The genus *Chlorospora* Spegazzini, an anamorphic fungus

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The type specimen of the unispecific genus *Chlorospora* was examined. This fungus, considered either a member of the Chromista, Peronosporaceae, or of a doubtful systematic position, is shown to be based on the anamorphic fungus *Harzia acremonioides*.

Keywords: *Chlorospora, Harzia, Peronospora,* Chromista, Peronosporales.

Spegazzini (1891: 32–33) introduced the genus *Chlorospora*, with the type species *Chlorospora vastatrix* Speg. Because the paper was entitled 'Phycomycetes Argentinae', *Chlorospora* was considered a member of the Phycomycetes, a name used in the old literature for a heterogeneous group of fungi including organisms now classified in the Zygomycota, Chytridiomycota and Chromista. However, the last phrase of the protologue, here translated into English, 'or rather preferably mucedinous hyphomycete.', shows that Spegazzini doubted that his fungus belonged to 'Phycomycetes'.

In a short review of Speggazini's paper, Roumeguère (1892: 49–50) concluded that 'Il s'agit indubitablement d'un hyphomycète de la famille des Mucédineès.' It is uncertain whether this is Roumeguère's own opinion, or an altered translation of the last phrase of the protologue. Saccardo (1895: 243–244) listed the generic name and the binomial within the family Peronosporaceae. Lindau (1900) also placed the genus in the Peronosporaceae, although he conceded that the diagnosis was unavailable to him. Saccardo & Saccardo (1905: 523) almost completely repeated the protologue from Spegazzini's publication, but omitted the last phrase. Wilson (1907) considered *Chlorospora* very close to *Plasmopara* Schröter, because of having '... conidia which germinate by a plasma.' Hauman-Merck (1914) listed *Chlorospora vastatrix* among the parasites of cultivated plants of Argentina. Fitzpatrick (1930: 222) mentioned 'for reference' *Chlorospora* among the Peronosporaceae, but regarded it as a doubtful genus. Probably because *Chlorospora vastatrix* was described

from *Allium* bulbs, Viégas (1961) considered this fungus conspecific with *Peronospora destructor* (Berk.) Caspary ex Berk., a common parasite of the onion. In the latest edition of the Dictionary of Fungi (Kirk & al., 2001), as well as in the previous ones, no more information other than that provided by Fitzpatrick (1930) was included. In the recent major publications treating the Peronosporaceae, *Chlorospora* was not mentioned (Waterhouse, 1973; Dick, 2000). In the latest monograph, including also the Chromistan fungi (Dick, 2001: 290), *Chlorospora* is only mentioned in a footnote, again as a doubtful genus.

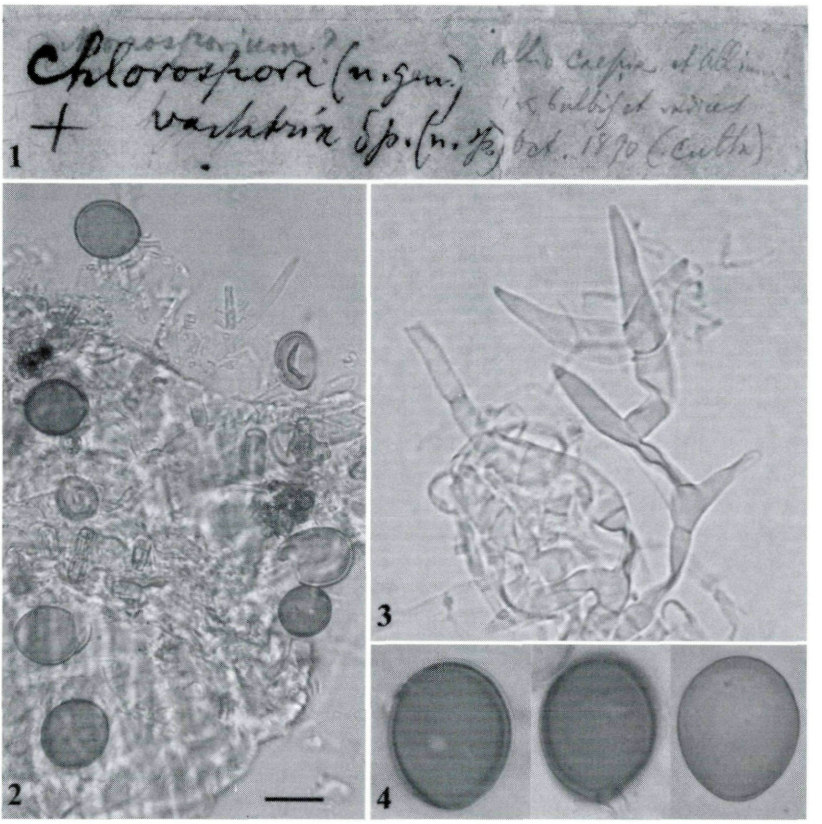
Since the introduction of the genus *Chlorospora*, the type specimen was apparently not re-examined. In order to elucidate the taxonomic position of this fungus, the holotype preserved at LPS [acronym according to Holmgren & al. (1990)] was obtained on loan.

The type specimen (on bulbs of *Allium cepa* L., Argentina, La Plata, Oct. 1890, C. Spegazzini, LPS 1159) consists of several fragments and scales, apparently part of two transverse sections of an onion bulb. One of these sections represents the lower part of the bulb. A few greyish, thread-like hyphae are present on some fragments. On most of the surfaces a reddish layer is present. Slides made from what appeared to be fungal growth mostly showed fragments of colourless, septate hyphae, and some golden brownish, obovoidal, 19–27 × 16–22 µm conidia reminiscent of *Harzia* (Fig. 2, 4). Portions of conidiophores with typical conidiogenous cells were also found (Fig. 3). The conidia and the conidiophores closely agree with the descriptions of *Harzia acremonioides* (Harz) Costantin [= *Acremoniella atra* (Corda) Sacc.] provided by Groves & Skolko (1946), Ellis (1971), and Domsch & al. (1980). The holotype was also compared with a duplicate of DAOM 15066 herbarium specimen (dry culture) of *H. acremonioides* present in UPS. The *Aspergillus*-like synanamorph was not found.

The scarcity of both the conidiogenous cells and conidia seems to be due to poor processing of the specimen. Thus, a large stain on the packet suggests the incomplete drying of the specimen prior to preservation. Moreover, I found numerous mite exuviae. Mites are well-known for feeding on fungi and this may also explain the paucity of the fungus in the type specimen.

Neither the presence of haustoria, nor the size of conidia given by Spegazzini (24–40 × 20–30 µm) could be confirmed by the examination of the holotype.

From the description of the symptoms, particularly of the destructive effect on the host given by Spegazzini, it seems likely that several organisms were initially involved. However, in addition to the presence of *Harzia acremonioides* in the holotype specimen, there are several other facts that indicate that this fungus was



Figs. 1–4. *Chlorospora vastatrix* (LPS 1159). – 1. Initial (*Monosporium*) and later (*Chlorospora*) labelling by Spegazzini. – 2. Conidia on bulb scale. – 3. Collapsed conidiophore and conidiogenous cells. – 4. Conidia. Scale bar: 2 = 20 µm; 3, 4 = 10 µm.

what Spegazzini had at hand. Thus, on the packet of the holotype a pencil line drawing made by Spegazzini shows undoubtedly a hyphomycetous fungus having *Harzia*-like conidia (Fig. 5). The conidiophores are regularly, monopodially branched, but this seems to be an oversimplification of the actual structures of *Harzia*. On the packet, the following text is written in pencil: '*Monosporium*?', and 'allio cepia Allium in bulbil et radices. Oct. 1890 (culta)'. Under the name *Monosporium*, Spegazzini added later in black ink: '*Chlorospora* (n. gen.) *vastatrix* sp. (n. sp.)' (Fig. 1). It seems that initially Spegazzini placed his fungus in the genus *Monosporium* Bonord., now considered a *nomen illegitimum* (Hughes, 1958), but at that time mostly regarded as a member of the anamorphic fungi.

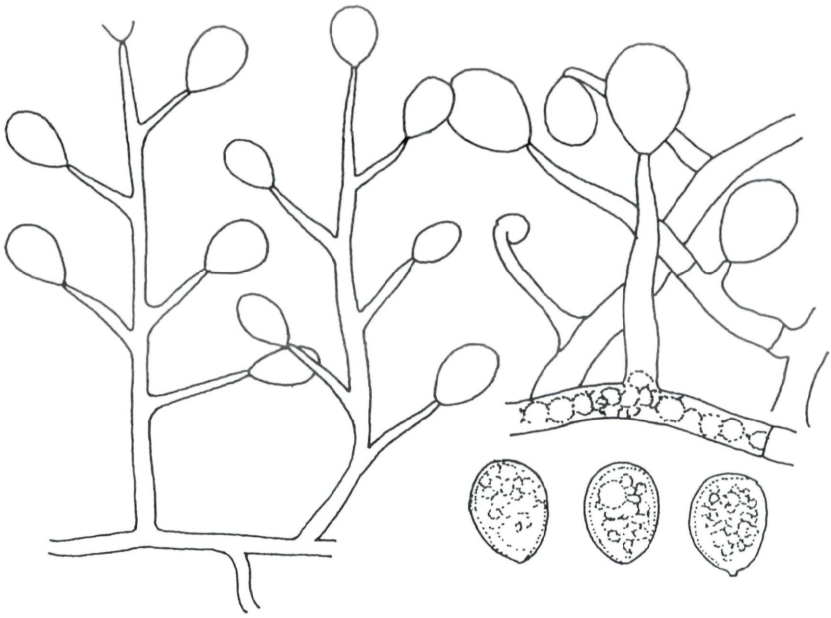


Fig. 5. *Chlorospora vastatrix* (LPS 1159). – Spegazzini's original illustration on the packet of the specimen (redrawn).

Only two chromistan fungi could have been initially present in Spegazzini's specimen: *Phytophthora* sp., and *Peronospora destructor*. However, the sporangia of *Phytophthora* are colourless, and *P. destructor,* although it may survive as mycelium in onion bulbs (Virányi, 1974; 1981), does not form conidiophores and conidia on these organs. In addition, the conidia in *P. destructor* are fusiform (l/w ratio >1.6), whereas the l/w ratio of both the conidia depicted by Spegazzini (1.28–1.4), and of those examined in this study (1.14–1.31), place Spegazzini's fungus in the broadly ellipsoidal shape group (Kirk & al., 2001: 480–481).

In conclusion, the genus *Chlorospora* Speg. is not based on a chromistan fungus, but on the hyphomycete *Harzia acremonioides*. The genus *Chlorospora* Spegazzini (1891) thus becomes a synonym of *Harzia* Costantin (1888).

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