

***Neozygites sminthuri* sp. nov. (Zygomycetes,  
Entomophthorales), a pathogen of the springtail  
*Sminthurus viridis* L. (Collembola, Sminthuridae)**

Siegfried Keller & Tove Steenberg\*

Federal Research Station for Agroecology and Agriculture, Reckenholzstrasse 191,  
CH-8046 Zürich, Switzerland

Royal Veterinary and Agricultural University, Section of Zoology, Bülowsvej 13,  
DK-1870 Frederiksberg C, Denmark

Keller, S. & Steenberg, T. (1997). *Neozygites sminthuri* sp. nov. (Zygomycetes, Entomophthorales), a pathogen of the springtail *Sminthurus viridis* L. (Collembola, Sminthuridae). – *Sydowia* 49(1): 21–24.

*Neozygites sminthuri* is described as a new species. The spherical hyphal bodies measure 12.1–14.6 µm and contain 4, rarely 3 nuclei. The conidiophores are unbranched and produce a single conidium. The primary conidia measure 13.2–14.5 × 8.2–10.0 µm. Secondary conidia resembling the primary ones are produced on short, thick secondary conidiophores. Capilliconidia and resting spores were not found, but the fungal structures observed allow the inclusion of this species in the genus *Neozygites*.

Keywords: Insect pathogens, taxonomy, morphology, *Neozygites*, Collembola, *Sminthurus*, lucerne.

Fungal pathogens have only rarely been recorded from springtails (Visser & al., 1987; Balazy, 1993). An entomophthoralean fungus (Zygomycetes: Entomophthorales), however, was recently found in populations of the lucerne flea *Sminthurus viridis* L. (Collembola: Sminthuridae) in Denmark. Fungus infected specimens of *S. viridis* were collected at three sites in the western and in the eastern part of Denmark. The fungus was recorded in two consecutive seasons and only infected a small proportion of the host population (Steenberg & al., 1996).

The fungus was identified as a hitherto unknown species of *Neozygites* Witlaczil (1885). This genus comprises species with relatively narrow host ranges, all of which have been found in small arthropods such as aphids (Homoptera), thrips (Thysanoptera) and mites (Acari) (Keller, 1991). This new species of *Neozygites* infecting springtails is described here.

---

\* Present address: Danish Pest Infestation Laboratory, Skovbrynet 14, DK-2800 Lyngby, Denmark.

## Materials and methods

Live samples of *S. viridis* were collected by sweep netting in lucerne fields during July and August. The specimens were transferred to humid chambers (30 ml plastic vials containing a leaf of lucerne embedded in a layer of water agar) and incubated for 7 days. During this time, some of them succumbed to the fungus, falling to the bottom of the vials.

The fungus material was mounted in lactophenol cotton blue (LPCB) or lactophenol aceto orcein (LPAO, 0.5% orcein) as described by Keller (1987). All measurements and counts were based, if not otherwise stated, on 50 objects per individual host, designated as one series. The number of series investigated is given after the range of the mean values, the extreme values (in brackets) and eventually the ratio length/diameter (L/D). Measurements of fungal structures are rounded to 1  $\mu\text{m}$ , those of nuclear diameters to 0.5  $\mu\text{m}$ .

## Results

***Neozygites sminthuri*** S. Keller & Steenberg sp. nov. – Pl. 1, Figs. 1–8.

Corpora hyphalia sphaerica vel subsphaerica (11–)12–15(–17)  $\mu\text{m}$ , 4 nuclei diametro 2.5–3  $\mu\text{m}$  praedita. Conidiophora simplicia. Conidia primaria (12–)13.5–14.5(–16)  $\times$  (6–)8–10(–12)  $\mu\text{m}$ , ovoidea vel pyriformia. Conidia secundaria primariis similia, 11–13  $\times$  7–10  $\mu\text{m}$ . Rhizoidea, cystidia, capilliconidia et sporae perdurantes absunt.

In *Sminthuro viridi* L. (Collembola, Sminthuridae) (Hospite typico).

Holotypus. – Dania, Taastrup, in *Sminthuro viridi*, VIII 1995, coll. J. Eilenberg et T. Steenberg, leg. S. Keller (ZT, no Sv3).

Paratypi. – Dania, Taastrup, in *Sminthuro viridi*, VIII 1995, coll. J. Eilenberg et T. Steenberg, leg. S. Keller (ZT, no Sv4, Sv13, Sv14; K no Sv21; BPI no Sv22).

Host. – Collembola, Sminthuridae: *Sminthurus viridis* L. (type species).

Etymology of specific epithet. – Suggesting the host from which the fungus was collected.

Rhizoids absent. – Hyphal bodies spherical, 12.1–14.6  $\mu\text{m}$  (11–17  $\mu\text{m}$ ) (3 series), sometimes slightly subspherical, containing 4, rarely 3 nuclei measuring 2.7–2.8  $\mu\text{m}$  (2.5–3  $\mu\text{m}$ ) (3 series), germinating with single germ tube. – Conidiophores unbranched. – Primary conidia 13.2–14.5  $\times$  8.2–10.0  $\mu\text{m}$  (12–16  $\times$  6–12  $\mu\text{m}$ ), L/D = 1.43–1.66 (5 series); ovoid to pyriform, apex rounded, papilla rounded, rarely flat; diameter of the papilla 6.1 (5–7)  $\mu\text{m}$  (1 series, n = 25). – Secondary conidia similar to the primary ones, 11.8  $\times$  8.7  $\mu\text{m}$

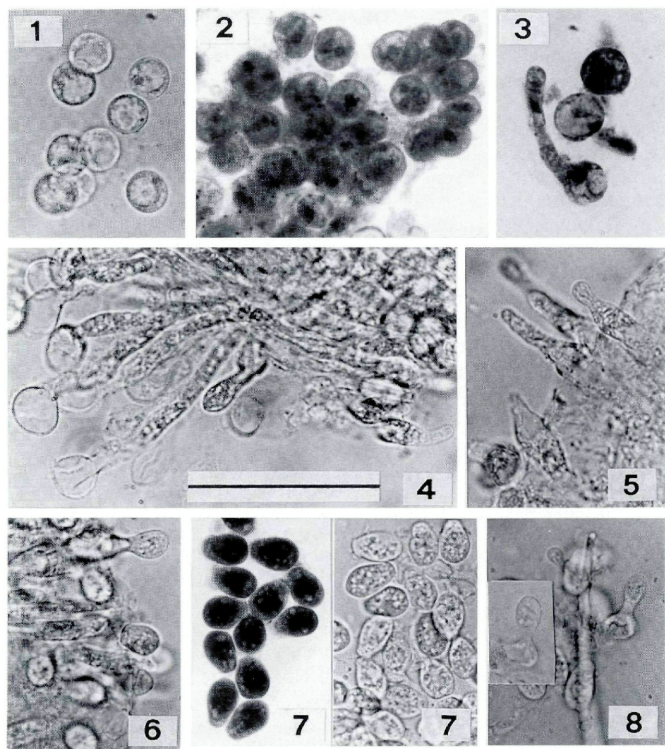


Plate 1. – 1–8: *Neozygites sminthuri*. – 1. Hyphal bodies (LPCB). – 2. Hyphal bodies with nuclei (LPAO). – 3. Germinating hyphal bodies. – 4. Shells of hyphal bodies with developing conidiophores. – 5. Conidiophores penetrating the host cuticle. – 6. Tips of conidiophores with developing conidia. – 7. Projected primary conidia. – 8. Primary conidia with developing secondary conidia. – Bar: 50  $\mu\text{m}$ .

(11–13  $\times$  7–10  $\mu\text{m}$ ),  $L/D = 1.35$  (1 series,  $n=25$ ), produced on a short, thick germ tube. – Capilliconidia, cystidia and resting spores not observed.

Distribution. – Taastrup (eastern Zealand) (type location), Aagerup (Zealand), Barde (western Jutland).

## Discussion

The species is incompletely known. Although many host specimens were examined no capilliconidia or resting spores were found. Nevertheless, the fungal structures present are typical for the genus *Neozygites*, especially the structure and size of the nuclei. Nearly all hyphal bodies, conidiophores and primary conidia examined contained 4 nuclei. From  $3 \times 50$  hyphal bodies only 2–6% contained 3 nuclei. Less than 3 or more than 4 nuclei were never found.

This is the first well documented case of an entomophthoralean fungus attacking an apterygote insect. Balazy (1993) mentioned a collection from Poland of *Erynia curvispora* on the Collembola *Podura* sp. floating on the water surface. Beside this isolated record this species is known only from Diptera: *Nematocera*, mainly belonging to the families Chironomidae and Simuliidae (Balazy, 1993; Keller, 1991). Since the Entomophthorales are known for their host specificity, the record of *E. curvispora* on Collembola must be considered doubtful and is in need of confirmation.

## Acknowledgments

The authors thank J. Eilenberg, D. Berthelsen, C. Nielsen and K. Dromph (Royal Veterinary and Agricultural University, Copenhagen, Denmark) for their help with the collection of the material and O. Petrini for his help with the Latin diagnosis. This study was supported by the Danish National Environmental Research Programme.

## References

- Balazy, S. (1993). Flora of Poland. Fungi (Mycota) Vol. XXIV. Entomophthorales. – Polish Academy of Sciences, Krakow, 356 pp.
- Keller, S. (1987). Arthropod-pathogenic Entomophthorales from Switzerland. I. *Conidiobolus*, *Entomophaga* and *Entomophthora*. – *Sydowia* 40: 122–167.
- Keller, S. (1991). Arthropod-pathogenic Entomophthorales from Switzerland. II. *Erynia*, *Eryniopsis*, *Neozygites*, *Zoophthora* and *Tarichium*. – *Sydowia* 43: 39–122.
- Steenberg, T., J. Eilenberg & J. Bresciani (1996). First record of a *Neozygites* species (Zygomycetes: Entomophthorales) infecting springtails (Insecta: Collembola). – *J. Invertebr. Pathol.* 68: 97–100.
- Visser, S., D. Parkinson & M. Hassalli (1987). Fungi associated with *Onychiurus subtenuis* (Collembola) in an aspen woodland. – *Can. J. Bot.* 65: 635–642.
- Witlaczil, E. (1885). *Neozygites aphidis*, eine neue Gregarine. – *Arch. f. Mikr. Anat.* 24: 599–603.

(Manuscript accepted 12th November 1996)

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Sydowia](#)

Jahr/Year: 1997

Band/Volume: [49](#)

Autor(en)/Author(s): Keller Siegfried, Steenberg Tove

Artikel/Article: [Neozygites sminthuri sp. nov. \(Zygomycetes, Entomophthorales\), a pathogen of the springtail Smithurus viridis L. \(Collembola, Sminthuridae\). 21-24](#)