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Title: On the occurrence of Pithophora oedogonia (Mont.) Wittr. var. polyspora Rendle et West fil (Cladophoraceae) in the Pond of the Wroclaw Botanical Garden.

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On the occurrence of Pithophora oedogonia (Mont.) Wittr. var. polyspora Rendle et West fil. (Cladophoraceae) in the Pond of the Wrocław Botanical Garden.

PANEK E.S.

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Translated by: G.H.M. Jaworski.

Species of Pithophora Wittr. occur mainly in tropical and subtropical regions (Brand 1905, Collins 1909, 1912, Heering 1921, Heller 1895, Möbius 1893, 1895, Schmidle 1897a, b, Patel 1971, Shukla 1971, Sula 1930, Wittrock 1877), however some also occur under natural conditions in temperate regions - chiefly in U.S.A. (McNeill 1966, Prescott 1962, Smith 1950, Tiffany and Britton 1952).

Species of Pithophora occasionally appear in Europe and are associated mostly with the tropical, higher water plants, cultivated in numerous botanical gardens. The three species which occur most often are:

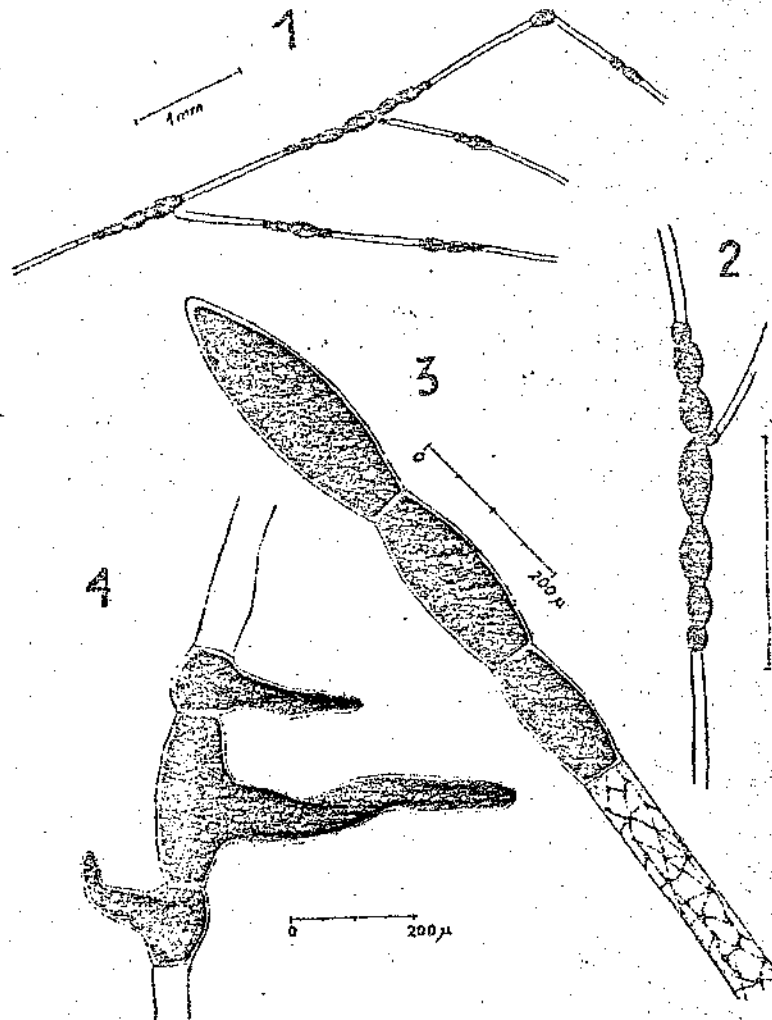
Pithophora oedogonia (Mont.) Wittr., P. kewenais Wittr. and P. varia Wille (Starmach 1972).

In June 1973 pale green, branched threads were discovered in the pond of the Wrocław Botanical Garden, amongst filaments of Spirogyra crassa (Kütz.) Czurda emend. and Cladophora glomerata (L.) Kütz. floating on the water surface. They were maintained for several weeks in crude cultures and produced numerous, dark akinetes tightly packed with reserve material. This collected material was found to be a member of the family Pithophora Wittr.

Throughout the day the temperature of the water in the pond fluctuated between 16 and 21°C; the average pH was 7.9; the amount of nitrogen (excluding nitrates) in the water remained constant at 1.6 mg.l⁻¹ and the values for Ca and K ions amounted to 72.2 mg.l⁻¹ and 14.4 mg.l⁻¹ respectively.

The size of whole plants varied from 1.5 to 3.0 cm. Generally primary and secondary branches were arranged separately along one side or - rarer - opposite. Occasionally tertiary branches emerged, which were usually single-celled (fig. 1-4). The average width of cells in the main filament was 75 µm, for primary branches 75 µm also, and for secondary branches around 55 µm. The width of cells forming tertiary branches did not exceed 35 µm. Vegetative cells were 10 - 45 times longer than broad, the length of cells increased similarly in the higher branching orders. Helicoids were not seen.

Cylindrical or barrel-shaped intercalary akinetes occurred separately but mostly 3-4 alongside each other (occasionally up to 7) (fig. 2). Terminal akinetes were elongated, cone shaped and rounded at the apex. They occurred individually, although often 1 or 2 cylindrical akinetes, with slightly convex lateral walls, developed below the terminal akinete. (fig. 3). Average measurements of the terminal akinetes were $91.3 \mu\text{m} \times 310 \mu\text{m}$ ($80-105 \mu\text{m} \times 250-340 \mu\text{m}$). On the other hand intercalary akinetes were $103.12 \mu\text{m} \times 225.9 \mu\text{m}$. ($75-130 \mu\text{m} \times 110-385 \mu\text{m}$).



Ryc 1—4. *Pithophora oedogonia* (Mont.) Wittr. var. *polyspora* Rendle et West fil. 1 — fragment rośliny przedstawiający odgałęzienie pierwszego rzędu oraz odgałęzienie drugiego rzędu, dźwigające akinety interkalarne, 2 — akinety interkalarne w odgałęzieniu pierwszego rzędu, 3 — fragment odgałęzienia drugiego rzędu z akinetą terminalną i przylegającymi do niej akinetami cylindrycznymi o nieco wypukłych ścianach bocznych, 4 — akinety interkalarne, kiełkujące w niej macierzystej

Fig. 1—4. *Pithophora oedogonia* (Mont.) Wittr. var. *polyspora* Rendle et West fil. 1 — Part of the plant representing primary and secondary ramifications supporting intercalary akinetes, 2 — Intercalary akinetes in a primary ramification, 3 — Part of a secondary ramification with an terminal akinete and adherent cylindrical akinetes with slightly convex side walls, 4 — Intercalary akinetes germinating in the parent filum

Germination was observed, several days after the transfer into tap water of filaments containing akinetes. The akinetes developed laterally, remaining within the parent filament, at the same time the principle of one-sidedness,

clearly visible in fully developed branches, was not retained (fig. 4). Comparing descriptions of numerous species and type material, in collections at the Herbarium of the Botanical Institute, Wroclaw University (Stojanowska in press), with specimens collected from the pond of Wroclaw Botanical Gardens showed, that they undoubtedly belonged to the section Isosporeae (Bourelly 1966), from which the two species most frequently encountered are: P. kewensis Wittr. and P. oedogonia (Mont.) Wittr. A lack of helicoids, dimensions and numbers of akinetes, together with the dimensions of vegetative cells made it possible to designate the collected material as Pithophora oedogonia (Mont.) Wittr. var. polyspora Rendle et West fil. In the process of designation drawings by J.W.G. Lund from Ambleside, based on material from the Reddish Canal (unpublished), were also made available.

In spite of an overall agreement of features, the Wroclaw specimen differed in certain respects from that described from the Reddish Canal (Rendle and West 1899). The average dimensions of intercalary akinetes were within the limits, set by Rendle and West, however they showed a greater range with regard to both width and length. Terminal akinetes were found to be longer than those in the variety from the Reddish Canal. A comparison between the sizes of akinetes from the Wroclaw specimen and those produced by the variety described by Rendle & West, is presented on page 258, (all measurements are in μm). Results from the table show, that the terminal akinetes formed by the algae found in Wroclaw were somewhat longer than those produced by the variety from the Reddish Canal. On the other hand longer and narrower examples were discovered amongst the intercalary akinetes. The length of vegetative cells was also rather larger in the Wroclaw specimens.

	Odmiana z Reddish Canal (Rendle i West 1899) Variety from Reddish Canal (Rendle and West 1899)		Okazy wrocławskie Specimens from Wrocław			
	Szerokość Width	Długość Length	Średnie Mean		Rozpiętość wymiarów Range of sizes	
			Szor. Width	Dług. Length	Szor. Width	Dług. Length
Akinety interkalarne Intercalary akinetes	96-167	147-300	103,1	225,9	75-130	110-385
Akinety terminalne Terminal akinetes	67-155	191-285	91,3	310,0	80-105	250-340

The lack of information concerning the variability, not only of the type described from the Reddish Canal but species in general belonging to Pithophora Wittr. does not allow one to settle, whether the above mentioned differences in the sizes of akinetes and vegetative cells are due to changing environmental conditions or in the case of the Wroclaw specimen, we have to deal

with a definite form. It appears that the member of Pithophora under discussion had become acclimatized in the pond of the Wrocław Botanical Garden, because it was found there both in Autumn 1973 and Spring 1974, although during the winter the pond was periodically covered with ice. It ought to be emphasized here, that this species was not found in the baths and aquaria of the hothouse, thus ruling out its repeated removal to the pond "de novo".

The discovery of a member of Pithophora Wittr. in Wrocław is worthy of mention for this reason, that - excepting rare occurrences (Heering 1921, Radzimovskij 1963) - all species found in Europe belonging to this genus were growing in aquaria or in places where the water was heated (Wittrock 1877, Rendle and West 1899, Sula 1930).

It is probable, that species of Pithophora Wittr. can become acclimatized in Europe, primarily in ponds of botanical gardens, where consequently they are able to tangle easily with higher tropical plants.

Factors determining the germination of akinetes, on the basis of experimental - too superficial - could not be observed. It can be said, that subject to the controlling conditions, akinetes in parental threads germinate at any moment or are released with the help of a mechanism described by Ramanathan (1939).

In relation to the arrival of the Wrocław species it can be assumed, that it was introduced from Brazil together with tropical Nymphaeaceae, at present under cultivation in the Wrocław Botanical Gardens. It is very probable that Brazil is the origin of the species P. oedogonia (Mont.) Wittr., although - from the literature available - the type var. polyspora Rendle et West. fil. was up till now only published from England (Rendle and West 1899).

This present report is the first relating to the occurrence of a member of Pithophora Wittr. in Poland under non-hothouse conditions.

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Notice

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.