A species of the fungus genus Conidiobolus as a pathogen of a lycosid spider

Autor(en): **Keller, Siegfried**

Objekttyp: **Article**

Zeitschrift: **Mitteilungen der Schweizerischen Entomologischen Gesellschaft = Bulletin de la Société Entomologique Suisse = Journal of the Swiss Entomological Society**

Band (Jahr): **83 (2010)**

Heft 3-4

PDF erstellt am: **23.05.2024**

Persistenter Link: https://doi.org/10.5169/seals-403011

MITTEILUNGEN DER SCHWEIZERISCHEN ENTOMOLOGISCHEN GESELLSCHAFT
BULLETIN DE LA SOCIÉTÉ ENTOMOLOGIQUE SUISSE
83: 227–231, 2010

A species of the fungus genus *Conidiobolus* as a pathogen of a lycosid spider

SIEGFRIED KELLER[1] & RUDOLF WEGENSTEINER[2]

[1] Rheinweg 14, CH-8264 Eschenz, Switzerland. siegfriedke@bluewin.ch
[2] University of Natural Resources and Applied Life Sciences, Gregor Mendel Strasse 33, A-1180 Vienna, Austria. rudolf.wegensteiner@boku.ac.at

A lycosid spider caught in a pitfall trap in central Switzerland attracted our attention due to the numerous scattered whitish spots on the dorsal abdomen. A microscopic examination revealed a fungus infection. However, only conidiophores were present. A few of them were in an early stage of conidia formation. The diameter of the unbranched conidiophores, the way conidia formation is initiated and the number, size and distribution of nuclei allowed us to attribute the fungus to the genus *Conidiobolus* of the order Entomophthorales. It is the first record of an entomophthoralean fungus infecting Aranea.

Keywords: Araneae, fungus infection, Entomophthorales, symptoms, morphology.

INTRODUCTION

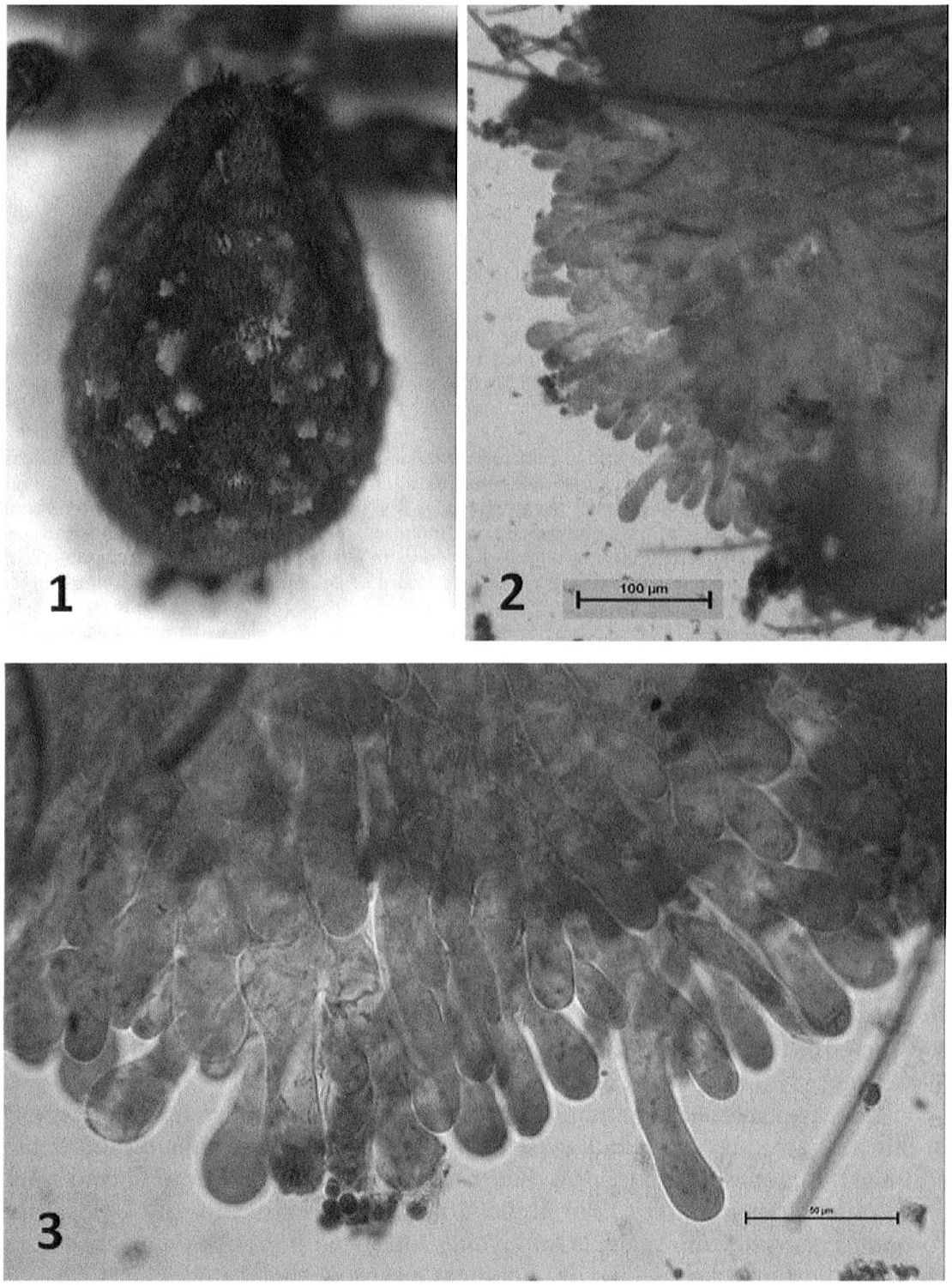
Insect and mite pathogenic fungi are well known and numerous species are thoroughly investigated. In contrast to that little is known about spider pathogenic fungus species. There is no updated list of fungi pathogenic to spiders. Evans & Samson (1987) mentioned 54 species; 27 of them belong to the genus *Torrubiella* and eight to the genus *Cordyceps* (Ascomycetes, Clavicipitales). The other 19 species are anamorphs of Ascomycetes (formerly known as Hyphomycetes) placed in the genera *Akanthomyces*, *Clathroconium*, *Engyodontium*, *Gibellula*, *Hirsutella*, *Hymenostilbe*, *Nomuraea*, *Paecilomyces* and *Verticillium*. The list, although not considered as comprehensive, gives a good overview on the genera involved. Some of the species are illustrated in Samson *et al.* (1988).

Only two species of Entomophthorales (Entomophthoramycotina) are known to infect Arachnida: *Entomophaga batkoi* and *Pandora phalangicida* infect harvestmen (Opiliones, Phalangiidae), but there is no species known to infect spiders of the order Aranea (Bałazy 1993, Keller 2007). There are records of *Conidiobolus coronatus* isolated from spiders (Anonymus 2009), but it is unknown if the fungus killed the host or colonised the dead body as a saprophyte.

During studies on arthropod diversity we found a lycosid spider in a pitfall trap with whitish spots on the abdomen. A first microscopic examination revealed the presence of a fungus. Here we report further details of this fungus.

MATERIAL AND METHODS

The infected spider was caught in a pitfall trap placed on the farmland of the former agricultural college Burgrain/Alberswil, canton Lucerne, in early summer



Figs 1–3. — 1: Dorsal view of the abdomen of *Pardosa amentata* showing bright, irregularly distributed spots with fungus outgrowth. — 2: Overview of a spot showing the numerous conidiophores. Scale bar = 100 µm. — 3: Detailed view of a spot showing the unbranched conidiophores. Scale bar = 50 µm.

1993. The sampling place was in a plane field suffering from inundations after heavy rainfalls.

The sample vials in the traps were half filled with a 4 % sodium hypochlorite solution which killed and preserved the catch. The vials were changed twice a week and stored subsequently in a cool room until the material was examined. In a first step, the material was separated into different taxonomic groups. A lycosid spider attracted attention due to the whitish spots on the abdomen and was placed in a small vial containing 70 % ethanol. A few weeks later a small part of the abdomen was removed and mounted in lactophenol-aceto-orcein (LPAO) with 0.05 % orcein as described by Keller (1987). A preliminary microscopic examination revealed the presence of a fungus.

To re-examine the material the slide was remounted in January 2010 in lactophenol-cotton blue (LPCB) with 0.1 % cotton blue. Measurements were done with a Wild M20 stereomicroscope at 500 times magnification. Photos were taken in a normal light microscope (Reichert Polyvar) with a digital camera (Nikon, DS-Fi1) and the imaging software NIS Elements BR 3.0 (Nikon).

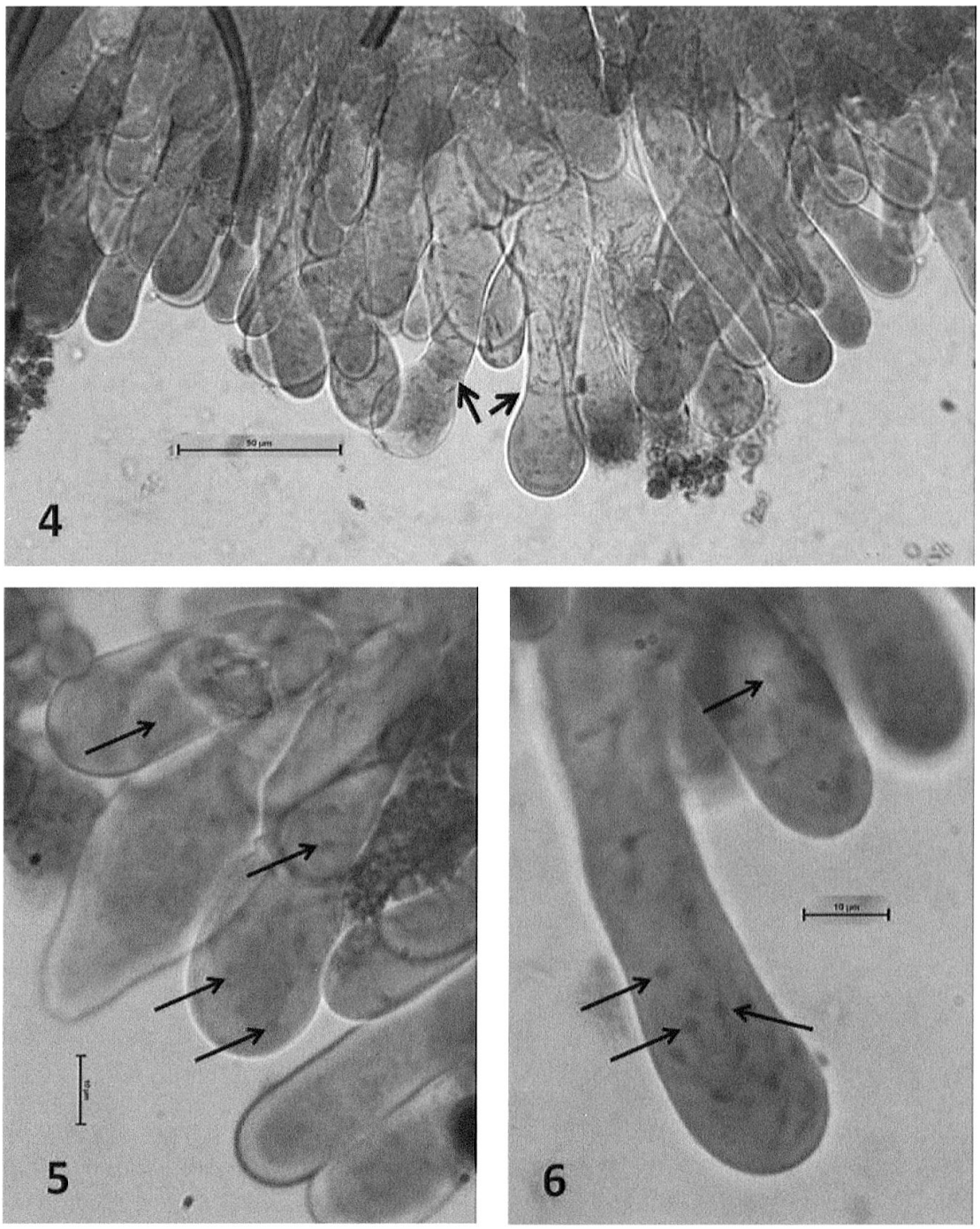
RESULTS AND DISCUSSION

Host: The spider was identified as an adult female of *Pardosa amentata* (Clerck, 1758) (Araneae, Lycosidae).

Symptoms: Whitish spots were scattered on the dorsal side of the abdomen which had a fluffy and irregular appearance (Fig. 1). Under the microscope only conidiophores could be seen (Fig. 2). Their diameter ranged from 9.5 to 15.5 µm with an average of 12.5 ± 1.96 µm. They were unbranched, the endings were rounded, some of them showed a terminal enlargement (Fig. 3). In a few cases this enlargement had a conical prolongation and some others showed a septum basally to the terminal enlargement (Fig. 4). These structures are considered as the early stages of conidia formation. The conidiophores contained numerous (more than 20) faintly stained spheres with a diameter of about 1 µm which are considered as nuclei (Figs 5 and 6). No other fungal structures were seen.

The presented findings (type and dimensions of conidiophores, early conidia formation, number, size and stainability of nuclei) are known from the genus *Conidiobolus* (Humber 1989; Keller & Petrini 2005). Therefore, we attribute this fungus to *Conidiobolus*. Unfortunately, no other fungal structure was present so that neither a further identification nor a complete description of the fungus can be given. The only species of Entomophthorales recorded from Araneae is *C. coronatus*, a ubiquitous fungus known as a saprophyte but also as pathogen of several arthropods (Anonymus 2009).

For the following reasons we consider this fungus as different from *C. coronatus*: In central Europe this fungus is mainly known as a saprophyte that has often been isolated from detritus and soil (Bałazy 1993, Keller 2008). The only known arthropod hosts are aphids (Bałazy 1993) and *Ceutorhynchus napi* (Coleoptera, Curculionidae) collected as larvae from soil (Keller 1987). In the latter case the fungus colonised the whole body of its hosts and covered their complete surfaces when sporulating. Further, the conidiophores of *C. coronatus* have a diameter of 9.5–25 µm (Bałazy 1993) in contrast to 9.5–15 µm of the present fungus. Nevertheless, further investigations are needed to demonstrate that the two fungi are really different.



Figs 4–6. — 4: Details of conidiophores. Two of them showing early stages of the conidia formation visible by the septum separating the future conidia from the conidiophores (arrows). Scale bar = 50 µm. — 5 and 6: Tips of conidiophores with nuclei. Some of them are marked with an arrow. Scale bars = 10 µm.

With this report we would like to attract the attention of arachnologists to this particular type of an entomophthoralean infection in true spiders. We believe that this phenomenon is not that rare but has been overlooked. Additional findings would enable us to describe all fungus structures and to understand the host-pathogen relationship. In particular, we do not know if the fungus causes only superficial infec-

tions like species of Laboulbeniales. For that histological sections are needed. Further, we do not know how the fungus interacts with its hosts, especially, if the fungus is able to kill it.

ZUSAMMENFASSUNG

Bei Untersuchnungen zur Arthropodendiversität auf dem Gutsbetrieb Burgrain/Alberswil, Kanton Luzern, wurde in einer Bodenfalle eine Spinne (*Pardosa amentata*; Araneae, Lycosidae) mit unregelmässig verteilten, weisslichen Flecken auf dem dorsalen Abdomen gefunden. Die mikroskopische Untersuchung zeigte, dass es sich bei diesen Flecken um Pilzinfektionen handelte. Die vorhandenen Strukturen erlaubten es, den Pilz der Gattung *Conidiobolus* (Entomophthorales) zuzuordnen, für eine Artbestimmung dagegen reichten sie nicht aus. Berichte über Entomophthorales-Infektionen bei Araneae beschränkten sich bisher auf *C. coronatus*, wobei nicht klar ist, ob dieser Pilz den Wirt tötete oder den toten Wirt als Saprophyt besiedelte. Auf Grund der Symptome gilt eine Identität des vorliegenden Pilzes mit *C. coronatus* als unwahrscheinlich.

ACKNOWLEDGEMENTS

The authors thank Christian Kropf, Museum of Natural History, Bern, for the identification of the spider, Martin Nyffeler, University Basel, for support with literature, Ruth Bruderer for sorting out the pitfall traps and Christian Schweizer, Federal Research Station Agroscope Reckenholz-Taenikon, for laboratory support.

REFERENCES

Anonymus. 2009. http://arsef.fpsnl.cornell.edu/mycology/catalogs/Catalog.pdf

Bałazy, S. 1993. Entomophthorales. In: Flora of Poland. Fungi (Mycota) Vol. XXIV. — Polish Academy of Sciences. 353 pp.

Evans, H.C. & Samson, R.A. 1987. Fungal pathogens of spiders. — Mycologist 21: 152–159.

Humber, R.A. 1989. Synopsis of a revised classification for the Entomophthorales (Zygomycotina). — Mycotaxon 34: 441–460.

Keller, S. 1987. Arthropod-pathogenic Entomophthorales of Switzerland. I. *Conidiobolus*, Entomophaga and Entomophthora. — Sydowia 40: 122–167.

Keller, S. 2007. List of species of arthropod-pathogenic Entomophthorales. *In*: Keller, S. (ed.), Arthropod-pathogenic Entomophthorales: Biology, ecology, identification, pp 127–133. — COST publication office, Luxembourg, ISBN 978-92-898-0037-2.

Keller, S. 2008. The arthropod-pathogenic Entomophthorales from Switzerland – is central Europe the centre of their global species-richness? — Bulletin de la Société entomologique Suisse 81: 39–51.

Keller, S. & Petrini, O. 2005. Keys to the identification of the arthropod-pathogenic genera of the families Entomophthoraceae and Neozygitaceae (Zygomycetes) with descriptions of three new subfamilies and a new genus. — Sydowia 57: 23–53.

Samson, R.A., Evans, H.C. & Latgé, J.P. 1988. Atlas of entomopathogenic fungi. — Springer Verlag Berlin.

(received June 14, 2010; accepted October 11, 2010)