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## *Pandora psocopterae*, a new species of insect-pathogenic Entomophthoraceae (Fungi, Entomophthoromycetes) from France

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During a re-examination of the author's collection of entomophthoralean fungi a species found on *Prionoglaris stygia* Enderlein (Psocoptera, Prionoglarididae) in southern France turned out to be new to science. The species, described as *Pandora psocopterae*, is mainly characterized by obovoid primary conidia measuring 17–25 x 8–12  $\mu\text{m}$ .

Keywords: Entomopathogenic fungus, new species, *Pandora psocopterae*, morphology, Psocoptera.

### INTRODUCTION

Until recently no fungal pathogen was known to attack Psocoptera. That's why Lord & Howard (2004) attributed the insects of this order a high tolerance for entomopathogenic fungi. Their experiments with four hypocrealian fungi (Ascomycota) gave evidence that cuticular fatty acids may contribute to this tolerance. However, this is only one factor to explain the scarcity of fungal infections in Psocoptera. In the author's opinion and in the light of recent findings the scarcity of such records is rather due to the fact that nobody looked for them.

It was Keller (2007) who described *Conidiobolus caecilius* (Entomophthorales, Ancylistaceae) as the first fungal pathogen of Psocoptera attacking *Caecilius* spp. (Caeciliidae). A year later, Toledo *et al.* (2008) mentioned *Pandora nouryi* (Remaudière & Hennebert) Humber as pathogen of *Heterocaecilius* sp. So far, *P. nouryi*, which was described from the lettuce root aphid *Pemphigus bursarius* (Remaudière & Hennebert, 1980), had only been known as pathogen of aphids. In addition to that Toledo *et al.* (2008) recorded two further fungal pathogens from Psocoptera, *Hirsutella strigosa* Petch and *H. citriformis* Speare (Ascomycota, Hypocreales).

The material presented here concerns a further fungal pathogen of Psocoptera and represents the third finding of a species of Entomophthorales within this insect order.

### MATERIAL AND METHOD

The air-dried cadaver was soaked in lactophenol-aceto-orcein (LPAO), teased on a slide and subsequently mounted. The examination and the measurements were done with a Wild M20 microscope. Conidia were abundant while only few rhizoids and cystidia were present.

## DESCRIPTION OF THE NEW SPECIES

***Pandora psocopterae* S. Keller sp. nov.**

(Figs. 1–3)

*Diagnosis.* *Rhizoidea monohyphalia*. *Conidia primaria* 17–25 x 8–12  $\mu\text{m}$ , mononucleata, bitunicata, obovoidea vel ellipsoidea, papilla lata, rotundata. *Cystidia gracilia*. *Sporae perdurantes absunt*.

*In Prionoglaris stygia* Enderlein (*Psocoptera*) (*hospite typico*).

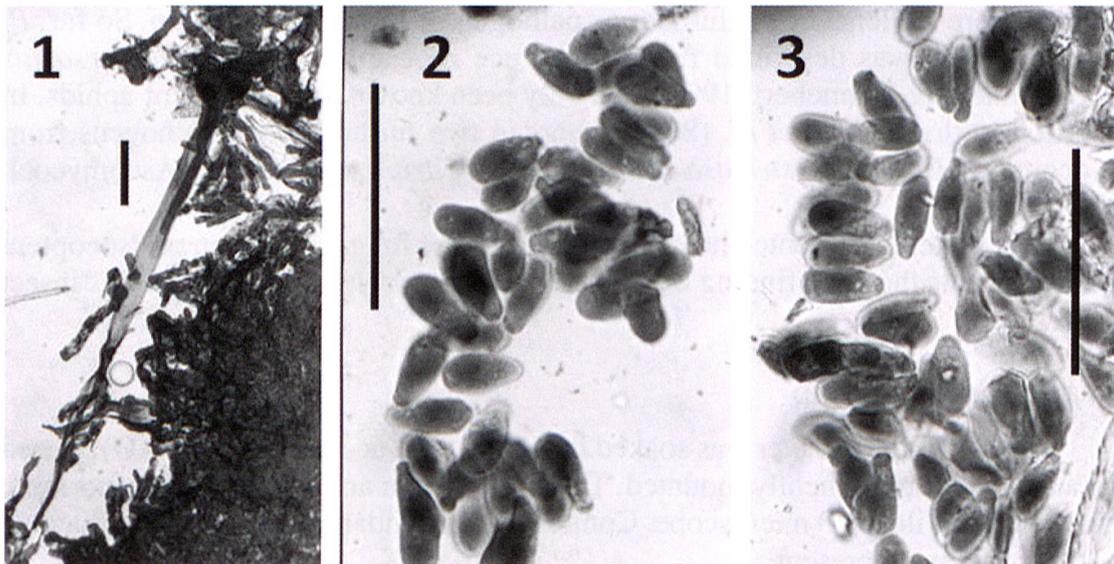
*Holotype:* ZT, France, Tardets-Sorholus, coll. C. Lienhard, det. S. Keller, 25.IX.1986, no. Pp87-01.

*Host.* *Prionoglaris stygia* Enderlein (*Psocoptera*, *Prionoglarididae*).

*Description.* Cystidia slender. - Rhizoids monohyphal (Fig. 1). - Primary conidia (17) 20.5 (25) x (8) 9.6 (12)  $\mu\text{m}$ ,  $Q = 2.15$  ( $n = 50$ ), elongate ovoid to ellipsoidal, largest diameter in apical half; papilla broad, rounded (Figs 2–3), nuclei with a diameter of 5–7  $\mu\text{m}$  ( $n = 6$ ).

*Distribution.* France, Pyrénées-Atlantiques, Tardets-Sorholus: Grotte Compagnaga Lecia près de Camou-Cihigue. The specimen, which died during the rearing, was collected by C. Lienhard on November 25, 1986, and supplied to the author as exsiccatum.

*Remarks.* Most arthropod-pathogenic Entomophthorales are placed in the families Entomophthoraceae and Neozygitaceae, only a few belong to the families Ancylistaceae and Meristacraceae. So far, only two species of Entomophthorales, *Conidiobolus caecilius* (Ancylistaceae) (Keller 2007) and *Pandora nouryi* (Entomophthoraceae) (Toledo *et al.* 2008), had been known to attack Psocoptera. Since Entomophthoraceae are known to be narrowly host specific, the presented species



Figs 1–3. *Pandora psocopterae*: 1. Rhizoid; 2–3. Primary conidia. All stained with LPAO. Bars represent 50  $\mu\text{m}$ .

is considered as new to science and described as *Pandora psocopterae* in spite of the incomplete data.

Usually, species of arthropod-pathogenic Entomophthorales are described from fresh or ethanol-preserved material. However, *P. psocopterae* is described from air-dried material. Therefore, it cannot directly be compared with other related species like *Pandora dipterigena* or *P. neoaphidis*, since the shrinking factor is unknown. On the other hand it can clearly be separated from *P. nouryi* and from *C. caecilius* by the shape and the dimensions of the primary conidia. The former has distinctly smaller conidia and the latter has subspherical and larger ones. With *P. psocopterae* the family Entomophthoraceae consists of 170 classified species (Keller, 2008).

#### ACKNOWLEDGEMENTS

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#### ZUSAMMENFASSUNG

Die Aufarbeitung der Entomophthoraceen-Sammlung des Autors führte zur Beschreibung von *Pandora psocopterae* (Fungi, Entomophthorales). Der Pilz wurde in *Prionoglaris stygia* Enderlein (Psocoptera, Prionoglarididae) in Südfrankreich von C. Lienhard gefunden. Neben *Pandora nouryi* handelt sich um die zweite Art der Familie Entomophthoraceae, die bei Psocopteren gefunden wurde. Die Art ist gekennzeichnet durch 17–25 x 8–12 µm messende obovate Primärkonidien (Abb. 2–3) sowie durch schlanke Cystidien und monohyphale Rhizoide. Sie lässt sich auf Grund von Konidienform und -grösse leicht von *P. nouryi* (Entomophthorales, Entomophthoraceae) und von *Conidiobolus caecilius* (Entomophthorales, Ancylistaceae) unterscheiden.

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