

CALYMPERACEAE SPECIMENS COLLECTED BY MAX FLEISCHER IN THE “MUSCI FRONDOSI ARCHIPELAGI INDICI ET POLYNESIACI EXSICCATI” SERIES AND PRESERVED AS FRAGMENTS IN THE EGR HERBARIUM (EGER, HUNGARY)

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Abstract: Twenty-one small moss fragments belonging to taxa in the Calymperaceae were discovered in the Herbarium EGR (Eger, Hungary). These specimens originate from Max Fleischer’s exsiccata series *Musci frondosi Archipelagi Indici et Polynesiaci exsiccati* (1900–1908), one of the most significant early bryological collections from the Indo-Pacific region. Although fragmentary, this material provides valuable insight into the history of early tropical bryological collecting and exsiccatae distribution. In addition to the EGR remnants, Fleischer’s exsiccatae are preserved in several major herbaria worldwide including FH, E, BM, G, L, NY, PC, U, W providing essential comparative context for reconstructing the provenance, circulation and broader historical trajectory of these collections. Each fragment from EGR was examined and re-identified according to current taxonomic concepts, but the principal contribution of this study lies in documenting the presence of these rare Indo-Pacific exsiccatae in a Central European herbarium and demonstrating their relevance for historical biogeography, specimen exchange networks and the reconstruction of Fleischer’s collecting legacy. Updated identifications and specimen data are provided to support future historical and curatorial research.

Keywords: Calymperaceae; bryophyte exsiccatae; Max Fleischer; Herbarium EGR; Indo-Pacific region; historical collections

INTRODUCTION

The exsiccata series *Musci frondosi Archipelagi Indici et Polynesiaci exsiccati*, issued by Max Fleischer between 1900 and 1908, represents one of the most important bryological collections from the Indo-Pacific region (Fleischer 1900–1908). Max Fleischer (1861–1930) was an Austrian bryologist whose work had a profound influence on early tropical bryology. He spent a decade



(1887–1897) in the Dutch East Indies, primarily on Java, where he conducted extensive fieldwork that later formed the basis of his monumental *Die Musci der Flora von Buitenzorg* (1904–1923). His main moss herbarium is now housed in the Farlow Herbarium (FH) at Harvard University (30,000 specimens), while additional exsiccata sets are preserved in several European herbaria including BM, E, FH, G, L, NY, PC, U, W, etc. (Sayre 1977). Fleischer was a central figure in early tropical bryology: his monumental work, *Die Musci der Flora von Buitenzorg* (1904–1923), and his extensive collecting efforts provided a comprehensive synthesis of the bryoflora of the Indo-Pacific archipelagos following the first synthesis by Dozy and Molkenboer (1854), *Musci Frondosi Inediti Archipelagici Indici*. His exsiccata sets, distributed to several herbaria have served as type or reference material for numerous tropical moss taxa and continue to constitute a critical source for modern taxonomic revisions (Kis 2004). Among the groups richly represented in Fleischer's collections is the family Calymperaceae, one of the most characteristic families of tropical mosses. Alongside specimens of genera long established within the family Calymperaceae – (e.g., *Calymperes* Web., *Syrrhopodon* Schwägr. and *Mitthyridium* H.Rob.), Fleischer collected material of *Leucophanes* Brid. With leucobryoid leaves, this genus was placed by Fleischer in a separate family, the Leucophanaceae M.Fleisch. (Fleischer 1904). However, presently, it is generally accepted as a leucobryoid member of the Calymperaceae (see Ellis 1985). *Leucophanes* was established by Bridel (1826), based on a collection of *L. octoblepharioides* of Nees v. Esenbeck from Java. It includes 12 species worldwide, distributed mainly in tropical and subtropical regions particularly in Asia and Africa (Salazar Allen 1993). Comprising predominantly epiphytic and xerotolerant species, the Calymperaceae are key components of the bryoflora throughout Southeast Asia and the Pacific Islands (Gradstein *et al.* 2001). Fleischer's collections significantly expanded the known distribution and morphological variation of the family, and many taxa he collected remain taxonomically important today. During the curation of bryophyte collections in the Herbarium EGR (Eger, Hungary), several small moss fragments were found that clearly originate from Fleischer's exsiccata series. According to Prof. Tamás Pócs, these were detached as small samples from original sheets preserved in the herbaria of Wrocław (WRSŁ) and subsequently deposited in Eger for reference purposes (Kis 2004). The presence

of such material in a Hungarian herbarium is noteworthy, as Indo-Pacific bryophyte exsiccatae are rarely represented in Central European collections. Although these fragments represent only minute parts of the original specimens, they retain their taxonomic and historical value and document the presence of Fleischer's material in Hungarian herbaria. Documenting Fleischer-derived fragments housed in EGR thus contributes to understanding the dispersal pathways of his sets of exsiccatae and may help clarify the identity and provenance of material held in other European institutions. The present study aims to document the Calymperaceae taxa represented in this historical material and to provide updated identifications according to current taxonomic concepts (Gradstein *et al.* 2001; WFO 2025).

MATERIAL AND METHODS

The examined fragments are housed in archival paper envelopes within the general bryophyte collection and represent detached portions of original exsiccate specimens from Max Fleischer's Musci Frondosi Archipelagi Indici et Polynesiaci series. According to information provided by Prof. Tamás Pócs (*pers. comm.*), the fragments were separated from complete sheets preserved in the herbaria of Wrocław (WRSL) and deposited in EGR for reference purposes. Original exsiccata label data were transcribed verbatim; illegible sections were indicated with square brackets ([illegible]) and no editorial corrections were applied. Exsiccata numbers, locality data and collector information were cross-referenced with published catalogues of Fleischer's series whenever possible to verify provenance. No attempt was made to reconstruct or infer missing label text.

RESULTS

Examined material

Leucophanes (Tropinotus) pungens Flsch. n. sp.

Samoa: Insel Sawai im Ivadistrict bei Sabongan an Palmen 30m. 22 May 1903, detex. M. Fleischer. Musci Frondosi Archipelagi Indici et Polynesiaci. Serie IX. No. 405. (No. 401–450). 1906.

Isotype of *Leucophanes pungens* Fleischer ex Dix. ann. Norris Salazar Allen date. April 13, 1986; *Leucophanes octoblepharioides* Brid. ann. Norris Salazar Allen date. 16 Dec.1985

Type status: Isotype (cf. Kis 2004)

Currently accepted name (WFO 2025):

Leucophanes octoblepharioides Brid.

Mentions: *Leucophanes pungens* Fleischer was described in 1906 in the ninth series of the Musci Frondosi Archipelagi Indici et Polynesiaci. The designation n. sp. indicates that Fleischer regarded it as a new species, based on material collected on the island of Savai'i (Samoa) on 22 May 1903, growing on palm trunks. The taxonomy of the genus has undergone substantial revision during the 20th century. Later studies – most notably Salazar Allen (1986) – treated many previously segregated species as morphological variants of the highly variable *Leucophanes octoblepharioides* Brid.

Syrrhopodon ciliatus (Hook.) Schw. fo. ***pseudopodianus*** Fl.

Java: Buitenzorg im bot. Garten an Palmenstämmen. January 1899. Musci Frondosi Archipelagi Indici, Serie II., No. 60 (No. 50–100). Fragmentum ex Fleischer exsiccata (orig. WRS�; fide T. Pócs). In herb. EGR.

Type status: Isotype (cf. Kis 2004)

Currently accepted name (WFO 2025): *Syrrhopodon ciliatus* (Hook.) Schwägr.

Calymperidium croceum Mitt. var. ***subcroceum***

Samoa: Insel Upolu am Lanutoo. 1500 m. Musci Frondosi Archipelagi Indici et Polynesiaci. Serie X. No. 524. (No. 501–550). 1905). Fragmentum ex Fleischer exsiccata (orig. WRS�; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Syrrhopodon croceus* Mitt.

Calymperidium mulleri Dz. Mb. f. ***compacta*** Fl.c.fr.

Borneo. Am Kapoeasfluss an Baumrinde. 1899, leg. Nieuwenhuis. Musci Frond. Archipelagi Indici, ser. VI, No. 262. (No. 251–300), 1902. Fragmentum ex Fleischer exsiccata (orig. herbarium WRS�; fide T. Pócs). In herb. EGR.

Mentions: *Calymperidium muelleri* f. *compacta* should be regarded as herbarium name, as it is known only from the exsiccata label.

***Calymperidium schiffnerianum* Fl.**

Java: Bei Tjibeurrum am Baumstämmen in lockeren Polstern. 1700m. März u, October 1899. Musci Frondosi Archipelagi Indici. Serie II. No. 62. (No. 50-100). 1906. Fragmentum ex Fleischer exsiccata (orig. WRSL; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Syrrhopodon schiffnerianus* (M.Fleisch.) Paris

***Exodictyon blumii* Fl. st. Syn. *Leucophanes blumii* Dz. Mb.**

Java: Tjibodas im Urwald an faulenden Stämmen von *Alsophila* 14–1600 m. März 1899. Musci Frond. Archipelagi Indici. Serie II. No. 58 (No. 50–100). 1899. Fragmentum ex Fleischer exsiccata (orig. WRSL; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Exostratum blumei* (Nees ex Hampe) L.T.Ellis

Mentions: Material originally distributed as *Exodictyon blumii* corresponds to *Exostratum blumei* (Nees ex Hampe) L.T.Ellis in its current nomenclatural treatment (Ellis 1985).

***Leucophanes (Tropinotus) albescens* C. Müll.**

Bismarck-Archipel: Insel Mioko am Seestrände an Bäumen in grossen Polstern. 6 März 1903, leg. M. Fleischer. Musci Frondosi Archipelagi Indici et Polynesiaci. Serie IX. No. 406. (No. 401–450). 1906. Fragmentum ex Fleischer exsiccata (orig. herbarium WRSL; fide T. Pócs). In herb. EGR. – Revised by N. Salazar Allen (April 1986, as *Leucophanes glaucum* (Schwaegr.) Mitt.).

Currently accepted name (WFO 2025): *Leucophanes glaucum* (Schwägr.) Mitt.

***Leucophanes (Leiomotus) densifolium* Mitt.**

Riouw-Archipel: Poeloe Singoedjan bei Singapore. Musci Frondosi Archipelagi Indici, ser. VII, No. 304. (No. 301–400), 1904. Fragmentum ex Fleischer exsiccata (orig. herbarium WRSL; fide T. Pócs). In herb. EGR. – Revised by N. Salazar Allen (as *Leucophanes candidum* (Schwaegr.) Lindb.)

Currently accepted name (WFO 2025): *Leucophanes candidum* (Schwaegr.) Lindb.

***Leucophanes glaucescens* C. Müll. st.**

Java: Buitenzorg im bot. Garten an Palmen; immer steril. Decbr. 1898. Musci Frond. Archipelagi Indici. Serie II. No. 57. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. herbarium WRS�; fide T. Pócs). In herb. EGR. – Revised by N. Salazar Allen April, 1986 (as *Leucophanes glaucum* (Schwaegr.) Mitt. Currently accepted name (WFO 2025): *Leucophanes glaucum* (Schwägr.) Mitt.

***Leucophanes (Tropinotus) massarti* Ren. et Card. st.**

West-Java: Tjipetir (leg. Godefroy) [text illeg]. Musci Frond. Archipelagi Indici. Serie V (No. 201–250), 1902. Fragmentum ex Fleischer exsiccata (orig. WRS�; fide T. Pócs). In herb. EGR. – Revised by N. Salazar Allen 12/12/85 (as *Leucophanes angustifolium* Ren. et Card.) Currently accepted name (WFO 2025): *Leucophanes angustifolium* Renaud and Cardot.

***Leucophanes octoblepharoides* Brid. c. fr.**

Java: Um Buitenzorg im bot. Garten etc. an Palmenstämmen sehr verbreitet, doch seltener fruchtend. Musci Frond. Archipelagi Indici. Serie II. No. 56. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. herbarium WRS�; fide T. Pócs). In herb. EGR. – Revised by N. Salazar Allen 21/5/85 (as *Leucophanes octoblepharoides* Brid.) Currently accepted name (WFO 2025): *Leucophanes octoblepharoides* Brid.

***Leucophanes octoblepharoides* Brid. var. *korthalsii* (Dz.Mb.) Flsch.**

West-Java: Buitenzorg an alten Bambuswurzelstöcken, 280 m. Mai 1898; leg. M. Fleischer. Musci Frond. Archipelagi Indici. Serie VIII. No. 353. (No. 351–400), 1905. Fragmentum ex Fleischer exsiccata (orig. herbarium WRS�; fide T. Pócs). In herb. EGR. — Revised by A. N. Salazar Allen; Date: 21/VI/1985 (as *Leucophanes octoblepharoides* Brid.) Currently accepted name (WFO 2025): *Leucophanes octoblepharoides* Brid.

Leucophanella bornense (Hpe) Fl. c. fr.

Java: Um Buitenzorg an Palmen in Kampong. Decbr. 1898. Musci Frond. Archipelagi Indici. Serie II. No. 59. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. herbarium WRSL; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Syrrhopodon borneensis* (Hampe) A.Jaeger

Leucophanella rufescens (Hook. et Gr.) Fl. c. fr.

Malacca: Bei Singapore auf dem Gipfel des Bukit-Timah an einem Baumstamm. 250 m. März 1. Musci Frond. Archipelagi Indici. Serie III. No. 103. (No. 101–150). 1900. Fragmentum ex Fleischer exsiccata (orig. herbarium WRSL; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Syrrhopodon rufescens* Hook. & Grev.

Leucophanella revoluta (Dz. & Mb.) Fl.c.fr.

Malacca: Bei Singapore am Hafen Tandjong Katong am Meeresufer an Cocospalmen. März 1898, leg. Fl. Musci Frond. Archipelagi Indici. Serie VI. No. 260. (No. 251–300), 1902. Fragmentum ex Fleischer exsiccata (orig. WRSL; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Syrrhopodon revolutus* Dozy & Molk.

Syrrhopodon spiculosus Hook. et Grev.

Singapore: Am Bukit Timah auf faulenden Baumstämmen. 100 m. März 1898. Musci Frond. Archipelagi Indici. Serie II. No. 61. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. WRSL; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Syrrhopodon spiculosus* Hook. & Grev.

Syrrhopodon* (*Eu-Syrrhopodon*) *tjibodensis Fl.

West Java: Am Gedehgebirge im Berggarten von Tjibodas spärlich an Baumstämmen der Virginiakiefer 1450m. Septbr. 1899. detex. F. Musci Frond. Archipelagi Indici, ser. VI, No.261. (No. 251–300), 1902. Fragmentum ex Fleischer exsiccata (orig. herbarium WRSL; fide T. Pócs). In herb. EGR. – Revised by T. Pócs (Eger, Hungary) as *Calymperopsis tjibodensis* (M. Fleisch.) M. Fleisch.

Currently accepted name (WFO 2025): *Syrrhopodon tjibodensis* M.Fleisch.

Thyridium cardotii Fl. n. sp. st.

Java: Buitenzorg im bot. Garten an Baumrinde. Jan. 1899. Musci Frond. Archipelagi Indici. Serie II. No. 73. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. WRS�; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Mitthyridium fasciculatum* subsp. *cardotii* (M.Fleisch.) B.C.Tan & L.T.Ellis

Thyridium cuspidatum (Besch.) Fl. st.

Java: Buitenzorg im botanischen Garten an Bäumen; Febr. 1892. Musci Frond. Archipelagi Indici, Serie II. No. 72. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. WRS�; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Mitthyridium flavum* (Müll.Hal.) H.Rob.

Thyridium manii (C. Müll.) Fl. st.; n. forma minor Fl.

Singapore: Bei Tanjong Katung in Cocos wäldern, am Meeresufer den sandigen Dünenboden überziehend; März 1898. Musci Frond. Archipelagi Indici, Serie II. No. 71. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. WRS�; fide T. Pócs). In herb. EGR.

Currently accepted name (WFO 2025): *Mitthyridium repens* var. *minus* (M.Fleisch.) B.C.Tan & Mohamed

Syrrhopodon horridulus (Hook. & Grev.) Besch.

[remaining text illegible on the original label fragment]. Musci Frond. Archipelagi Indici, Serie II. (No. 50–100), 1899. Fragmentum ex Fleischer exsiccata (orig. WRS�; fide T. Pócs). In herb. EGR. – Revised by T. Pócs (Eger, Hungary) as *Syrrhopodon spiculosus* Hook. & Grev. (Syn.: *S. horridulus*) – Revised. T. Pócs, Eger, Hungary.

Currently accepted name (WFO 2025): *Syrrhopodon spiculosus* Hook. & Grev.

CONCLUSIONS

A total of twenty-one fragmentary specimens of Calymperaceae representing 17 currently accepted taxa, were identified among the historical bryophyte holdings of the Herbarium EGR. The fragments represent four genera within the family and correspond to specimens distributed in various series of Max Fleischer's *Musci frondosi Archipelagi Indici et Polynesiaci exsiccati*, issued between 1898 and 1908 (Fleischer 1900–1908). Label data, when legible, were consistent with Fleischer's original localities in Indonesia, Papua New Guinea and the Malay Peninsula, and in many cases the provenance of the fragments could be confirmed by cross-checking exsiccata numbers, collectors, or localities with known series (Kis 2004). All fragments were assigned updated names according to current taxonomic concepts (Gradstein *et al.* 2001), and the generic placement of each specimen is consistent with modern revisions. The material is curated in EGR under these revised names and its exsiccata origin and associated data have been standardised for future reference (Index Herbariorum 2025). Fleischer's main herbarium, including exsiccatae, is preserved in the Farlow Herbarium (FH) at Harvard University (Sayre 1977). These fragments document the presence of rare Indo-Pacific bryophyte material in a Central European herbarium, enriching the known distribution network of Fleischer's exsiccata, which is among the most geographically and taxonomically significant bryophyte exsiccata of the early 20th century. Its specimens have often been used as types or critical reference material for tropical moss systematics, and their presence in EGR suggests historical exchange between Polish, German and Hungarian bryologists, highlighting the broader movement of botanical material across institutions. Updating names according to contemporary taxonomic frameworks (WFO nomenclature) ensures that the specimens remain usable for current research, including phylogenetic, biogeographic or nomenclatural studies.

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