

## *Gibellula leiopus* (Vuillemin in Maublanc) Mains—the fungus pathogenic for spiders

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The flora of hyphomycetous fungi pathogenic for arthropods in Poland is rather scarce. Among the 33 species listed by Lipa (1963) only a few belong to typical insect pathogens. The majority is constituted by saprophytes—having sometimes may be certain pathogenic tendencies—or doubtless necrophytes. In some sporadic cases entomopathogenic species have been met on spiders. Therefore it will be useful to note the occurrence of a further species *Gibellula leiopus* (Vuillemin in Maublanc 1920) Mains 1950, so far not yet reported from Poland, the more so since there are some obscurities concerning its nomenclature as well as its biology.

### MATERIAL AND METHODS

Sporulating specimens of *G. leiopus* were collected in June, July and August, 1968, in the nature reserve called "ptasi" (bird's), on the area of the Wielkopolski National Park near Poznań. The fungus grew on dead spiders of moderate or small size (determination of host species was not possible) and was found always on the underside of bigger leaves of trees in the undergrowth or forest herbaceous plants. Identification of the fungus species and examination of its micromorphology were established on the basis of elements of the mycelium developing on the spiders.

Numerous attempts aiming at isolation of the fungus on Czapek's-agar or other organic-mineral media and extracts from various plant substances with an addition of agar, did not give any positive results. In order to isolate the fungus various methods of monosporous culture were applied and media were inoculated with small portions of mycelium from the inner part of surface sterilized spider bodies. Attempts at infection of spiders and insects in laboratory were initiated, however, hitherto the results allow no wider discussion on the possible existence of disease.

## RESULTS OF INVESTIGATION

## a. Morphology of the fungus

Their mycelium envelops the spider body with a thin, silky cover. It has a cream-yellow or yellow-grey colour with violet shade, especially in strong light (also under a quartz lamp). The mouth parts and legs of the spiders are also entirely covered with a layer of hyphae. Conidial sporulation occurs generally on mycelial bundles of the synnema-type, 0,5—3 mm long and 0,1—0,2 mm thick at the base and 0,15—0,3 mm in the club-shaped, widened upper portion. These synnemata (12—70) grow from the abdominal part of the spider's body (Fig. 1). They are

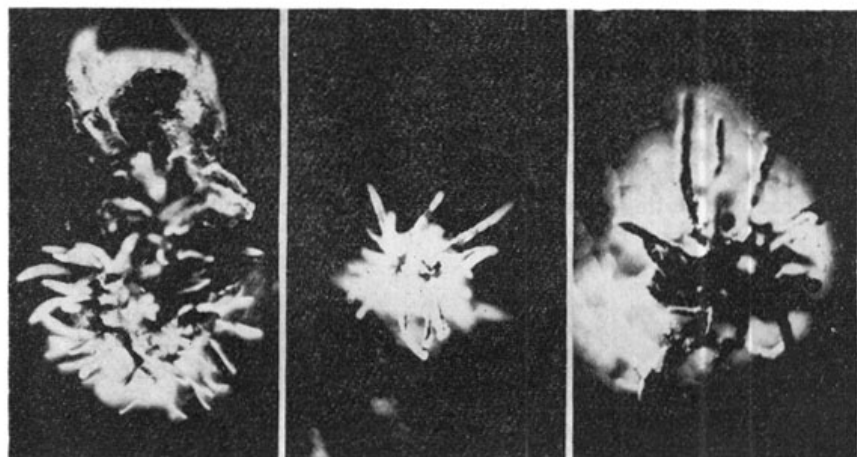


Fig. 1. Dead spiders overgrowing with the fungus *G. leiopus*

widely rounded or spindle-like narrowed at their tips. Their colour resembles that of the mycelium overgrowing the spider body. Single conidiophores may be met also among mycelial hyphae not gathered in bundles. The synnemata are composed of two layers of differentiated hyphae. In the inner layer the hyphae are relatively thin ( $1,7-2,5\mu$  in diameter), equally thick along their length, smooth, unbranched, with cross walls situated at about  $50\mu$  intervals. In the superficial layer the hyphae are thicker  $2,5-3\mu$  and in some segments even to  $4,5\mu$  in diameter, sometimes with the outer walls appearing as delicately rough. These hyphae have lateral stripes  $2-7\mu$  long, bearing particular conidiophores; the latter are, however, always separated by a cross wall, seldom

by one intermediate cell. The conidiophores proper (Fig. 2a) are one-celled, club-shaped or obovoidal,  $9-14\ \mu$  long,  $4-4.5\ \mu$  thick at the base and  $6.5-10\ \mu$  at the widened upper part. They are ended by biverticillate, penicillate structures, bearing the tangled chains of conidia, which form terminal heads. Prophialides are cylindric or indistinctly club-shaped,  $5-10$  on the tip of each conidiophore, measuring  $8.5-10$  by  $4-6.2\ \mu$ . Phialides cylindric spindle-like with a very short and indistinct conidium-forming tube, outgrew in the number of  $3-6$  from each prophialide and measure  $6-9.2$  by  $2.3-3\ \mu$ ; sometimes single once reaching  $10\ \mu$  and even more. The conidia (Fig. 2b) are oval or short ellipsoidal, sometimes

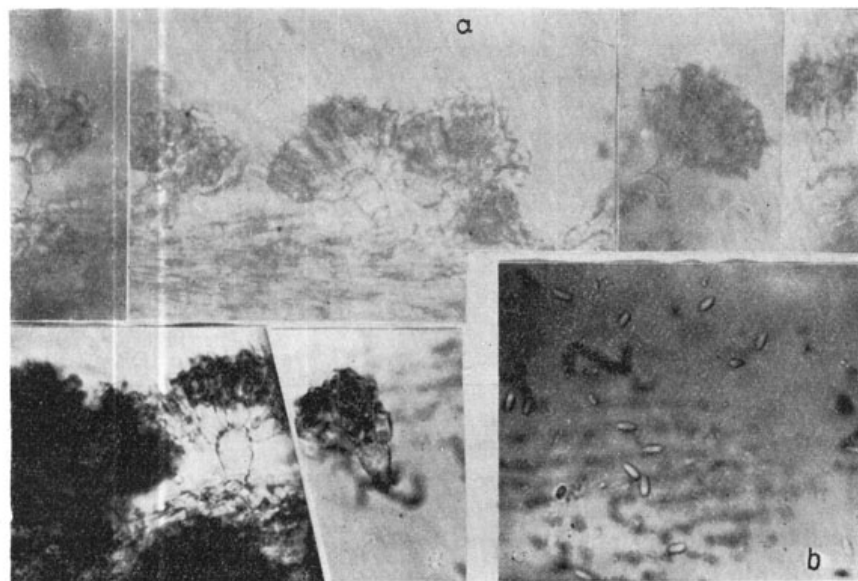


Fig. 2. *Gibellula leiopus* (Vuill. in Maubl.) Mains  
 a — Penicillate conidium-forming structures in microscopical view; b — Conidia (strongly enlarged)

with one end more distinctly narrowed,  $3.5-6$  by  $1.9-3\ \mu$ , smooth, hyaline. The morphology of the fungus is entirely comparable to the description of the species *G. leiopus*.

#### b. Notes on the nomenclature of the species

Under the generic name *Gibellula* Cavara 1894 there have been described or included after revisions 15 species from among the fungi pathogenic for spiders and insects (Vuillemin 1911; Petch 1931,

1932; Mains 1949, 1950). As a result of the general revision carried out by Petch (1932) nearly all the species names, given earlier were treated as synonyms of *G. araneorum* (Schweinitz 1822) Sydow 1922 (basonym *Isaria araneorum* Schweinitz 1822). On the basis of examination of a relatively abundant material Petch came to the conclusion that small morphological differences may occur between particular series of specimens from different areas, but these differences have neither the character of, nor any value as specific features. Applying as the fundamental criteria of the taxonomy of the dimensions of conidiophores, phialides and spores, Petch paid also attention to the fact that in the case of some North-American specimens treated as *G. araneorum*, the penicillate conidium-forming elements outgrew on very short stalks, often appearing as almost sitting on hyphae of the outer layer of synnemata. Accepting in a principle Petch's opinion as to the specific identity of the majority of *Gibellula* forms developing on dead spiders Mains (1950) recognized — on the priority principle — the name *G. araneorum* (Schw.) Syd. as the synonym of *G. pulchra* (Saccardo 1877) Cavara 1894 (basonym *Corethropsis pulchra* Saccardo 1877). Moreover, he distinguished further species *G. leiopus* (Vuill. ap. Maubl.) Mains, which is described and illustrated in Vuillemin's work (1911) as *G. arachnophila* (Ditmar 1817) Vuillemin 1911, and later recognized as *G. arachnophila* f. *leiopus* Vuill. by Maublanc (1920). Petch (1932) recognized the form *G. arachnophila* (Ditm.) Vuill. as the synonym of *G. araneorum* (Schw.) Syd., whereas he treated the specimen of *Isaria arachnophila* described by Ditmar (1817) — from which the name *G. arachnophila* derives — as belonging to the genus *Hymenostilbe* Petch 1931 (s. also Petch 1931a). Therefore is no doubt that the specimens mentioned by him having very short conidiophores should be included into *G. leiopus*.

According to up-to-date investigations — *G. pulchra* and *G. leiopus* are the conidial stages of an ascomycete *Torrubiella arachnophila* (Johnston 1915) Mains 1950 (syn. *Cordyceps arachnophila* Johnston 1915, *Torrubiella Gibellulae* Petch 1932). On the basis of morphological differences in conidial sporulation Mains (1950) distinguished two of its strains: *T. arachnophila* var. *pulchra* Mains and *T. arachnophila* var. *leiopus* Mains. However, ascomycetous fructification does not always occur. It was not observed on the specimens from Wielkopolski National Park.

On the basis of the descriptions and illustrations given there is no doubt that *Isaria perexigua* Kobayasi 1941 found in Japan and then reported from the south-eastern Soviet Union (Koval 1963), is identical with *G. leiopus*.

As it results from the successful bibliography, an undetermined *Gibellula* species was found in Poland on the pupae of *Panolis flammea* (Schiff.) and *Hyloicus pinastri* (L.) (Kozłowska 1956). Unfortunately, these materials have not been preserved and now it is impossible to reconstruct the name of the species of that fungus on so far not noted species of host insects.

#### CONCLUSIONS

The fungus *Gibellula leiopus* (Vuill. in Maubl.) Mains occurs in Poland as a pathogen of undetermined spider species. Separation of this species by Mains (1950) on the basis of morphological differences between the specimens of *Gibellula* pathogenic for spiders was reasonable. The name *Isaria perexigua* Kobayasi 1941 should be acknowledged as a synonym of *G. leiopus*.

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#### LITERATURE

- Cavara F., 1894, Ulteriore contribuzione alla micologia Lombarda, Atti Inst. Bot. Univ. Pavia Ser. 2. 3:313-350.
- Ditmar L. P. F., 1817, Die Pilze Deutschlands. [In:] Sturm's Deutschlands Flora Abt. III. Bd. 1:1-130.
- Johnston J. R., 1915, The entomogenous fungi of Porto Rico, Porto Rico Bd. Agr. Exp. Sta. Bull. 10:1-33.
- Kobayasi Y., 1941, The genus *Cordyceps* and its allies, Sci. Rep. Tokyo Bunr. Daig. Sect. B. 5. 84:53-260.
- Koval E. Z., 1963, Entomofilnye griby iz klassa Deuteromycetes juga primorja, Bot. Mat. Otd. Spor. Rast. Akad. Nauk SSSR. 16:104-108.
- Kozłowska C., 1956, Insect killing fungi occurring on material collected for detection of biological forest injurers, Roczn. Nauk Leśn. 19:43-61 (in Polish; English and Russian summaries).
- Lipa J. J., 1963, Polish analytical bibliography of insect pathology. Part I. Disease and microbial control of noxious insects. Prace Nauk. Inst. Ochr. Rośl. 5:1-101 (in Polish; English and Russian summaries).
- Mains E. B., 1949, New species of *Torrubiella*, *Hirsutella* and *Gibellula*, Mycologia 41:303-310.
- Mains E. B., 1950, The genus *Gibellula* on spiders in North America, Mycologia 42:306-321.
- Maublanc M. A., 1920, Contribution à l'étude de la flore mycologique brésilienne. Bull. Soc. Mycol. Fr. 36:33-43.
- Petch T., 1931, New species of fungi collected during the Whitby foray, Naturalist 891:101-103.

- Petch T., 1931a, *Isaria arachnophila* Ditmar, Naturalist 895:247—250.
- Petch T., 1932, *Gibellula*, Ann. Mycol. 30:386—393.
- Saccardo P. A., 1877, Fungi Italici autographice delineati, Michelia 1:73—100.
- Schwenitz de, L. D., 1822, Synopsis fungorum Carolinae superioris, Schrift. Naturf. Ges. Leipzig. 1:20—131.
- Sydow H., 1922, Fungi novo-guineenses, Engler's Bot. Jahrb. 57:321—325.
- Vuillemin P., 1911, Les isaria de la famille Verticilliacées (*Spicaria* et *Gibellula*), Bull. Soc. Mycol. Fr. 27:75—82.

*Gibellula leiopus* (Vuillemin in Maublanc) Mains — grzyb  
pasożytujący na pająkach

Streszczenie

Zarodnikujące okazy grzyba *Gibellula leiopus* znalezione zostały w roku 1968 na martwych pająkach w Wielkopolskim Parku Narodowym koło Poznania. W pracy podano szczegółowy opis morfologiczny grzyba oraz przedyskutowano zagadnienia dotyczące jego nomenklatury. Zdaniem autora *Isaria perexigua* Kobayasi jest synonimem nazwy *Gibellula leiopus*. Pomimo licznych prób i usiłowań, grzyba tego nie udało się hodować na sztucznych podłożach (standardowe pożywki agarowe oraz agaryzowane wyciągi z substancji roślinnych).