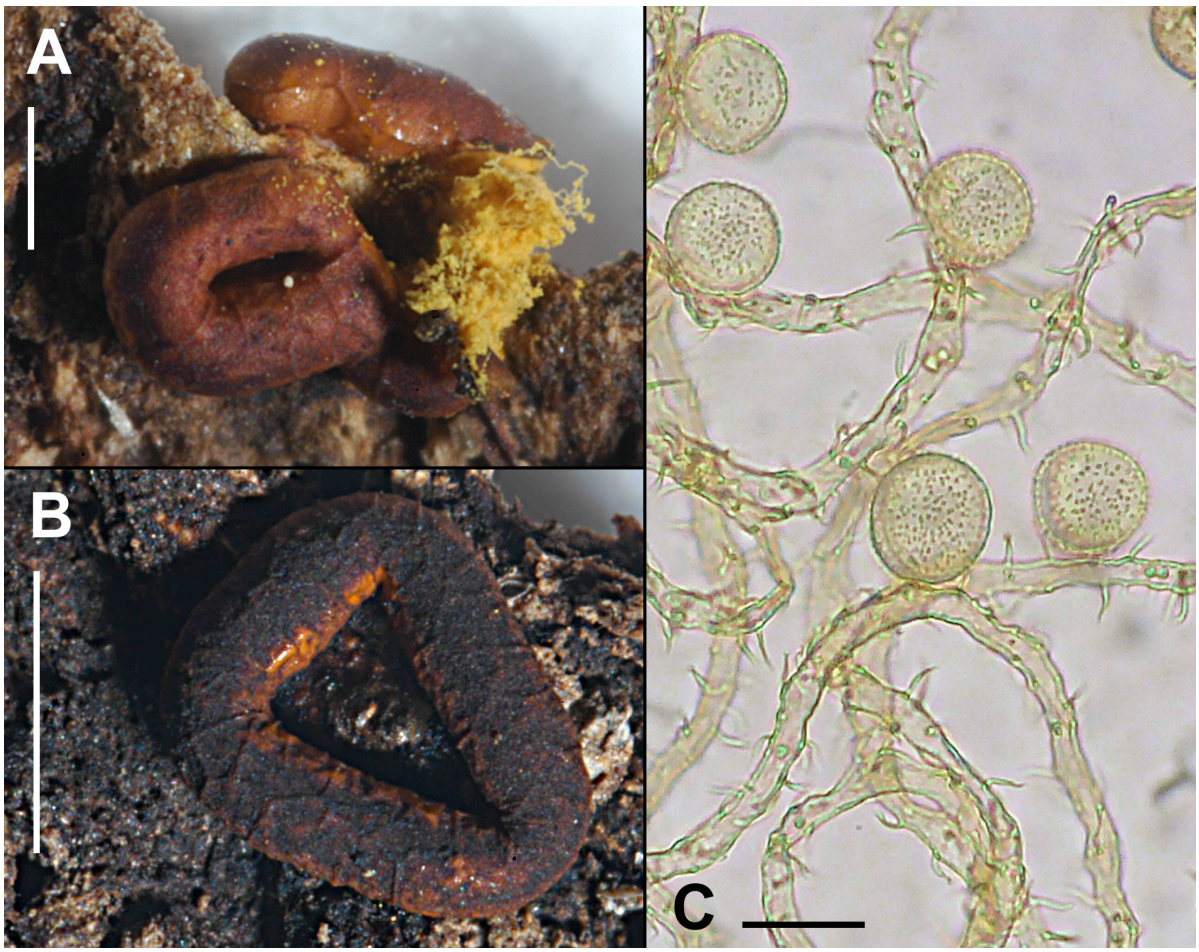

A. Sporocarps, habit (bar = 1 mm). **B**. Sporocarp, detail (bar = 1 mm). **C**. Capillitium and spores (bar = 10 µm). [Photographs: A. Michaud]

Perichaena chrysosperma (Curr.) Lister, *A Monograph of the Mycetozoa*: 196 (1894). [*IndexFungorum* 118849]

Ophiotheca chrysosperma Curr., *Quarterly Journal of Microscopic Science* **2**: 241 (1854). [*IndexFungorum* 143858]

Trichia curreyi P. Crouan, in CROUAN & CROUAN, *Florule de Finistère*: 16 (1867). [*IndexFungorum* 240990]

Ophiotheca wrightii Berk. & M.A. Curtis, in BERKELEY, *Journal of the Linnean Society* Botany **10**: 349 (1868). [*IndexFungorum* 484219]

Cornuvia wrightii (Berk. & M.A. Curtis) Rostaf., *Śluzowce (Mycetozoa) Monografia* Supplementum 1: 36 (1876). [*IndexFungorum* 208835]

Perichaena chrysosperma var. *wrightii* (Berk. & M.A. Curtis) Torrend, *Brotéria* Séries Botânica **7**: 31 (1908). [*IndexFungorum* 569100]

Hemitrichia melanopeziza Speg., *Anales de la Sociedad Científica Argentina* **12**: 257 (1881). [*IndexFungorum* 250546]

Hemiarcyria melanopeziza (Speg.) Berl., in BERLESE, DE-TONI & FISCHER, *Sylloge Fungorum* **7**(1): 449 (1888). [*IndexFungorum* 193761]

Arcyria melanopeziza (Speg.) Massee, *A Monograph of the Myxogastres*: 162 (1892). [*IndexFungorum* 569101]

Cornuvia dictyocarpa Krup., *Kosmos* Warsaw **11**: 377 (1886). [*IndexFungorum* 209918]

Perichaena corticalis var. *affinis* G. Lister, in A. LISTER, *A Monograph of the Mycetozoa* Edn 2: 251 (1911). [*IndexFungorum* 431361]

Diagnostic features. The doughnut-shaped plasmodiocarps occasionally produced in moist chamber cultures, and the prominently spiny capillitium make *P. chrysosperma* particularly distinctive. The macroscopic characters of this species, however, vary widely, and this may result in confusion with atypical forms of *P. corticalis* (Batsch) Rostaf., *P. vermicularis* (Schwein.) Rostaf. and even *Trichia contorta* (Ditmar) Rostaf. It may be distinguished from these three species by the short, wider and occasionally branched plasmodiocarps, the darker colour, spiny capillitium and smaller spores.

Habit. On dead wood, bark, fallen leaves, cladodes, and occasionally other substrata including dung. *Plasmodium* white at first when emerging, later becoming yellowish brown, pinkish grey, or rose to pale yellow. *Sporophores* no more than sessile sporangia or short plasmodiocarps, gregarious to scattered, ochraceous yellow, deep yellowish brown, deep yellow, reddish brown, chestnut-brown or black, especially when prematurely dried. *Hypothallus* inconspicuous or absent. *Stalks* not observed. *Sporangia* subglobose or pulvinate, 0·2–0·5 mm diam. *Plasmodiocarps* allantoid, reniform or ring-shaped, upper and lateral surfaces convex, sometimes branched or ring-shaped, but not forming a sinuous network, 0·2–0·8 × 0·4–3·0 mm or, when ring-shaped, with a ring up to *c.* 2·5 mm diam. *Peridium* double, thick, fragile, partially evanescent, persistent at the base, the outer layer membranous, shining, opaque, yellowish brown, or moderate olive-brown to deep yellow by transmitted light, cartilaginous or subcartilaginous, filled with included granular refuse matter, usually without crystalline deposits, sometimes, especially on bark, marked by a pattern of dark lines, giving an effect of reticulate ridges; the inner layer attached to the outer layer, membranous, thin and translucent, deep yellow to pale greenish yellow by transmitted light, the inner surface with faint and dense papillae, either smooth or faintly roughened within, pale yellow; dehiscence irregular, by fissures or areolae, into plates which, in globose and annular fruiting bodies, are more or less indicated by faint ridges, circumscissile. *Capillitium* usually present but sometimes scanty, variable in quantity, tubular, elastic when abundant, consisting of slender yellow filaments, forming a lax reticulum of threads which are pale greenish yellow to colourless by transmitted light, 2–3 µm diam., flexuous, hardly branched, slightly entangled, not bi-refringent in polarized light, without attachment to the peridium, decorated with scattered delicate or stout, minutely to strongly spiny, often curved spines up to 6 µm long or densely covered with spines less than 2 µm long, rarely almost smooth, sometimes with a few free ends rounded, and intercalary or axillary swellings. *Spores* bright yellow, or greenish yellow in mass, individually free, globose or subglobose, pale yellow or pale greenish yellow by transmitted light, varying from faintly roughened to distinctly warted, or minutely spinulose, (8–)9–11(–12) µm diam.

ASSOCIATED ORGANISMS & SUBSTRATA: **Animalia**. *Mammalia* indet. (dung). **Fungi**: *Berkleasmium leonense* M.B. Ellis; *Nitzschkia cupularis* (Pers.) P. Karst. (stroma). **Plantae**: *Acer campestre* L. (bark), *A. platanoides* L. (bark); *Agave* sp. (leaf); *Arbutus unedo* L. (bark, wood); *Chamaerops humilis* L. (bark, wood); *Chlorophora excelsa* Welw., Benth. & Hook f.; *Cornus mas* L. (bark); *Cupressus sempervirens* L. (bark); *Eucalyptus* sp. (bark, wood); *Fagus orientalis* Lipsky (branch), *F. sylvatica* L. (bark); *Ficus* sp.; *Frullania dilatata* (L.) Dumort.; *Juniperus excelsa* Bieb. (bark), *J. thurifera* L. (bark); *Nerium oleander* L. (bark, wood); *Opuntia ficus-indica* (L.) Mill. (cladode); *Pinus heldreichii* H. Christ (bark), *P. pinaster* Aiton (bark, wood); *Plantae* indet. (leaf, wood); *Platanus orientalis* L. (bark); *Populus alba* L. (bark, wood), *P. nigra* L. (bark, wood); *Pyrus communis* L. (bark); *Quercus pubescens* Willd. (bark), *Q. robur* L. (bark, branch, wood); *Robinia pseudacacia* L. (bark, wood); *Salix fragilis* L. (bark); *Sorbus torminalis* (L.) Crantz (bark); *Taxus baccata* L. (bark); *Tilia cordata* Mill. (bark); *Ulmus laevis* Pall. (bark), *U. scabra* Mill. (bark).

INTERACTIONS & HABITATS: Nothing specific is known about interactions between *Perichaena chrysosperma* and other organisms, but myxomycetes in general, in their plasmodial state, are known to feed on bacteria, yeasts and other single-celled organisms, and they themselves provide food for insects, particularly beetles, and other animals. Some beetle species are known only from myxomycetes, and for some of these there may be a close symbiosis. Myxomycetes may also be found in association with fungi, and some fungi have been found only on myxomycete sporocarps and, presumably, derive their nutrition from them either as parasites or as saprobes. *Perichaena chrysosperma* sporocarps are generally observed on dead parts of plants, using the plant material as a substratum, but probably not as a nutrient source. The species is very widely distributed, but seems to prefer zones where the climate has a strong Mediterranean component. It is recorded on decaying bark and wood (perhaps particularly on inner bark of fallen branches) of angiosperms, less often of gymnosperms, and is not uncommon on decayed cladodes of cacti. It has also been found on mossy bark of living trees, dead leaves and, less commonly, on dung of herbivores.

GEOGRAPHICAL DISTRIBUTION: AFRICA: Egypt, Kenya, Morocco, Sierra Leone, Sudan, Tanzania. CENTRAL AMERICA: Costa Rica, Nicaragua, Panamá. NORTH AMERICA: Canada (Manitoba, Ontario), México, USA (Alaska, Arizona, Arkansas, Colorado, Florida, Louisiana, Maine, Michigan, Montana, North Dakota, Texas, Washington, West Virginia). SOUTH AMERICA: Argentina, Brazil (Pernambuco), Chile, Colombia, Ecuador, French Guiana, Perú, Uruguay, Venezuela. ASIA: China, India (Rajasthan, Uttar Pradesh, West Bengal), Indonesia, Japan, Kazakhstan, Nepal, Pakistan, Russia (Chelyabinsk oblast, Chukotka autonomous okrug, Krasnoyarskyi krai, Magadan oblast, Taimir autonomous okrug, Tiumen' oblast), Singapore, Thailand, Turkey. ATLANTIC OCEAN: Ascension Island. AUSTRALASIA: Australia (New South Wales, Northern Territory, Queensland, Western Australia), New Zealand. CARIBBEAN: American Virgin Islands, Antigua & Barbuda, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Jamaica, Puerto Rico, St Lucia, Trinidad & Tobago. EUROPE: Belgium, France, Germany, Greece, Italy, Lithuania, Portugal, Russia (Astrakhanskaya oblast, Krasnodarskyi krai, Leningrad oblast, Republic of Karelia, Voronezh oblast), Spain, Sweden, Ukraine, United Kingdom. PACIFIC OCEAN: USA (Hawaii).

ECONOMIC IMPACTS: In recent years, exploration has begun of metabolites and other chemicals produced by myxomycetes. SHINTANI *et al.* (2010) isolated 6-Hydroxy-9′-methoxystaurosporinone (compound 1), a new bisindole alkaloid, from field-collected fruiting bodies of *Perichaena chrysosperma*, together with two known compounds. The structure of the new alkaloid was elucidated from spectral data, and compound 1 was shown to have Hedgehog signal inhibitory activity (the Hedgehog signaling pathway is a key component of animal embryonic development and its malfunction may be the cause of some human cancers). No evaluation has been made of any other possible positive economic impact of this myxomycete (e.g. as a source of useful products, as a provider of checks and balances within its ecosystem, or of other ecosystem services such as recycling, etc.). No reports of negative economic impacts have been found.

INFRASPECIFIC VARIATION: The subspecific taxa *Perichaena chrysosperma* var. *wrightii* (Berk. & M.A. Curtis) Torrend and *Perichaena corticalis* var. *affinis* G. Lister are not currently accepted, and are listed above as synonyms of typical *P. chrysosperma*.

DISPERSAL & TRANSMISSION: Nothing specific is known about *Perichaena chrysosperma*. Myxomycete spores are produced in dry dusty masses inside sporocarps. The sporocarp outer wall fragments to expose the spores which are then, most probably, primarily dispersed by wind. This dispersal is likely to be totally random unless there is a strong prevailing wind in the vicinity. Insects are known to graze on myxomycete sporocarps, and spores have frequently been found in their faeces. This is therefore also likely to be an important part of their dispersal mechanism. Insect dispersal has the potential to be less random than wind dispersal, but there seem to be no studies of how long spores may remain in an insect digestive tract or of insect movements in relation to myxomycete spore dispersal. After the spores have landed on plant material, each may germinate to produce a single-celled zoospore with one or two

flagella. This zoospore may then use its flagella to disperse locally. The zoospores subsequently transform into amoeba-like cells which reproduce by mitosis and aggregate, forming groups which are sometimes sufficiently large as to be seen with the unaided eye. These groups, which are called plasmodia, can also migrate, often in response to light. For almost the whole life cycle, therefore, myxomycetes are mobile organisms, with only the sporocarp stage being fixed in a single location. Unlike members of the kingdom *Fungi*, myxomycetes do not form hyphae, and do not derive nutrition from the plant substrata on which they are found. As a result, it is not meaningful to describe them in terms of transmission. There is no infection stage, and no colony formation inside plant material. Instead, the individual amoebae derive their nutrition by engulfing bacteria, yeasts and other single-celled organisms.

CONSERVATION STATUS: **Information base**. Nearly 1300 records (specimens, databases, bibliographic sources and field observations combined, excluding duplicates) from 1854 to 2011, with observations in January, February, March, May, June, July, August, September and October with the main fruiting season in the northern hemisphere from June to September. Most if not all of its known associated organisms are common and likely to be classified as Least Concern by the IUCN. **Estimated extent of occurrence** [calculated using *http://geocat.kew.org*]. Nearly 85·7 million km^2 (Africa: 12·3 million km^2; Central America: 0·1 million km^2; North America: 11·7 million km^2; South America: 13·9 million km^{2}Asia: 33·6 million km^2; Australasia: 6·5 million km^2; Caribbean: 1·0 million km^2; Europe: 6·6 million km^2; Pacific Ocean: insufficient data). **Estimated area of occupancy** [calculated using *http://geocat.kew.org*]. About 328 km^2. The method for estimating area of occupancy has probably produced an artificially low figure. **Population trend**. Not reported, but sufficient records exist for some analysis to be possible. **Threats**. No specific threats have been identified. **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 Least Concern. ***In situ* conservation actions**. None noted. Many recent records, however, originate from protected areas, including military land managed for nature conservation (ADAMONYTE, 1997). ***Ex situ* conservation actions**. One nucleotide sequence was found in a search of the NCBI GenBank database [*www.ncbi.nlm.nih.gov*]. No living strains of this species were found in a search of the ATCC, CABI, CBS and ICMP culture collection on-line catalogues.

NOTES: The distribution map of this species on the *Eumycetozoan Project* website [*http://slimemold.uark.edu*] provides further georeferenced records but some errors may have occurred in allocating latitudes and longitudes. The record on that map, apparently from near the Maldive Islands, is in reality from Ecuador, the record from Russia, apparently from Kirovograd oblast, is in reality from the Republic of Karelia, and the record apparently from Nigeria is, in reality, from Costa Rica.

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See also the following internet pages:

- *Checklist of Fungi of the British Isles* [*www.fieldmycology.net/GBCHKLST/gbchklst.asp*].
- *Cybertruffle* [*www.cybertruffle.org.uk*].
- *GBIF* [*http://data.gbif.org/welcome.htm*].
- *Google* [*www.google.co.uk*].
- *Landcare Research New Zealand* [*http://nzfungi.landcareresearch.co.nz*].
- *Myxomycetes of Ukraine* [*www.myxomycet.com.ua/eng*].
- *National Center for Biotechnology Information* [*www.ncbi.nlm.nih.gov*].
- *Nomen.eumycetozoa.com* [*www.nomen.eumycetozoa.com*].
- *The Eumycetozoan Project* [*http://slimemold.uark.edu*].

- *USDA Fungal Databases* [*http://nt.ars-grin.gov/fungaldatabases/index.cfm*].

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