

Type collections of *Lycogala*: where are they?

Dmytro Leontyev

Department of Botany, H.S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine

E-mail: alwisiamorula@gmail.com

Received: 14 September 2023

Accepted for publication: 17 September 2023

Published: 25 September 2023

Editor: Steven L. Stephenson

Abstract: The paper provides data on the location of type collections of 19 species of *Lycogala*. Data on the type and the author's collections of *L. confusum*, *L. exiguum*, and *L. fuscoviolaceum*, the neotype of *L. epidendrum*, and also holotypes of 15 recently described species are listed.

Keywords: herbarium, holotype, lectotype, neotype, taxonomy

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Introduction

The genus *Lycogala* has garnered significant attention due to the discovery of remarkable morphological and genetic diversity within some of its species. It has been revealed that the classical species *L. epidendrum* (L.) Fr. actually comprises a complex of at least 76 distinct biological species, with only a small fraction of them currently described (Leontyev et al. 2022, 2023a, 2023b; Leontyev and Schnittler 2023a). The taxonomic revision, which began in 2022, involved the analyses of the type collections of species of *Lycogala*, especially those closely resembling *L. epidendrum*, such as *L. confusum* Nann.-Bremek. ex Ing, *L. exiguum* Morgan, and *L. fuscoviolaceum* Onsberg. We were fortunate to acquire the author's collections, including the lectotype, for *L. exiguum*, as well as author's collections, although not type specimens, of *L. confusum* (Leontyev and Schnittler 2023b), and the holotype of *L. fuscoviolaceum* (Leontyev 2023). As for *L. epidendrum*, the type collection of which appears to be lost, a neotype was selected from the private collection of E. Johannesen (Leontyev et al. 2023b).

In 2023, 15 species of *Lycogala* were newly described, and their holotypes were obtained from various collections, including private ones (Leontyev et al. 2023b). To safeguard these specimens from potential loss, in September 2023, they were officially deposited in the State Botanic Collection (SNSB) in Munich, Germany. Additionally, the neotype of *L. epidendrum* was placed in the Herbarium of the University of Oslo, Norway. As a result, we have compiled information regarding the current locations of types and author's collections for a total of 19 species within the genus *Lycogala*. In this paper, we provide a comprehensive summary of this information.

Materials and methods

Types and author's collections used during the recent critical revision of the genus *Lycogala* (Leontyev et al. 2022, 2023a, 2023b; Leontyev and Schnittler 2023b) served as material of this study. Collections of *L. confusum*, *L. exiguum*, and *L. fuscoviolaceum* were obtained from the herbaria in which they are deposited (see caption to Table 1). Information on the holotype of *L. confusum* was obtained from a protologue (Ing 1999), but we failed to contact the owner of the collection to obtain the specimen.

Results

Information about 26 specimens that belong to 19 species of the genus *Lycogala* is provided in Table 1. Among the specimens there are 17 holotypes, 7 seven original species author's collections without nomenclatural status, one lectotype (having separate numbers for a specimen and a slide) and one neotype.

Table 1. Location of known type and author's collections of species from the genus *Lycogala*. For taxa authorship, see Lado 2005–2023.

Species	Collector(s)	Specimen number	Location of the specimen*	Duplicate collection number	Location of duplicate*	Nomenclature status
<i>L. acinonychum</i>	delacruz	M-0330597	M	PFb75	DL	Holotype
<i>L. aggregatum</i>	Schnittler M., Shchepin O.N.	M-0330604	M	sc32100	MSc	Holotype
<i>L. alisaulianovae</i>	Sarzhnevskiy S.V.	M-0330603	M	CWP3656	DL	Holotype
<i>L. botrydium</i>	Ishchenko Y.	M-0330599	M	IY30	DL	Holotype
<i>L. caviaroides</i>	Lamkowski P.	M-0330594	M	sc22165	MSc	Holotype
<i>L. confusum</i>	Ing B.	BI 92077	BI (?)	–	–	Holotype
<i>L. confusum</i>	Nannenga- Bremekamp N.E.	BR5020051875773 (NENB1869)	BR	–	–	Species author's collection
<i>L. confusum</i>	Nannenga- Bremekamp N.E.	BR5020052018261 (NENB2010)	BR	–	–	Species author's collection
<i>L. confusum</i>	Nannenga- Bremekamp N.E.	BR5020056604538 (NENB4950)	BR	–	–	Species author's collection
<i>L. confusum</i>	Nannenga- Bremekamp N.E.	BR5020063351104 (NENB10977)	BR	–	–	Species author's collection
<i>L. epidendrum</i>	Mandal K.A., Johannesen E., Hombre K., Kristoffersen I.	O-F-268806	O	–	–	Neotype
<i>L. exiguum</i>	Morgan A.P.	BPI834630	BPI	BPI834633	BPI	Lectotype
<i>L. exiguum</i>	Morgan A.P.	BPI834632	BPI	–	–	Species author's collection

<i>L. exiguum</i>	Morgan A.P.	BPI834612	BPI	–	–	Species author's collection
<i>L. exiguum</i>	Morgan A.P.	BPI834700	BPI	–	–	Species author's collection
<i>L. fossiculatum</i>	Leontyev D.V., Kochergina A.V., Sarczewski S., Vjunyk V.	M-0330602	M	CWP4170	DL	Holotype
<i>L. fuscoviolaceum</i>	Søhting U.	MBH157191	UC	–	–	Holotype
<i>L. irregulare</i>	Schnittler M.	M-0330591	M	sc27520	MSc	Holotype
<i>L. leopardinum</i>	Schnittler M.	M-0330595	M	sc27504	MSc	Holotype
<i>L. maculatum</i>	Leontyev D.V.	M-0330600	M	CWP2348	DL	Holotype
<i>L. olearium</i>	Heinrich E.	M-0330592	M	sc32006	MSc	Holotype
<i>L. oncoides</i>	Zúñiga J.M., Castillo D.	M-0330605	M	USJ7527	USJ, MSc	Holotype
<i>L. palianytsia</i>	Schnittler M.	M-0330593	M	sc22074	MSc	Holotype
<i>L. roseosporum</i>	Ishchenko Y.	M-0330598	M	IY05	DL	Holotype
<i>L. skovorodaense</i>	Leontyev D.V., Kochergina A.V., Sarczewski S., Vjunyk V.	M-0330601	M	CWP4169	DL	Holotype
<i>L. succineum</i>	Schnittler M.	M-0330596	M	sc27545	MSc	Holotype

* BI – Collection of B. Ing, United Kingdom (status unknown); BR – Meise Botanic Garden, Belgium; DL – Collection of D. Leontyev, currently at the University of Greifswald, Germany; O – University of Oslo; M – State Botanic Collection (SNSB), München, Germany; SC – Collection of M. Schnittler, University of Greifswald, Germany; UC – University of Copenhagen, Denmark; USJ – University of Costa Rica.

Discussion

The collections of the recently described 15 species, along with the neotype of *L. epidendrum*, consist of relatively fresh and well-preserved specimens from which molecular barcodes have been successfully obtained. Consequently, these specimens are poised for extensive use in future research endeavors. As for the type material of *L. exiguum*, which dates back to 1893, it consists of abundant fruiting material that has been remarkably well-preserved. However, due to the specimen's age, it is not yet molecularly barcoded. A complicated case of the type collections of *L. confusum* was described previously (Leontyev and Schnittler 2023b). The author of this species, N. E. Nannenga-Bremekamp, passed away prior to the taxon's publication, but her collections survived and were thoroughly examined by us. The publisher of the species, B. Ing, although he credited N. E. Nannenga-Bremekamp as its sole author (*L. confusum* Nann.-Brem. ex Ing), chose his own type specimen for it. While this specimen's number is known, we have been unable to determine the whereabouts of Ing's collection.

The type specimen of *L. fuscoviolaceum* was thoroughly studied by us, but our results were thus far published only in the form of an abstract (Leontyev 2023). In our opinion, the species does not belong to the genus *Lycogala*.

Some of the material collected by the author of this paper or received by him from the collections of Thomas dela Cruz (Philippines), Yuri Ishchenko (Russia), and Carlos Rojas (Costa Rica) are currently not held in the Herbarium of H.S. Skovoroda Kharkiv National Pedagogical University (CWP) Kharkov, Ukraine, but in the Collection of M. Schnittler, University of Greifswald, Germany, where they were moved due to the Russian military aggression against Ukraine.

To advance our understanding of the taxonomy within the genus *Lycogala*, future research efforts will necessitate the quest for type collections of various other species. These include currently recognized species such as *L. conicum* Pers., *L. leiosporum* Reichardt, and *L. flavofuscum* (Ehrenb.) Rostaf., but also taxa synonymized with *L. epidendrum*, such as *L. terrestre* Pers.

Acknowledgements

The author extends heartfelt gratitude to all colleagues and the dedicated staff of herbaria who provided him with valuable collections of myxomycetes. A special expression of appreciation goes to Ann Bogaerts (Meise, Belgium), Lisa A. Castlebury (Beltsville, US), and Christian Lange (Copenhagen, Denmark) for providing collections of *Lycogala confusum*, *L. exiguum*, and *L. fuscoviolaceum*. Additionally, sincere thanks are owed to Edvin Johannesen (Oslo, Norway) for his efforts in collecting, providing specimens for study, and assisting in the process of depositing the neotype of *L. epidendrum*.

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