 60 (1911). [*Index Fungorum* 214849]

Physarum rubronodum G.W. Martin, *Journal of the Washington Academy of Sciences* **38**(7): 238 (1948). [*Index Fungorum* 336971]

Diagnostic features. Nivicolous. Identifiable in the field by its conspicuous yellow sporocarps on stalks arising from an extensive hypothallus.

Sporocarps as sporangia, sometimes also as small plasmodiocarps, loosely to densely gregarious, rarely scattered, subglobose or, more commonly, obovoid, 0·7–1·5 mm diam., up to 2 mm high, white, pale to

brilliant yellow to dark orange or, when lime is lacking, dark blue, sometimes sessile, more often stalked on strands of the hypothallus, the stalks up to 2 mm long. *Hypothallus* massive, veined, creamy yellow to pale orange. *Peridium* single but, when the limy crust is especially thick, appearing double as the lime flakes away, membranous and iridescent when lime is lacking, dehiscing above by small flakes and leaving a persistent base. *Columella* not observed but a similar structure ('pseudocolumella') may rarely be present. *Capillitium* pale to dark brown forming a rigid, intricate reticulum, attached to the peridium, threads flattened, lime knots sparse to numerous, minute to large, round, elongated or branched, white, yellow, orange or red. *Spores* in mass black to dark purple-brown, individually purple to violet-brown, globose, 11–13 µm diam., spinulose, often paler on one side. *Plasmodium* yellow to scarlet or orange-red.

ASSOCIATED ORGANISMS & SUBSTRATA: **Plantae**. *Cytisus oromediterraneus* Rivas Mart., T.E. Díaz, Fern. Prieto, Loidi & Penas; *Empetrum nigrum* L.; *Gramineae* indet.; *Larix* sp.; *Nardus stricta* L.; *Pinus uncinata* Ramond ex DC.; *Plantae* indet. (debris, leaf, litter, wood); *Rubus* sp.; *Salix* sp.; *Saxifraga bronchialis*; *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. *Physarum albescens* 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. The present species has been recorded next to snowbanks at altitudes from 150 to 3400 m above mean sea level.

GEOGRAPHICAL DISTRIBUTION: NORTH AMERICA: Canada (Alberta, Quebec), USA (Alaska, California, Colorado, Florida, Montana, New Hampshire, New Mexico, Oregon, South Dakota, Utah, Virginia, Washington, West Virginia). SOUTH AMERICA: Brazil. ASIA: Japan, Russia (Chukotskyi Avtonomnyi okrug, Krasnoyarskyi krai, Primorskyi krai, Sverdlovskaya oblast, Tiumen oblast). AUSTRALASIA: Australia (New South Wales, Victoria), New Zealand. CARIBBEAN: Cuba, Puerto Rico. EUROPE: Austria, France, Germany, Italy, Netherlands, Norway, Poland, Portugal, Russia (Astrakhanskaya oblast, Leningradskaya oblast, Rostov-na-Donu oblast, Volgogradskaya oblast), 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: 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 August 1899 to 2007. The species has been recorded in January, February, March, April, May, June, July, August, October, November, December, with the main fruiting season in the northern hemisphere from April to June. MITCHELL *et al.* (1980) described it as 'one of the most abundant of the Colorado snowbank species', 'producing massive fruitings over large areas of alpine meadows and forest floors in May and June between 2800 and 3400 m'. In Germany, the species has been evaluated as 'probably not threatened', but is very local and rare, occurring only at a few places in the German Alps (*http://www.gbif-mycology.de/DatabaseClients/GBIFmyxchecklist/searchresult.jsp*). **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: *Physarum albescens* 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. Spécial Myxomycètes. *Bulletin Trimestriel de la Federation Mycologique Dauphine-Savoie* **125**: 40 pp. (1992). COCHET, S. & MONIER, C. *Physarum albescens* Ellis ex Macbr., myxomycète nouveau pour la France. *Bulletin Trimestriel de la Société Mycologique de France* **91**: 153–154 (1975). DONADINI, J.C. & TRIMBACH, J. *Physarum albescens* Ellis ex Macbride, a myxomycete new to France. *Bulletin de la Société Linnéenne de Provence* **27**: 71–78 (1974). GIAON, A., MARCANTONI, A. & TULLI, M. *Myxomycetes* nivali del Gran Sasso d'Italia. *Funghi & Natura* **21**: 56–61 (2007). HAGELSTEIN, R. Notes on the *Mycetozoa*: III. *Mycologia* **31**(3): 337–349 (1939). HAGELSTEIN, R. Notes on the *Mycetozoa*: IV. *Mycologia* **32**(3): 376–387 (1940). 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). JOHANNESEN, E.W. New and interesting *Myxomycetes* from Norway. *Nordic Journal of Botany* **4**(4): 513–520 (2008). KUHNT, A. Nivicole Myxomyceten aus Deutschland (unter besonderer Berücksichtigung der Bayerischen Alpen). Teil III [Nivicolous myxomycetes from Germany (with special attention to the Bavarian Alps). Part III]. *Zeitschrift für Mykologie* **74**(1): 147–180 (2008). MACBRIDE, T.H. *The North American Slime Moulds* A Descriptive List of All Species of Myxomycetes Hitherto Reported From the Continent of North America, With Notes on Some Extralimital Species. Edn 2 (New York, NY: Macmillan): xvii, 347 pp. [esp. p. 86] (1922). MARTIN, G.W. *Myxomycetes*. *North American Flora* **1**(1): 1–152, 179–190 (1949). MARTIN, G.W. & ALEXOPOULOS, C.J. *The Myxomycetes* (Iowa City, IO: Iowa University Press): 560 pp. (1969). 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). NEUBERT, H., NOWOTNY, W. & BAUMANN, K. *Die Myxomyceten Deutschlands und des angrenzenden Alpenraumes unter besonderer Berücksichtigung Österreichs* **2**: *Physarales* (Gomaringen, Germany: Karlheinz Baumann Verlag): 365 pp. (1995). RICHARDSON, K.A. & CURRAH, R.S. *Myxomycetes* of Alberta. *Mycotaxon* **37**: 363–378 (1990). RONIKIER, A. & RONIKIER, M. How 'alpine' are nivicolous myxomycetes? A worldwide assessment of altitudinal distribution. *Mycologia* **101**(1): 1–16 (2009). RONIKIER, A., RONIKIER, M. & DROZDOWICZ, A. Diversity of nivicolous myxomycetes in the Gorce mountains – a low-elevation massif of the Western Carpathians. *Mycotaxon* **103**: 337–352 (2008). ROSTAFIŃSKY, J.T. *Śluzowce (Mycetozoa) Monografia* (Paris, France: Nakładem Biblioteki Kórnickiej):

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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*, 4 records.
  Global Biodiversity Information Facility, *http://data.gbif.org*, 778 records.
  Landcare Research New Zealand, *http://nzfungi.landcareresearch.co.nz/html/mycology.asp*, 3 records.
  New York Botanic Garden Virtual Herbarium, *http://sciweb.nybg.org/science2/VirtualHerbarium.asp*, 1 record.
  USDA Fungal Database, *http://nt.ars-grin.gov/fungaldatabases/index.cfm*, 137 records.
- **Personal communication**. M. Meyer.

See also the following internet pages:

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

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