

Eocene *Plagiochila groehnii* sp. nov. - the first representative of Plagiochilaceae in Baltic amber

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Abstract – Fragments of a sterile *Plagiochila* were found in a piece of Baltic amber along with the moss *Trachycystis flagellaris* (Sull. & Lesq.) Lindb. They are described as *Plagiochila groehnii* Grolle & Heinrichs, sp. nov., and compared to the extant *Plagiochila sciophila* Nees & Lindenb., a morphologically closely related species from southeastern Asia.

Plagiochilaceae / *Plagiochila groehnii* / *Plagiochila sciophila* / Baltic amber / fossil / Europe

A piece of Baltic amber with several inclusions of bryophytes became available for study by the authors, courtesy of Carsten Gröhn (Glinde, Germany). A moss [Gröhn 2088a] was identified as *Trachycystis flagellaris* (Sull. & Lesq.) Lindb. by J.-P. Frahm. Fragments of a hepatic proved to belong to *Plagiochila* (Dumort.) Dumort., the first record of this genus and the family Plagiochilaceae in Baltic amber. The *Plagiochila* fragments are described below as a new species.

***Plagiochila groehnii* Grolle & Heinrichs, sp. nov.** Figs 1-2

Plagiochilae sciophilae Nees ex Lindenb. similis, sed differt dentibus foliorum grossioribus. **Holotype:** GPIH-4309 (Collection Gröhn 2088b), inclusion in Baltic amber.

Only two **sterile shoot** fragments known, light yellowish brown, the larger one ca 10 mm long and up to 0.3-0.7 mm wide, unbranched, tapering into a long flagelliform part (without losing dorsiventrality). **Stem** deeply red-brown, ca 50-100 µm in diameter, well visible between the leaves both in dorsal and ventral view, flagelliform part on ventral side with a few scattered rhizoids. **Leaves** alternate, remote to contiguous, obliquely spreading, with broad insertion line, dorsal margin ± flat, straight, hardly to shortly decurrent at base, not extending to the dorsal stem midline, ventral margin weakly arched, hardly decurrent, largest leaves

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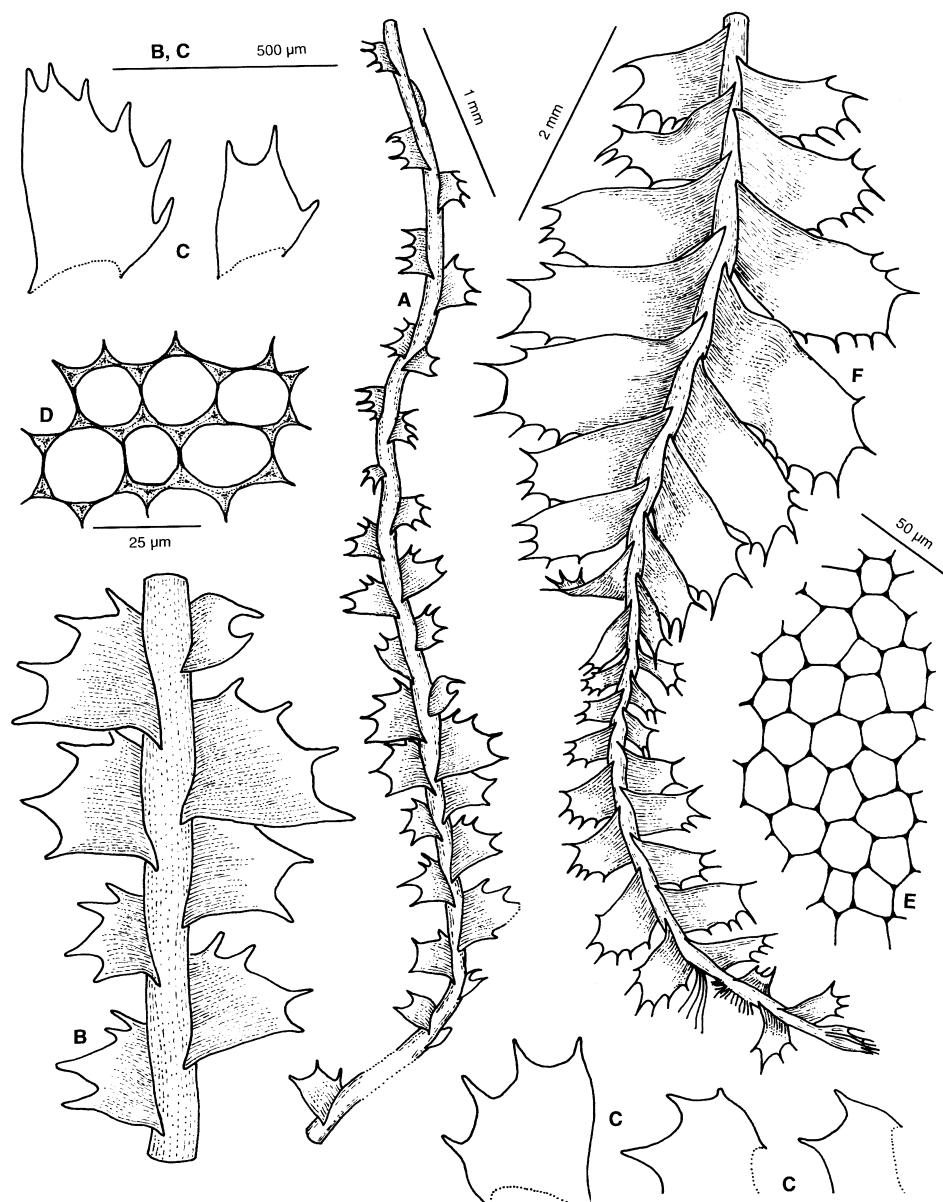


Fig. 1. *Plagiochila groehnii* Grolle & Heinrichs (A-D) and *P. sciophila* Nees ex Lindenb. (E-F): A, B, F, parts of shoots, dorsal view; C, leaves; D, E, median leaf cells [A-D from holotype of *P. groehnii* (Gröhn 2088b, GPIH-4309), E-F from Japan, Ohnishi 5400 (HIRO)].

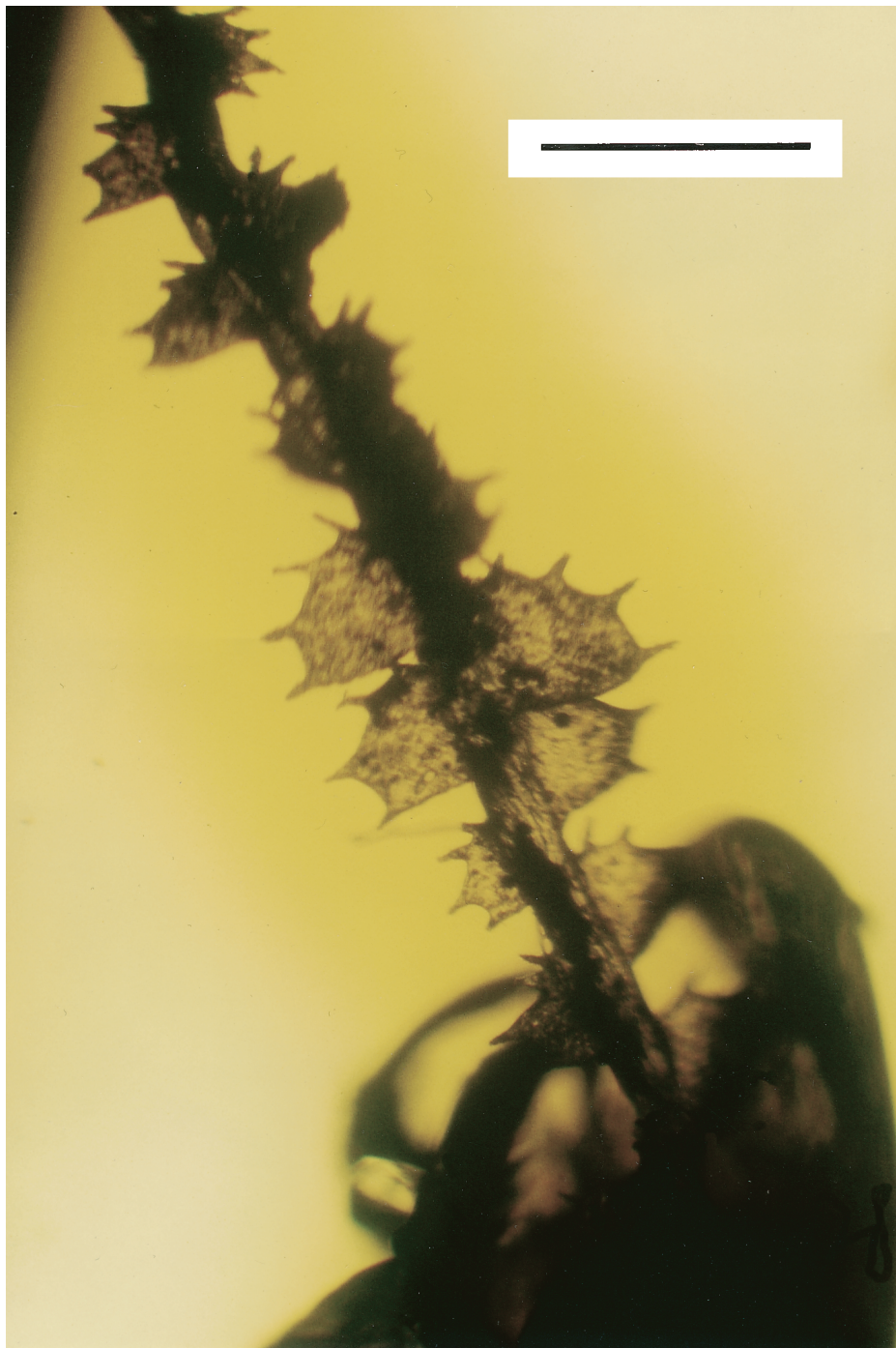


Fig. 2. *Plagiochila groehnii* Grolle & Heinrichs. Micrograph from the holotype [scale bar = 0.5 mm].

oblong to triangularly oblong, *ca* 0.16–0.4 mm long and 0.13–0.28 mm wide, *ca* 0.5–1.4 times as long as wide, in total with (2)3–4(6) teeth, apex broadly rounded to truncate, with two often slightly larger teeth; ventral leaf margin with 2(4) usually somewhat smaller teeth, these rectangular to leaf margin or somewhat forward directed, straight, occasionally weakly curved, elongate triangular, (1)2–3 cells wide at base, 3–6 cells long, below terminal cell often 2 cells wide, terminal cell usually rounded (but teeth possibly damaged); leaves of flagelliform part of shoot much shorter, *ca* 0.3–0.5 times as long as wide, usually with (3–)4 teeth; leaf cells $\pm$ isodiametric throughout, *ca* (12)20–30 μ m in diameter, cell walls (as far as recognisable) thin to slightly thickened and with small, acute trigones. **Underleaves** vestigial, formed by 1(–2?) short filamentous segment(s).

The fragments of *Plagiochila groehnii* closely resemble flagelliform tapering shoots of the extant *Plagiochila sciophila* Nees ex Lindenb., the “most common and most polymorphic taxon among the species of *Plagiochila*” (Inoue, 1984) (see Fig. 1 E–F). The leaves of both species have a broad leaf insertion. As in *P. groehnii*, the leaves in flagelliform parts of *P. sciophila* are distinctly smaller and shorter than those in normal ones. However, *P. groehnii* differs from *P. sciophila* by coarser teeth which are often 2 cells wide below the terminal cell. *Plagiochila sciophila* is widespread in Asia and disjunctly occurs in southeastern North America (Inoue, 1984).

Morphologically somewhat similar are also the Neotropical *Plagiochila subplana* Lindenb. (Heinrichs *et al.*, 1999) and the African *Plagiochila integerrima* Steph. (Jones, 1962; Müller *et al.*, 2000).

The sole previous fossil records of *Plagiochila* and the Plagiochilaceae are the Pliocene *P. willershausensis* (Straus) Grolle (Grolle, 1983) with an absolute geological age of less than 5 million years, and the Miocene *P. saportana* Schimp. (Inoue, 1989). The discovery of the Eocene *P. groehnii* extends their fossil record to an absolute geological age of at least 50 million years, based on the K–Ar isotope analyses of Samlandic “blue earth” strata by Ritzkowski (1997).

The liverworts recorded from Baltic amber all belong to extant genera. These are *Bazzania* (Grolle, 1980a), *Calypogeia* (Grolle, 1985c), *Cephaloziella* (Grolle, 1980a), *Cheilolejeunea* (Grolle, 1984), *Frullania* (Caspary, 1887; Grolle, 1985b, 1998, 2003), *Jungermannia* (Grolle, 1980b), *Metacalypogeia* (Grolle, 1999), *Nipponolejeunea* (Grolle, 1981), *Notoscyphus* (Grolle, 1988), *Radula* (Caspary, 1887; Grolle 1980b, 1989), *Scapania* (Grolle & Schmidt, 2001), *Spruceanthus* (Grolle, 1985a), *Trocholejeunea* (Grolle, 1982), now added by *Plagiochila*.

The existence of these extant genera already 50 million years ago leads to the conclusion that these quite different taxa must have evolved much earlier.

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