



Five new thelotremoid Graphidaceae from the Philippines

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Abstract

Five new species of thelotremoid Graphidaceae are described from the Philippines: *Myriotrema subviride* Rivas Plata, Sipman & Lücking, differing from *Myriotrema viride* in the more prominent ascomata and transversely septate ascospores; *Ocellularia gigantospora* Rivas Plata, Sipman & Lücking, differing from *O. ripleyi* in the uncarbonized, eolumellate ascomata and the larger ascospores; *O. leucocavata* Rivas Plata, Sipman & Lücking, differing from *O. cavata* in the uncarbonized ascomata and the larger ascospores; *O. sublaeviusculoides* Rivas Plata, Sipman & Lücking, differing from *O. laeviusculoides* in the erumpent ascomata with black columella; and *Thelotrema philippinum* Rivas Plata, Sipman & Lücking, differing from *Thelotrema suecicum* in the stictic acid chemistry. The new combination *Ocellularia megalospora* (Müll. Arg.) Lücking is also proposed. Three of the new species are based on historical collections from vanished rain forest areas on the island of Luzon and are probably extinct, emphasizing the role of herbaria in documenting biotic diversity from threatened ecosystems.

Keywords: extinct species, Palawan, Sorsogon

Introduction

Mainly due to the pioneering work of Vainio (1909, 1913, 1921, 1923) and Herre (1924, 1946, 1950, 1957, 1963), the lichen biota of the Philippines is one of the better known in tropical southeast Asia. Notably, almost half of the lichen taxa reported from the Philippines are based on material first collected in that country (Gruezo 1979). As a biotic inventory in Palawan (Sipman *et al.* 2013) shows, this concerns not necessarily endemic taxa, but often the first reports of more widespread species. Other recent fieldwork (e.g. Parnmen *et al.* 2012) indicates that our knowledge of Philippine lichens, and tropical Southeast Asian taxa in general, is still rudimentary, especially regarding crustose groups.

For the core Graphidaceae, comprising graphidoid and thelotremoid species in subfamilies Fissurinoideae and Graphidoideae (Rivas Plata *et al.* 2012), Parnmen *et al.* (2012) reported 221 species for the Philippines, a number at that time only surpassed by tropical Australia and India. Meanwhile, further inventory work increased the number of species known from the Philippines to 270, whereas at the same time even more taxa are known from Thailand and Sri Lanka (Lücking *et al.* 2014). Although this number is fairly high, one of the difficulties in cataloging Philippine lichens is the few remaining undisturbed rain forest areas in the country, covering less than three percent of the terrestrial area of the Philippines (Myers *et al.* 2000; Brooks *et al.* 2002; FAO 2003), making it difficult to encounter species that are confined to well-conserved vegetation. For instance, field work on Mt. Palali in 2007, one of the last remaining primary rain forests on the island of Luzon, revealed more species than previously recorded for the entire Philippines (Parnmen *et al.* 2012). Also, many of the species based on historic collections, especially among thelotremoid taxa, have not been recollected and are possibly extinct along with the destruction of their habitat. This might also be the case for three of the five new species described here, based on collections made almost one hundred years ago by the North American botanist Adolph Daniel Edward Elmer (1870–1942), whereas the other two new species originate from a well-conserved but difficult to access submontane rain forest on the island of Palawan.

***Thelotrema philippinum* Rivas Plata, Sipman & Lücking, sp. nov.** (Fig. 1F)

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Differing from *Thelotrema suecicum* in the stictic acid chemistry.

Type:—PHILIPPINES. Sorsogon: Luzon Island, Irosin; on branchlets of *Vavaea luzonense*; April 1916, *Elmer 16476* (holotype: B!; isotype: F!).

Thallus corticolous, epiperidermal, up to c. 5 cm diam., continuous; surface uneven to verrucose, yellowish grey; prothallus absent. Thallus in section 50–60 µm thick, with loose cortex, 10–20 µm thick, photobiont layer, 20–30 µm thick, and medulla mostly developed in the verrucae, 10–30 µm thick, filled with clusters of calcium oxalate crystals. Photobiont *Trentepohlia*; cells rounded to irregular in outline, in irregular groups, olive-green, 8–11 × 5–10 µm. Ascomata rounded, prominent, with complete thalline margin, 0.5–0.6 mm diam., 0.15–0.2 mm high; disc covered by 0.1–0.2 mm wide pore; proper margin distinct, entire, forming a prominent rim around the disc and separated from the thalline margin by a split; thalline margin thick, entire, smooth to uneven, light yellowish grey. Excipulum entire, yellowish, 20–30 µm wide, paraplectenchymatous, separated from thalline margin by a split; laterally covered by algiferous, corticate thallus including orange-brown periderm layer; columella absent (degenerated hymenia may resemble a pseudocolumella); hypothecium prosoplectenchymatous, 10–20 µm high, hyaline; hymenium 100–120 µm high, hyaline, clear; epithecium 5–10 µm high, grey, granular. Paraphyses unbranched, apically smooth; periphysoids present, 20–30 µm long; asci fusiform, 100–120 × 15–18 µm. Ascospores (4–)8 per ascus, oblong with tapering distal end, 11–15-septate, 40–55 × 10–12 µm, 3.5–4.5 times as long as wide, hyaline, distoseptate with lens-shaped lumina, thick-walled, I+ violet-blue.

Secondary chemistry:—Stictic and constictic acids; medulla P+ orange, microscopic section with K+ persistently yellow efflux.

Distribution and ecology:—Only known from historic collections from a probably vanished rain forest area on the island of Luzon; possibly extinct.

Remarks:—This new species is morphologically identical with *Thelotrema suecicum* (H. Magn.) James (1977: 186) and has typical *Thelotrema*-type thallus and ascomata, but differs chiefly in the stictic acid chemistry. Also, the ascospores, while displaying the same morphology and iodine reaction as in *T. suecicum*, are slightly larger in size (30–40 µm long in *T. suecicum*).

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References

- Brooks, T.M., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B., Rylands, A.B., Konstant, W.R., Flick, P., Pilgrim, J., Oldfield, S., Magin, G. & Hilton-Taylor, C. (2002) Habitat loss and extinction in the hotspots of biodiversity. *Conservation Biology* 16: 909–923.
<http://dx.doi.org/10.1046/j.1523-1739.2002.00530.x>
- FAO (2003) *State of the World's Forests 2003*. FAO, Rome, Italy. <http://www.fao.org/DOCREP/005/Y7581E/Y7581E00.HTM>, accessed 25 February 2004.
- Frisch, A., Kalb, K. & Grube, M. (2006) Contributions towards a new systematics of the lichen family Thelotremataceae. *Bibliotheca Lichenologica* 92: 1–556.
- Gruezo, W.S. (1979) Compendium of Philippine lichens. *Kalikasan, Philippine Journal of Biology* 8: 267–300.
- Hale, M.E. (1974) Morden-Smithsonian Expedition to Dominica: The lichens (Thelotremataceae). *Smithsonian Contributions to Botany* 16: 1–46.
<http://dx.doi.org/10.5479/si.0081024x.16>
- Herre, A.W.C.T. (1924) Lichens in the Philippines. *Bryologist* 27: 85–86.
- Herre, A.W.C.T. (1946) The lichen flora of the Philippines. *Journal of the Arnold Arboretum* 27: 408–412.
- Herre, A.W.C.T. (1950) New lichens from California, New Mexico, and the Philippines. *Bryologist* 53: 296–299.

- Herre, A.W.C.T. (1957) New records of Philippine and other tropical Pacific lichens with descriptions of five new species. *Philippine Journal of Science* 86: 13–35.
- Herre, A.W.C.T. (1963) The lichen genus *Usnea* and its species at present known from the Philippines. *Philippine Journal of Science* 92: 41–76.
- James, P.W. (1977) Distribution maps of lichens in Britain. Map. 25. *Thelotrema subtile* Tuck. *Lichenologist* 9: 185–187.
- Lücking, R., Aptroot, A., Boonpragob, K., Cáceres, M.E.S., Ertz, D., Harris, R.C., Jia, Z.-F., Kalb, K., Kraichak, E., Lendemmer, J.C., Mangold, A., Manoch, L., Mercado-Díaz, J., Moncada, B., Mogkulsuk, P., Papong, K., Parnmen, S., Peláez, R., Poengsunoen, V., Rivas-Plata, E., Saipunkaew, W., Sipman, H.J.M., Sutjaritturakan, J., van den Broeck, D., von Konrat, M., Weerakoon, G. & Lumbsch H.T. (2014) One hundred and seventy five new species of Graphidaceae: closing the gap or a drop in the bucket? *Phytotaxa* 189(1): 7–38.
<http://dx.doi.org/10.11646/phytotaxa.189.1.4>
- Lumbsch, H.T., Ahti, T., Altermann, S., Amo De Paz, G., Aptroot, A., Arup, U., Bárcenas Peña, A., Bawingan, P.A., Benatti, M.N., Betancourt, L., Björk, C.R., Boonpragob, K., Brand, M., Bungartz, F., Cáceres, M.E.S., Candan, M., Chaves, J.L., Clerc, P., Common, R., Coppins, B.J., Crespo, A., Dal-Forno, M., Divakar, P.K., Duya, M.V., Elix, J.A., Elvebakk, A., Fankhauser, J.D., Farkas, E., Ferraro, L.I., Fischer, E., Galloway, D.J., Gaya, E., Giral, M., Goward, T., Grube, M., Hafellner, J., Hernández M., J.E., Herrera Campos, M.A., Kalb, K., Kärnefelt, I., Kantvilas, G., Killmann, D., Kirika, P., Knudsen, K., Komposch, H., Kondratyuk, S., Lawrey, J.D., Mangold, A., Marcelli, M.P., McCune, B., Messuti, M.I., Michlig, A., Miranda González, R., Moncada, B., Naikatin, A., Nelsen, M.P., Øvstedal, D.O., Palice, Z., Papong, K., Parnmen, S., Pérez-Ortega, S., Printzen, C., Rico, V.J., Rivas Plata, E., Robayo, J., Rosabal, D., Ruprecht, U., Salazar Allen, N., Sancho, L., Santos De Jesus, L., Santos Vieira, T., Schultz, M., Seaward, M.R.D., Sérusiaux, E., Schmitt, I., Sipman, H.J.M., Sohrabi, M., Søchting, U., Zeuthen Søgaard, M., Sparrius, L.B., Spielmann, A., Spribille, T., Sutjaritturakan, J., Thammathaworn, A., Thell, A., Thor, G., Thüs, H., Timdal, E., Truong, C., Türk, R., Umaña Tenorio, L., Upreti, D.K., Van Den Boom, P., Vivas Rebuella, M., Wedin, M., Will-Wolf, S., Wirth, V., Wirtz, N., Yahr, R., Yeshitela, K., Ziemmeck, F., Wheeler, T. & Lücking, R. (2011) One hundred new species of lichenized fungi: a signature of undiscovered global diversity. *Phytotaxa* 18: 1–127.
- Mangold, A., Elix, J.A. and Lumbsch, H.T. (2009) Thelotremataceae. *Flora of Australia* 57: 195–420.
- Müller, J. (1882) Lichenologische Beiträge 16. *Flora* 65: 483–490, 499–505, 515–519.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B. & Kent, J. (2000) Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858.
<http://dx.doi.org/10.1038/35002501>
- Nagarkar, M.B. & Hale, M.E. (1989) New species in the lichen family Thelotremataceae from Asia (Ascomycotina). *Mycotaxon* 35: 437–447.
- Orange, A., James, P.W., & White, F.J. (2010) *Microchemical Methods for the Identification of Lichens*. 2nd edition. British Lichen Society, London.
- Parnmen, S., Rivas Plata, E., Lücking, R., Bawingan, P.A., Lisangan-Tabaquero, A., Kalb, K., Sipman, H.J.M. & Lumbsch, H.T. (2012) The lichen family Graphidaceae in the Philippines. The 7th IAL Symposium 2012 "Lichens: from genome to ecosystems in a changing world", 9th – 13th January 2012, Chaophya Park Hotel, Bangkok, Thailand. Book of Abstracts, The 7th Symposium of the International Association for Lichenology: 99.
- Räsänen, V. (1949) Lichenes novi. V. *Archivum Societatis Zoologicae Botanicae Fennicae "Vanamo"* 3: 178–188.
- Redinger, K. (1936) Thelotremataceae brasilienses imprimis e herbario Regnelliano cognitae praeterea in herbariis Krempelhuberi, Mülleri Arg., Nylanderii, Wainionis et Zahlbruckneri asservatae. *Arkiv för Botanik* 28A(8): 1–122.
- Rivas Plata, E., Lücking, R., & Lumbsch, H.T. (2012) A new classification for the family Graphidaceae (Ascomycota: Lecanoromycetes: Ostropales). *Fungal Diversity* 52: 107–121.
<http://dx.doi.org/10.1007/s13225-011-0135-8>
- Rivas Plata E., Parnmen, S., Staiger, B., Mangold, A., Frisch, A., Weerakoon, G., Hernández M.J.E., Cáceres, M.E.S., Kalb, K., Sipman, H.J.M., Common, R.S., Nelsen, M.P., Lücking, R. & Lumbsch, H.T. (2013) A molecular phylogeny of Graphidaceae (Ascomycota, Lecanoromycetes, Ostropales) including 428 species. *MycKeys* 6: 55–94.
<http://dx.doi.org/10.3897/mycokeys.6.3482>
- Sipman, H.J.M. (1983) A monograph of the lichen family Megalosporaceae. *Bibliotheca Lichenologica* 18: 1–241.
- Sipman, H.J.M., Lücking, R., Aptroot, A., Chaves, J.L., Kalb, K. & Umaña Tenorio, L. (2012) A first assessment of the Ticolichen biodiversity inventory in Costa Rica and adjacent areas: the thelotremoid Graphidaceae (Ascomycota: Ostropales). *Phytotaxa* 55: 1–214.
- Sipman, H.J.M., Diederich, P. & Aptroot, A. (2013) New Lichen records and a catalogue of lichens from Palawan Island, The Philippines. *Philippine Journal of Science* 142, Special Issue: 199–210.
- Vainio, E.A. (1909) Lichenes Insularum Philippinarum, I. *Philippine Journal of Science C, Bot.*, IV, 5: 651–662.
- Vainio, E.A. (1913) Lichenes Insularum Philippinarum II. *Philippine Journal of Science C, Bot.*, 8: 99–137.
- Vainio, E.A. (1921) Lichenes insularum Philippinarum III. *Annales Academiae Scientiae Fennicae, ser. A* 15(6): 1–368.
- Vainio, E.A. (1923) Lichenes Insularum Philippinarum IV. *Annales Academiae Scientiarum Fennicae, ser. A* 19: 1–84.
- Zahlbruckner, A. (1923) *Catalogus Lichenum Universalis* 2. Borntraeger, Leipzig.