



A. Sporocarps, habit (bar = 1 mm). B. Spores (bar = 10 μ m). [Photographs: A. Michaud]

Physarum luteolum Peck, *Annual Report of the New York State Museum of Natural History* **30**: 50 (1877, publ. 1878). [*IndexFungorum* 169059; *Physaraceae*, *Physarales*]
Lignyidium luteolum (Peck) Kuntze, *Revisio Generum Plantarum* **3**(3): 490 (1898). [*IndexFungorum* 526919]

Diagnostic features. Distinguished from *Physarum nitens* (G. Lister) Ing, which has bright yellow to orange spores 7–9 μ m diam.

On natural substratum. Plasmodium appearance not known, but probably yellow. *Hypothallus* apparently absent. *Sporocarps* sessile sporangia mingled with short plasmodiocarps, sparse, scattered, gregarious or clustered, but not heaped, typically spherical, sessile, bright chrome-yellow, white to beige, becoming paler. *Sporothecae* subglobose, often on a restricted base, 0.4–0.8 mm diam., rugulose or nearly smooth. *Stalk* absent. *Peridium* single, membranous or thick, brittle, with included yellow lime globules, dehiscing in small flakes. *Capillitium* a network of colourless threads bearing numerous small, yellow or whitish,

rounded or angular, scanty calcareous nodes of variable size. *Columella* absent. *Spores* brown *en masse*, pale lilaceous in transmitted light, almost smooth, minutely spinulose, 8·5–10(–11) µm diam.

ASSOCIATED ORGANISMS & SUBSTRATA: **Plantae.** *Adansonia grandidieri* Baill. (bark); *Agave parryi* Engelm.; *Calophyllum inophyllum* L.; *Castanopsis cuspidata* (Thunb.) Schottky; *Coffea* sp. (leaf); *Cornus canadensis* L. (leaf); *Eucalyptus* sp.; *Nothofagus dombeyi* (Mirb.) Oerst. (wood); *Picea* sp. (bark); *Pinophyta* indet. (leaf); *Plantae* indet. (leaf); *Pomaderris apetala* Labill. (leaf); *Populus* sp. (leaf); *Salvia glutinosa* L. **Associated organism of type specimen.** *Cornus canadensis*.

INTERACTIONS & HABITATS: Most information about this species is based on sporocarps and spores (the dispersal phase), and observed associations with other organisms usually only indicate the physical substratum on which sporocarps form. Other observations are rare, particularly of trophic phases (myxamoebae and swarm cells [individual haploid amoeba-like cells], and plasmodia [multi-nucleate, diploid, and often extensive cytoplasm]), and dormant phases (microcysts and sclerotia). As a result, very little is known about nutrition and interactions beyond broad statements that myxomycetes feed on living bacteria and fungi, and on non-living organic material (MARTIN & ALEXOPOULOS, 1969). A study of temperate secondary forest in Japan, including the present species, showed that myxomycete diversity is greater when leaf litter is derived from more than one tree species and from tree species with different peaks for leaf fall (TAKAHASHI, 2013). This species is known from bark, decaying leaves, and forest soil. It has been recorded from coffee plantations and temperate forests, with one record on bark of spruce near melting snow. Nothing else is known about its habitats. Beyond what is known generally about the nutrition of *Physarum*, there is no information about any specific associations with animals, fungi or micro-organisms.

GEOGRAPHICAL DISTRIBUTION: AFRICA: Angola, Madagascar, Mozambique. NORTH AMERICA: Canada (Alberta, British Columbia, Ontario, Quebec), Mexico, USA (Arizona, California, Iowa, Maine, Massachusetts, Michigan, New Jersey, New York, North Carolina, Pennsylvania, Tennessee, Texas, Virginia, Washington DC, West Virginia, Wyoming). SOUTH AMERICA: Argentina, Ecuador. ASIA: China (Jilin, Fujian), India (Karnataka, Maharashtra), Israel, Japan, Russia (Primorskyi krai), Turkey. AUSTRALASIA: Australia (Tasmania, Western Australia). EUROPE: former Czechoslovakia, France, Germany, Ireland, Spain, UK. INDIAN OCEAN: La Réunion, Seychelles. Apparently native throughout its known range. Records up to 2300 m above sea level in USA, 640 m above sea level in Spain, 560 m above sea level in Argentina.

ECONOMIC IMPACTS: No evaluation has been made of any possible positive economic impact of this fungus (e.g. as a recycler, as a source of useful products, as a provider of checks and balances within its ecosystem, etc.). No reports of negative economic impacts have been found.

INFRASPECIFIC VARIATION: No subspecific taxa have been described [*SpeciesFungorum*, accessed 23 August 2017].

DISPERSAL & TRANSMISSION: Primarily by airborne spores, particularly for longer distances; some local dispersal may also occur by movement of myxamoebae and plasmodia.

CONSERVATION STATUS: **Previous evaluations.** None. **Information base.** Over 150 records (specimens, databases and bibliographic sources combined, excluding duplicates) from at least July 1878 to January 2016, with observations in January, March, April, May, June, July, August, September, October and November. **Estimated extent of occurrence** [calculated using <http://geocat.kew.org>]. Over 40·3 million km² (Africa: 0·7 million km²; Asia: 29·0 million km²; Australasia: insufficient data; Europe: 1·2 million km²; North America: 9·4 million km²; South America: insufficient data). **Estimated area of occupancy** [calculated using <http://geocat.kew.org>]. Well over 200 km². The method for estimating area of occupancy has produced an artificially low figure. The species is likely to be under-recorded, despite the admirable and well-organized enthusiasm of often amateur myxomycete experts, because compared with recording of flowering plants and vertebrates, so few people have the skills to search for and identify it.

At least some of the plants with which it is associated are common and widespread species. **Threats.** Insufficient information to enable threats to be identified. **Population trend.** In general, not known. Rare in southwestern Virginia and southern India (STEPHENSON *ET AL.*, 1993). Of datable records, c. 20% are pre-1961, 40% post-1960 but pre-2001, and 40% post-2000. **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 Data Deficient/Least Concern. **In situ conservation actions.** None noted. **Ex situ conservation actions.** *Physarum* species grow readily in culture and, using simple techniques, can be induced to sporulate. There are, however, no living strains of this species listed by the Straininfo website [www.straininfo.net, accessed 4 August 2017]. Two partial nucleotide sequences of small subunit ribosomal RNA were found in a search of the NCBI GenBank database [www.ncbi.nlm.nih.gov, accessed 13 August 2017].

NOTES: Although there are more than 150 records of this species, there is insufficient information about associated organisms, habitats and substrata to make a confident evaluation of its red-list status. For further help with identification, the excellent keys provided by POULAIN *ET AL.* (2011) should be consulted.

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- *Cybertruffle* [www.cybertruffle.org.uk].

- *Discover Life (myxomycete pages)* [www.discoverlife.org/mp/20q?guide=Myxomycetes].
- *Fungus Conservation Trust CATE2 Database* [www.abfg.org].
- *GBIF* [www.gbif.org].
- *Google* [www.google.co.uk].
- *Landcare Research New Zealand* [<http://nzfungi2.landcareresearch.co.nz>].
- *Les Myxomycètes* [<http://myxo.be/pdf/Physarum%20luteolum%20MM38579.pdf>].
- *Mycportal* [www.mycportal.org].
- *Mycotaxon Regional Checklists in Downloadable Format* [www.mycotaxon.com/resources/weblists.html].
- *National Center for Biotechnology Information* [www.ncbi.nlm.nih.gov].
- *Nomen.mycetozoa.com - an online nomenclatural information system of Eumycetozoa* [<http://eumycetozoa.com>].
- *Tasmanian Myxomycetes* [<https://sarahlloydmyxos.files.wordpress.com/2017/01/physarum-luteolum-0595-0596.pdf>].
- *USDA Fungal Databases* [<https://nt.ars-grin.gov/fungaldatabases>].

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Issued by CABI, Bakeham Lane, Egham, Surrey, TW20 9TY, UK

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