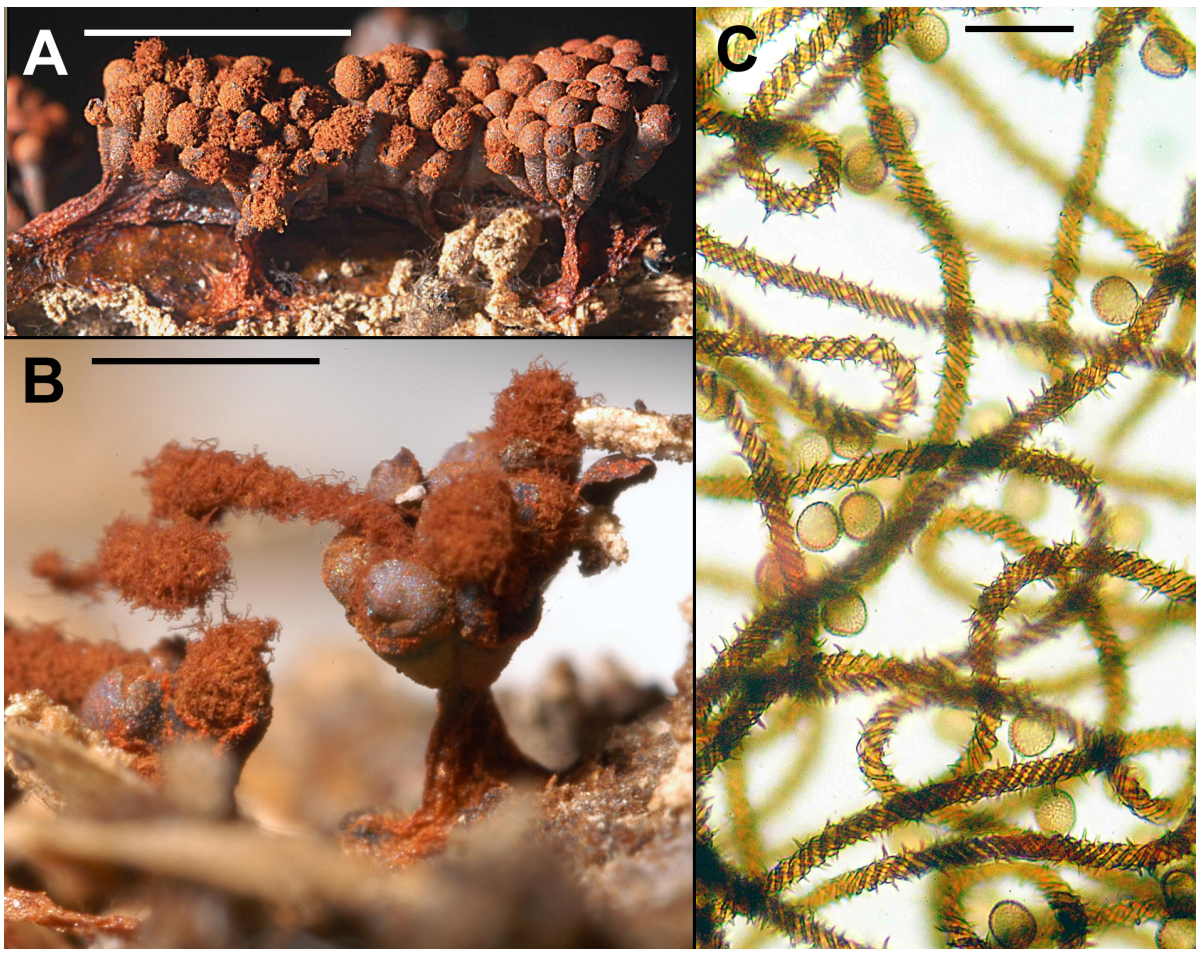
IMI Descriptions of Fungi and Bacteria
No. 1916

METATRICHIA VESPARIUM



A. Sporocarps, habit (bar = 5 mm). **B**. Sporocarps, detail, showing capillitium (bar = 1 mm). **C**. Capillitium and spores (bar = 20 µm). [Photographs: A. Michaud]

Metatrichia vesparium (Batsch) Nann.-Bremek. ex G.W. Martin & Alexop., *The Myxomycetes*: 143 (1969). [*IndexFungorum* 452964]

Lycoperdon vesparium Batsch, *Elenchus Fungorum* Continuatio Prima: 253 (1786). [*IndexFungorum* 168641]

Stemonitis vesparium (Batsch) J.F. Gmel., *Systema Naturae* **2**: 1470 (1792). [*IndexFungorum* 569120]

Hemitrichia vesparium (Batsch) T. Macbr., *The North American Slime Moulds*: 203 (1899). [*IndexFungorum* 123564]

Mucor pyriformis Leers, *Flora Herbornenses*: 288 (1775), *nom. illegit.*, *ICBN* Art. 53·1, non *M. pyriformis* Scop. (1772). [*IndexFungorum* 271873]

Trichia pyriformis (Leers) Hoffm., *Vegetabilia Cryptogama* **2**: 1 (1790), *nom. illegit.*, *ICBN* Art. 53·1, non *T. pyriformis* Vill. (1789). [*IndexFungorum* 536165]

Stemonitis cinnabarina Roth, *Tentamen Florae Germanicae* **1**: 547 (1788). [*IndexFungorum* 145737]

Trichia fragiformis With., *A Botanical Arrangement of British Plants* Edn 2, **3**: 480 (1792). [*IndexFungorum* 170153]

Trichia rubiformis Pers., *Neues Magazin für die Botanik* **1**: 89 (1794). [*IndexFungorum* 171394]

Hemiarcyria rubiformis (Pers.) Rostaf., *Śluzowce (Mycetozoa) Monografia*: 262 (1875). [*IndexFungorum* 182615]

Arcyria rubiformis (Pers.) Massee, *A Monograph of the Myxogastres*: 158 (1892). [*IndexFungorum* 419801]

Hemitrichia rubiformis (Pers.) Lister, *A Monograph of the Mycetozoa*: 175 (1894). [*IndexFungorum* 438437]

Trichia rubiformis var. *minor* Pers., *Tentamen Dispositionis Methodicae Fungorum*: 54 (1797), as 'β *minor*'. [*IndexFungorum* 191394]

Trichia rubiformis var. *laevis* Alb. & Schwein., *Conspectus Fungorum in Lusatiae Superioris*: 98 (1805). [*IndexFungorum* 499077]

Trichia chalybea Chevall., *Flore Générale des Environs de Paris* **1**: 323 (1826). [*IndexFungorum* 242788]

Craterium porphyrium Schwein., *Transactions of the American Philosophical Society of Philadelphia* New Series **4**: 258 (1832). [*IndexFungorum* 193060]

Trichia neesiana Corda, *Icones Fungorum* **1**: 23 (1837). [*IndexFungorum* 157767]

Hemiarcyria rubiformis var. *neesiana* (Corda) Rostaf., *Śluzowce (Mycetozoa) Monografia*: 263 (1875). [*IndexFungorum* 182848]

Hemitrichia vesparium var. *neesiana* (Corda) Torrend, *Brotéria* Séries Botânica **7**: 47 (1907, publ. 1908). [*IndexFungorum* 407528]

Trichia ayresii Berk. & Broome, *Annals and Magazine of Natural History* Series 2, **5**: 367 (1850). [*IndexFungorum* 227318]

Hemiarcyria rubiformis var. *tubulina* Rostaf., *Śluzowce (Mycetozoa) Monografia*: 263 (1875). [*IndexFungorum* 569098]

Hemiarcyria ellisii Massee, *Journal of the Royal Microscopical Society* London 1889(1): 354 (1889). [*IndexFungorum* 185938]

Diagnostic features. The clustered sporangia with a distinctive shape and papery texture resembling miniature wasp nests, the shining purple-red sporangia, and the red spore mass all make this an easy species to identify. When stalks are joined this species can look like *M. floriformis* (Schwein.) Nann.-Bremek., but the spore mass colour is usually sufficient to separate them and, if there is any doubt, the spiny capillitium of *M. vesparium* is diagnostic.

Habit. On dead wood, bark, and occasionally other substrata. *Plasmodium* black but becoming deep red just prior to fruiting. *Sporocarps* sessile or stalked, or rarely no more than a sessile sporangium, erect, gregarious to clustered, densely crowded when sessile, usually in extensive groups of up to 12, sharing united stalks when stipitate, sometimes forming a pseudoaethalium, wine-red to dark maroon or sometimes nearly black, 1·0–4·5 mm high. *Hypothallus* membranous, translucent, contiguous for a group of sporangia, colourless to dark red or reddish brown, merging with the stalk. *Stalks* when present erect, solid, longitudinally striate, individual or coalescent, rather thick when supporting several sporangia, brick red, dark brown to deep reddish brown, or dark yellow to moderate olive-brown, not filled with dirt particles, 0·2–3·5 mm long. *Sporangia* subcylindrical, obovate, or conical to subovate, usually firmly united into clusters, 0·5–2 × 0·4–0·7 mm, dark red, reddish purple, or dark grey to nearly black, shiny, iridescent or dull, with a deeply trumpet-shaped calyculus. *Peridium* thick, brittle, opaque, firm, shining, often with metallic reflexions, persistent, with 2 (or occasionally 3) layers, the outer layer cartilaginous, leathery, filled with granular matter, strong orange-yellow by transmitted light, the inner thin, membranous, translucent, attached to the outer layer, moderate yellow by transmitted light, usually dehiscing by a preformed lid, dehiscence by a preformed dome-shaped operculum. *Capillitium* tubular, elastic, red, strong yellowish brown to light olive-brown or dark yellow by transmitted light, flexuous, branched, entangled, not bi-refringent in polarized light, consisting of numerous very long coiled tubules, with free, rarely branched elaters, 5–6 μm diam., most of which are bent 180 degrees in the middle with the two halves coiled about one another, bearing 3–5 spiral bands and numerous spines 1–4 μm long, bright red to deep crimson, the tips

blunt, with free ends (10–)15–20 µm long. *Spores* brownish red, rust-red, deep orange, or scarlet in mass, individually free, subglobose, pale orange-red, or reddish orange to brilliant greenish yellow by transmitted light, (9–)10–12(–14) µm diam., ornamented with minute warts, the warts being wider at the top and producing the effect of a border on the spore in optical section.

ASSOCIATED ORGANISMS & SUBSTRATA: **Fungi**: *Hypoxylon* sp. (stroma). **Plantae**: *Acer campestre* L. (bark, wood), *A. pseudoplatanus* L. (wood); *Alnus glutinosa* (L.) Gaertn. (bark, wood); *Arbutus unedo* L. (wood); *Betula pendula* Roth (bark, wood); *Bursera simaruba* (L.) Sarg. (trunk); *Carpinus betulus* L. (stump, trunk, wood); *Coccoloba* sp. (log); *Cocos nucifera* L. (log); *Crataegus* sp. (wood); *Elaeis guineënsis* Jacq. (wood); *Eucalyptus camaldulensis* Dehnh. (wood), *E. globulus* Labill. (wood); *Fagus sylvatica* L. (stump, trunk, wood); *Fraxinus excelsior* L. (wood); *Mangifera indica* L. (bark); *Muscopsida* indet.; *Palmae* indet. (leaf, petiole, wood); *Picea abies* (L.) H. Karst. (stump, trunk, wood); *Pinus sylvestris* L. (wood); *Platanus orientalis* L. (branch); *Populus nigra* L. (bark, wood), *P. tremula* L. (bark, wood); *Pyrus communis* L. (wood); *Quercus petraea* (Mattuschka) Liebl. (bark, wood), *Q. robur* L. (bark, wood), *Q. suber* L. (wood); *Roystonea regia* (Kunth) O.F. Cook (leaf, petiole); *Robinia pseudacacia* L. (wood); *Salix* sp. (wood). **Protozoa**: *Trichia scabra* Rostaf.

INTERACTIONS & HABITATS: Nothing specific is known about interactions between *Metatrichia vesparium* 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. *Metatrichia vesparium* 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 common and very widely distributed in temperate regions of the northern hemisphere particularly in mild and humid sites, but apparently less common in the tropics and southern hemisphere humid zones. It is found on decaying bark or wood, particularly of broadleaf trees and most of all on *Fagus* and *Ulmus* species. It is also occasionally encountered on dead leaves, but is very rare on bryophytes and gymnosperms.

GEOGRAPHICAL DISTRIBUTION: AFRICA: Algeria, Ghana, Kenya, Liberia, Morocco, Réunion. CENTRAL AMERICA: Costa Rica, Nicaragua, Panamá. NORTH AMERICA: Canada (Alberta, Ontario, Québec), México, USA (Alaska, Arizona, California, Idaho, Iowa, Minnesota, New Hampshire, North Carolina, Ohio, Oklahoma, Oregon, Texas, Wyoming). SOUTH AMERICA: Argentina, Bolivia, Brazil (Amazonas, Goiás, Mato Grosso, Roraima), Colombia, Ecuador, Venezuela. ASIA: Armenia, China, Georgia, India (Himachal Pradesh), Kazakhstan, Nepal, Pakistan, Philippines, Russia (Altaiskyi krai, Chitinskaya oblast, Khabarovskyi krai, Krasnoyarskyi krai, Sverdlovsk oblast, Tiumen' oblast), Sri Lanka, Turkey. AUSTRALASIA: Australia (Queensland, Tasmania), New Zealand. CARIBBEAN: American Virgin Islands, Antigua & Barbuda, Cuba, Dominica, Dominican Republic, Jamaica, Puerto Rico, Trinidad & Tobago. EUROPE: Belgium, Czech Republic, France, Germany, Greece, Italy, Lithuania, Poland, Russia (Bashkortostan, Kaliningrad oblast, Komi autonomous republic, Krasnodarskyi krai, Leningrad oblast, North-Ossetian autonomous republic, Tver oblast, Volgograd oblast), Spain, Sweden, Ukraine, United Kingdom.

ECONOMIC IMPACTS: In recent years, exploration has begun of metabolites and other chemicals produced by myxomycetes. KOPANSKI *et al.* (1982) reported the isolation from this myxomycete of arcyriaflavin C, a chemical cytotoxic to HeLa cells (an immortalized cell line in widespread use for cancer research and other fields of investigation), COLE *et al.* (2003) reported the isolation from this myxomycete of an orange anthraquinone pigment, homotrichione, with moderate antibiotic properties, and KOPANSKI *et al.* (1987) reported isolation of a naphthoquinone with possible antibiotic properties. No evaluations have 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 *Trichia rubiformis* var. *minor* Pers., *Trichia rubiformis* var. *laevis* Alb. & Schwein., *Hemiarcyria rubiformis* var. *neesiana* (Corda) Rostaf., *Hemitrichia vesparium* var. *neesiana* (Corda) Torrend, *Hemitrichia vesparium* var. *neesiana* (Corda) Meyl., and *Hemiarcyria rubiformis* var. *tubulina* Rostaf., are not currently accepted. All are listed above as synonyms of typical *M. vesparium*.

DISPERSAL & TRANSMISSION: Nothing specific is known about *Metatrichia vesparium*. 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**. More than 2000 records (specimens, databases, bibliographic sources and field observations combined, excluding duplicates) from 1786 to 2012, with observations in February, March, May, June, July, August, September, October and December with the main fruiting season in the northern hemisphere from June to October. The species is widely regarded as very common. 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 84 million km^2 (Africa: 17·5 million km^2; Central America: 0·1 million km^2; North America: 13·1 million km^2; South America: 6·8 million km^2; Asia: 33·0 million km^2; Australasia: 2·6 million km^2; Caribbean: 1·0 million km^2; Europe: 7·9 million km^2). **Estimated area of occupancy** [calculated using *http://geocat.kew.org*]. About 300 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. ***Ex situ* conservation actions**. Three nucleotide sequences were 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 epithet for this species is often cited as *vesparia*, as though it were an adjective in the feminine form agreeing with the feminine noun *Metatrichia*, but the Latin word is, in fact, *vesparium*, a neuter noun meaning 'wasps' nest' which, being in apposition, does not change its ending when used as an epithet.

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. A record on that map from Russia, apparently from Krasnoyarskyi krai, is in reality from Kaliningrad oblast.

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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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