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# Designation of a lectotype for *Weissia calycina* Hedw. (*Holomitrium calycinum* (Hedw.) Mitt.) (Musci)

MICHELLE J. PRICE

## ABSTRACT

PRICE, M. (2002). Designation of a lectotype for *Weissia calycina* Hedw. (*Holomitrium calycinum* (Hedw.) Mitt.) (Musci). *Candollea* 57: 45-53. In English, English and French abstracts.

Recent taxonomic studies of the genus *Holomitrium* revealed the need for the designation of a lectotype for *Weissia calycina* Hedw. (= *Holomitrium calycinum* (Hedw.) Mitt.), held in the Hedwig-Schwägrichen Herbarium at the Conservatoire et Jardin botaniques de la Ville de Genève (G). Two different species, *Holomitrium calycinum* and *Holomitrium olfersianum* Hornsch., were identified from the multiple stems present on the original Hedwig herbarium sheet. To ensure the correct application of the name *Weissia calycina* in the future, a lectotype is proposed here. This lectotypification shows the importance of careful consideration of specimens from the Hedwig-Schwägrichen herbarium with a view to ascertaining the correct application of species names published by Hedwig in *Species Muscorum*.

## RÉSUMÉ

PRICE, M. (2002). Désignation d'un lectotype pour *Weissia calycina* Hedw. (*Holomitrium calycinum* (Hedw.) Mitt.) (Musci). *Candollea* 57: 45-53. En anglais, résumés anglais et français.

Dés études taxonomiques récentes dans le genre *Holomitrium* ont montré que la désignation d'un lectotype pour *Weissia calycina* Hedw. (= *Holomitrium calycinum* (Hedw.) Mitt.) est indispensable. Un spécimen est conservé dans l'herbier Hedwig-Schwägrichen aux Conservatoire et Jardin botaniques de la Ville de Genève (G). Sur la feuille originale de Hedwig il y a deux espèces différentes, à savoir *Holomitrium calycinum* et *Holomitrium olfersianum* Hornsch. Un lectotype basé sur le spécimen correspondant à *Holomitrium calycinum* est proposé, ceci afin d'assurer à l'avenir l'application correcte du nom *Weissia calycina*. Cet exemple de lectotypification montre combien il est important de considérer avec soin les spécimens de l'herbier Hedwig-Schwägrichen pour l'application correcte des noms de taxons publiés par Hedwig dans son *Species Muscorum*.

**KEY-WORDS:** Hedwig-Schwägrichen herbarium – Moss – *Holomitrium* – Lectotype – *DICRANACEAE*.

## Introduction

Johannes HEDWIG's 1801 publication, *Species Muscorum*, was designated as the starting point of moss names, except for *Sphagnaceae*, during the 1910 Botanical Congress in Brussels (DIXON, 1933; FLORSCHÜTZ, 1960). The Hedwig-Schwägrichen herbarium, at the Conservatoire et Jardin botaniques de la Ville de Genève, thus became an important repository of material critical for ensuring the correct application of nomenclature of those mosses described by HEDWIG (1801). Over three hundred and sixty species were included in *Species Muscorum* and although most were from Europe and/or North America, some species were tropical in origin. Hedwig described seventy-five new taxa in *Species Muscorum* but many of his names were based on those in earlier publications (DILLINEUS, 1741; LINNAEUS, 1753, 1762-1763; HEDWIG, 1785-1787) and were only ascribed to him after the 1910 designation of the starting point of moss names. This ruling led to the need to typify many of Hedwig's species and genera. All the names

in *Species Muscorum* were considered new after the 1910 decision, and all material seen by Hedwig consisted of syntypes (GEISSLER, 2000).

The process of designating type material from the Hedwig-Schwägrichen herbarium is made difficult by the differences between the practices at the time and modern herbarium standards and rules for correctly establishing type material (GREUTER, 2000). The manner of presentation of specimens, often sparse material, later additions and annotations by Schwägrichen, discrepancies between labels and protologues, and scant label information seen in the Hedwig-Schwägrichen herbarium must all be carefully considered when typifying material. Although there have been efforts to typify Hedwig names (CARDOT, 1899; KOPONEN, 1979; GEISSLER, 1985; FRAHM & GEISSLER, 1985; PURSELL, 1986; GEISSLER & MAIER, 1995; FIFE, 1996; HEDENÄS & GEISSLER, 1999; LEWINSKY-HAAPASAARI & ISOVIITA, 1999; GEISSLER, 2000), many of Hedwig's names, especially for tropical species, remain in need of typification (GEISSLER, 2000).

After the death of Hedwig in 1799 his herbarium was purchased by his son R. A. Hedwig. It was later sold, from the estate of R. A. Hedwig, to C. F. Schwägrichen, a former student of Hedwig's who had edited *Species Muscorum* after his death (FLORSCHÜTZ, 1960). The Hedwig-Schwägrichen herbarium was thought to have arrived in Geneva as early as 1853, but its incorporation into the general herbarium of the Conservatoire et Jardin botaniques was not begun until 1958 (for a comprehensive review of the history of the Hedwig-Schwägrichen herbarium see FLORSCHÜTZ, 1960 and GEISSLER, 2000). The original Hedwig herbarium sheets are still kept in their original blue folders and these are placed inside a modern herbarium packet. The Hedwig labels are fixed to the sheet in the bottom left corner with later annotations by Schwägrichen written both on these labels (e.g. page and plate numbers from *Species Muscorum*), and directly onto the sheets (see Fig. 1). Majority of the Hedwig labels lack locality information and indications of the date and/or collector of the particular specimen or specimens. The exceptions to this are the collections of Olof Peter Swartz, from Jamaica and Sweden, and Rev. Gotthilf Heinrich Ernst Mühlenberg, from North America; mostly Lancaster, Pennsylvania. Many of the original Hedwig labels contain references to earlier works, specifically DILLENIUS (1741), LINNAEUS (1753, 1762-1763), and HEDWIG (1785-1797). Another problem encountered when examining Hedwig labels is that information on the label, when present, does not always correspond to that of the protologue in *Species Muscorum*.

Specimens in the Hedwig-Schwägrichen herbarium are often considered sparse, especially when compared to material in modern herbarium collections; however multiple stems or groups of stems may be glued to the individual herbarium sheets. These stems or groups of stems can be of the same species or a different species, in the modern sense, to the material considered to be the type of the species in question (see, PURSELL, 1986, for examples from the genus *Fissidens* and Fig. 1). A further complication encountered when multiple specimens are found on the sheets is that Schwägrichen glued additional specimens to the sheets containing Hedwig's original specimens. Schwägrichen edited *Species Muscorum*, enclosing his additions in rounded brackets within the text (FLORSCHÜTZ, 1960), and he also worked with the original Hedwig herbarium material, adding details from *Species Muscorum*, annotations and specimens to herbarium sheets. Schwägrichen's later additions are often marked with letters while the original Hedwig specimens remain unmarked. The written annotations by Schwägrichen that accompany the specimens can be hard to decipher. Careful attention must be paid to the handwriting on the labels and sheets, as well as to specimen indications, to distinguish Hedwig specimens from those attached by Schwägrichen, and to establish which specimens were most likely to be the basis for each species description. The multiple stems or groups of stems attached to a sheet are assumed to have been placed there either for comparative purposes or to represent variation in the species. Sometimes two or three different species, based on modern species concepts, can be found on the herbarium sheets. They were presumably included under a wider concept of the species than that of the present day (see, GEISSLER & FRAHM, 1995, for an example using *Barbula ruralis* Hedw.), or these particular plants were incorrectly determined at the time (PURSELL, 1986).

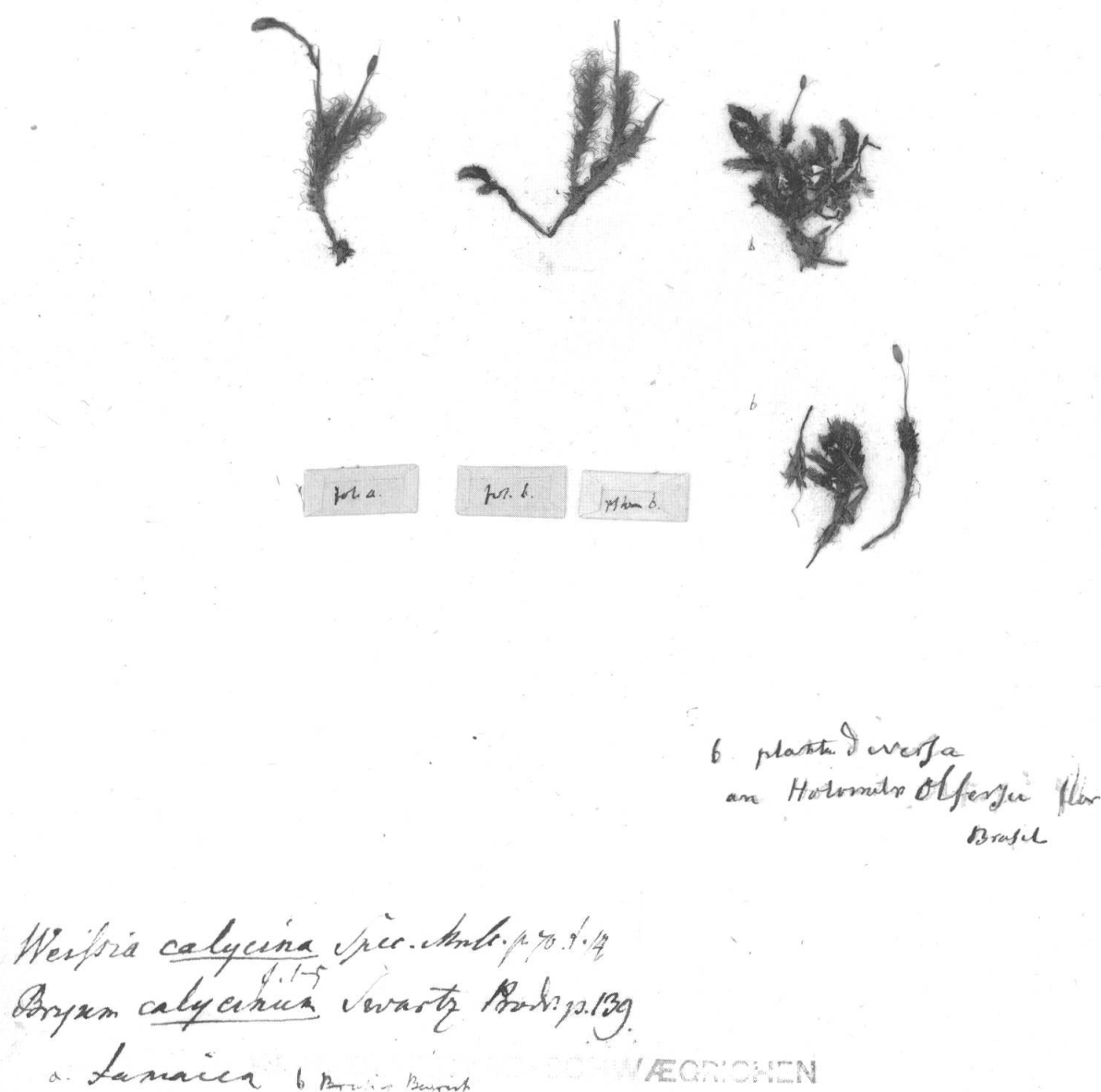


Fig. 1. – Copy of the sheet from the herbarium of Hedwig-Schwägrichen containing the lectotype of *Weissia calycina* Hedw. (= *Holomitrium calycinum* (Hedw.) Mitt.). Plants on upper row, left and centre are *H. calycinum* and the plants on the right (top and bottom) are *H. olfersianum* Hornsch. The plant on the very left, upper row, is the designated lectotype of *Weissia calycina*.

The importance of the Hedwig-Schwägrichen herbarium for the nomenclature of mosses has been discussed by GEISSLER (2000). In the light of the often sparse material, multiple stems or groups of stems per herbarium sheet (which may have been attached at different times), scant information on the specimen labels, and the frequent incompatibility of label information with the protologue, careful consideration of the possible type material is needed, and in many cases lectotypification is necessary to establish the correct use of the name. KOPONEN (1979) outlined several possibilities for the typification of species in the Hedwig-Schwägrichen herbarium, and this problem is further discussed by PURSELL (1986), HEDENÄS & GEISSLER (1999), and GEISSLER (2000). In this latter work Geissler gives an example for use when lectotypifying names from the Hedwig-Schwägrichen herbarium, along with a list of the important points

**Table 1. – Important points to consider when lectotypifying Hedwig names, after Geissler (2000).**

<p><b>A. Identification of potential type material on the herbarium sheet.</b></p> <ol style="list-style-type: none"> <li>1. Carefully check handwriting and specimen annotations.</li> <li>2. Compare material to the plates of <i>Species Muscorum</i> (HEDWIG, 1801), or HEDWIG (1785-1797).</li> <li>3. Compare the label information to that of the protologue.</li> <li>4. Check any earlier reference material indicated on the label, DILLENIUS (1741), LINNAEUS (1753, 1763), HEDWIG (1785-1797).</li> <li>5. Compare specimen(s) on sheet against the protologue description.</li> <li>6. Identify which specimen was most likely the basis for the description of the species in question.</li> </ol>
<p><b>B. Selection of appropriate specimen on the herbarium sheet.</b></p> <ol style="list-style-type: none"> <li>1. Select the appropriate specimen for designation (typification of a species, where possible, should take into account the circumscription of a species as it is currently understood).</li> <li>2. If necessary, carefully check taxonomic identity with the minimal physical manipulation of the specimen.</li> <li>3. If microscope preparations are needed these must be made into permanent slides, included with the specimen and accompanied by drawings. This minimizes the damage caused to the specimen by examinations by multiple researchers.</li> </ol>
<p><b>C. Designation of lectotype and use of annotation labels.</b></p> <ol style="list-style-type: none"> <li>1. Indicate unambiguously on the annotation label which specimen is the lectotype, see PURSELL, 1986, <i>Fissidens asplenioides</i> Hedw.; GEISSLER &amp; MAIER, 1995, <i>Grimmia ovalis</i> (Hedw.) Lindb.; HEDENAS &amp; GEISSLER, 1999; GEISSLER, 2000, <i>Bryum squarrosum</i> Hedw. for examples.</li> <li>2. Publish newly selected lectotype in a scientific journal.</li> </ol>
<p><b>D. If no potential lectotype material is available in the Hedwig-Schwägrichen herbarium.</b></p> <ol style="list-style-type: none"> <li>1. Check specimens from the original herbarium of the collector, e.g. Swartz (S), see PURSELL, 1986 for problems encountered with some species of <i>Fissidens</i>.</li> <li>2. Search the herbarium of the authors indicated on specimen label – for example, FRAHM &amp; GEISSLER, 1985, proposed a specimen from the herbarium of Timm as a lectotype for <i>Dicranum flexuosum</i> Hedw.</li> <li>3. Designation of an iconotype, as exemplified by GEISSLER (1985) for <i>Gymnostomum aestivum</i> Hedw.</li> </ol>

to consider when lectotypifying Hedwig specimens. These points have been expanded here in Table 1.

A common mistake associated with the annotation of specimens from the Hedwig-Schwägrichen herbarium is the inclusion of an annotation label that indicates the presence of the holotype for the species in question, but one that fails to indicate precisely which stem or group of stems (where multiple are present on the herbarium sheet) the designation was based on, i.e. which specimen from amongst the material was thought to have been originally used in the description and/or illustration of the species. In some cases, plants used for the illustrations in *Species Muscorum* can be identified from the herbarium sheets (compare Fig. 1, upper left specimen and Fig. 2, upper half of plate). The designation of a holotype is a practice that has only come into wide use in modern times in accordance with the development of the Code of Botanical Nomenclature. A holotype constitutes the one specimen or illustration used by the author, or designated by the author as the nomenclatural type. A lectotype is a specimen that is designated, from the original material, if no holotype was indicated at the time of publication, if no holotype has been found, or if the supposed holotype is found to belong to more than one species (see, St. Louis Code, GREUTER & al., 2000).

#### **Lectotypification of *Weissia calycina* Hedw.**

Recent taxonomic studies of the genus *Holomitrium* (*Dicranaceae*) revealed a need to designate a type for the name *Weissia calycina* Hedw. On the first herbarium sheet of the possible type material in G, contained in the original blue herbarium folder of the Hedwig-

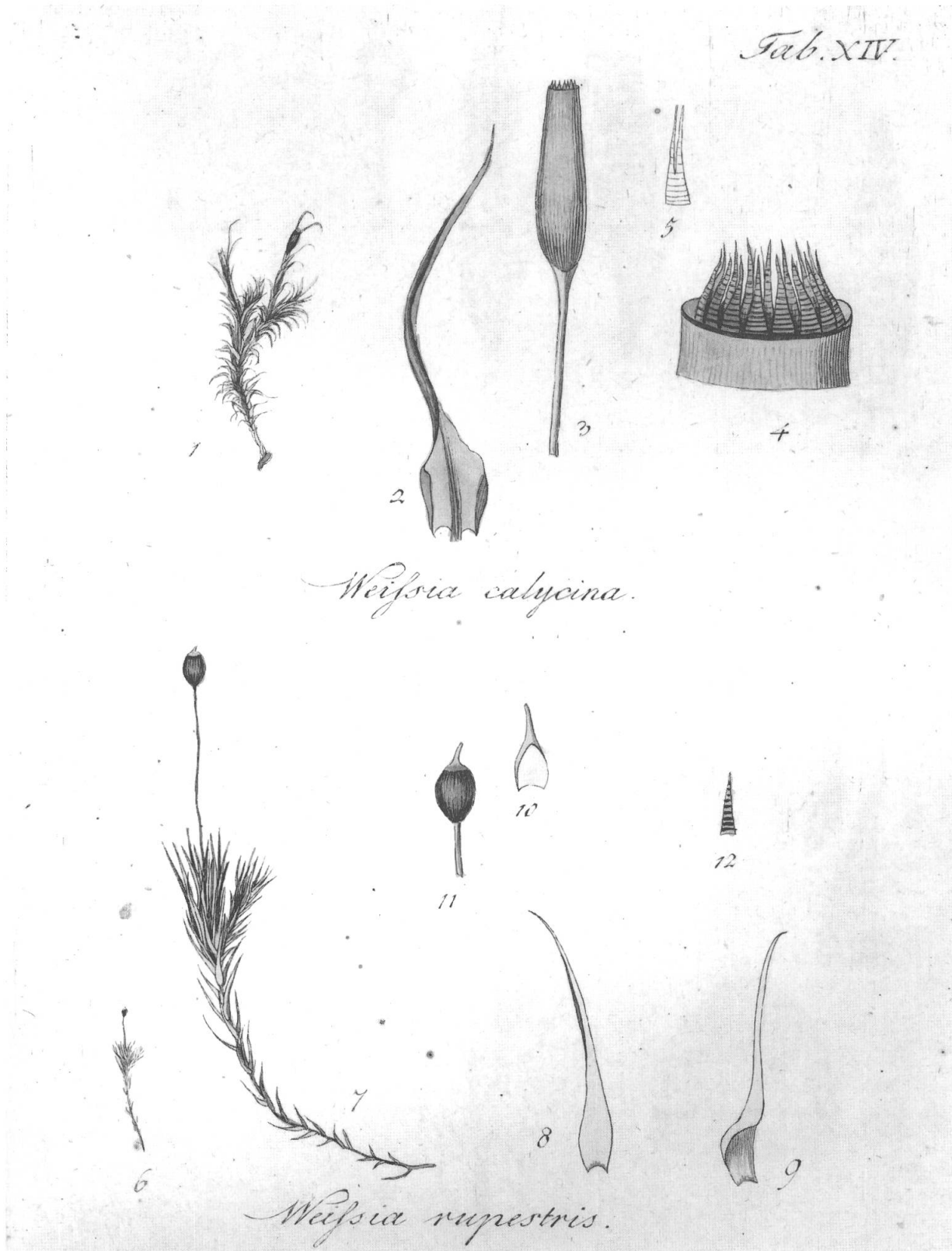


Fig. 2. – Copy of the original illustration of *Weissia calycina* from Hedwig (1801). Upper half of plate (1-5) *Weissia calycina* Hedw., bottom half of plate (6-12) *Weissia rupestris* Hedw.



Schwägrichen herbarium, are attached four stems (elements) in two rows. The upper row (three elements), consists of two specimens of *Weissia calycina*, on the left and in the centre; and on the right, labelled 'b,' a specimen of *Holomitrium olfersianum* Hornsch. (see Fig. 1). The very left specimen on the upper row is here designated as the lectotype of *Weissia calycina* Hedw. This specimen corresponds to the modern concept of the species and also to the protologue (HEDWIG, 1801: 70) and plate (HEDWIG, 1801: tab. XIV, but written as XIII in the protologue, see Fig. 2). On the original label is written, in the hand of Hedwig, 'Weissia calycina Spec. Musc. (p. 70. t. 14. f. 1-5). Bryum calycinica Swartz Prodr. p. 139 Jamaica.' In Schwägrichen's hand is added the plate and table number from *Species Muscorum*, see brackets above, and the annotation 'a' placed in front of the word Jamaica and beside that 'b Brasil Beyrich.' (see, Fig. 1).

On the bottom row are three small packets labelled 'foli a', 'foli b' and '(illegible word) term b' and then another specimen of *Holomitrium olfersianum* also labelled 'b', see Fig. 1. Under the lower specimen of *H. olfersianum* is written in Schwägrichen's hand 'b planta diversa an Holomitrium olfersii Hor Brasil.' This would indicate that the elements of *H. olfersianum*, labelled 'b' were attached later to the sheet by Schwägrichen for comparative purposes. Two stem pieces of *H. olfersianum* that had become detached have been glued back onto the sheet as if they came from the two specimens of *H. calycinum*. One stem fragment of *H. olfersianum* is glued at the tip of the stem of *H. calycinum* (lectotype) on the upper left, and the other has been attached at the base of the plant in the center of the sheet.

A second sheet of possible type material of *Weissia calycina* was found to consist of a later duplicate specimen from Schwägrichen that was included in the Barbey-Boissier Herbarium at Geneva. On the original label is written in the hand of Schwägrichen 'Dicran. longocalyc Weissia calycina Hg.' Under this has been added, possibly at a later date '= (illegible word) ad latera vicinitate Porto d'Entrada & (illegible word) 19 mu 21.' On the sheet to which the specimens are attached is written 'l. Jamaica in Herb. Schwägrichen.' Three elements are present on the sheet and are labelled 'a,' 'b' and 'c.' All of these elements are *Holomitrium olfersianum*. The specimens on this sheet do not constitute type material.

### Description of *Holomitrium calycinum* (Hedw.) Mitt.

***Holomitrium calycinum*** (Hedw.) Mitt. in J. Linn. Soc., Bot. 12: 60. 1869.

= *Weissia calycina* Hedw., Sp. Musc. Frond.: 70. 1801.

= *Dicranum calycinum* (Hedw.) F. Weber & D. Mohr, Index Mus. Pl. Crypt.: 10. 1803.

= *Cecalyphum calycinum* (Hedw.) P. Beauv., Prodr. Aethéogam.: 50. 1805.

**Lectotype** (selected here): **JAMAICA:** Swartz s.n. (G ! left specimen, upper row) (Fig. 1, 3).

= *Holomitrium marginatum* Mitt. in J. Linn. Soc., Bot. 12: 57. 1869.

– *Holomitrium crispulum* Mont. non Mart.: Sull. in Proc. Amer. Acad. Arts 5: 279. 1861.

**Type:** **Cuba:** "in sylvis densis ad arbores delapsus", C. H. Wright 41 (Holo-: NY !; iso-: BM !, G !, JE !, L !, MO !, S !).

*Plants* medium in size, green to green-brown above, brown below, glossy, growing in tufts. *Stems* erect, 2 to 5 cm tall; radiculose throughout; central strand well-developed. *Leaves* crowded, erect at base, crispate above when dry; erect-spreading above when wet; narrowly-lanceolate from broadly ovate, clasping to sheathing base, 3–7 × 0.5–1.1 mm, canaliculate throughout; irregularly bistratose, often extensively so, along margins and across leaf lamina; apices abruptly narrowed above leaf shoulder, long-acuminate; *margins* plane, entire to serrulate below, weakly to strongly serrate above shoulder; *costae* percurrent to excurrent, dentate at back, in cross-section at mid-leaf with 5 to 8 central guide cells, dorsal and ventral stereid bands dense, epidermal cells enlarged; *alar cells* distinct, red-orange to hyaline, rectangular to sub-rectangular, 20–50 × 16–20 µm, persistent, incrassate, not or very weakly pitted; *basal cells* long-

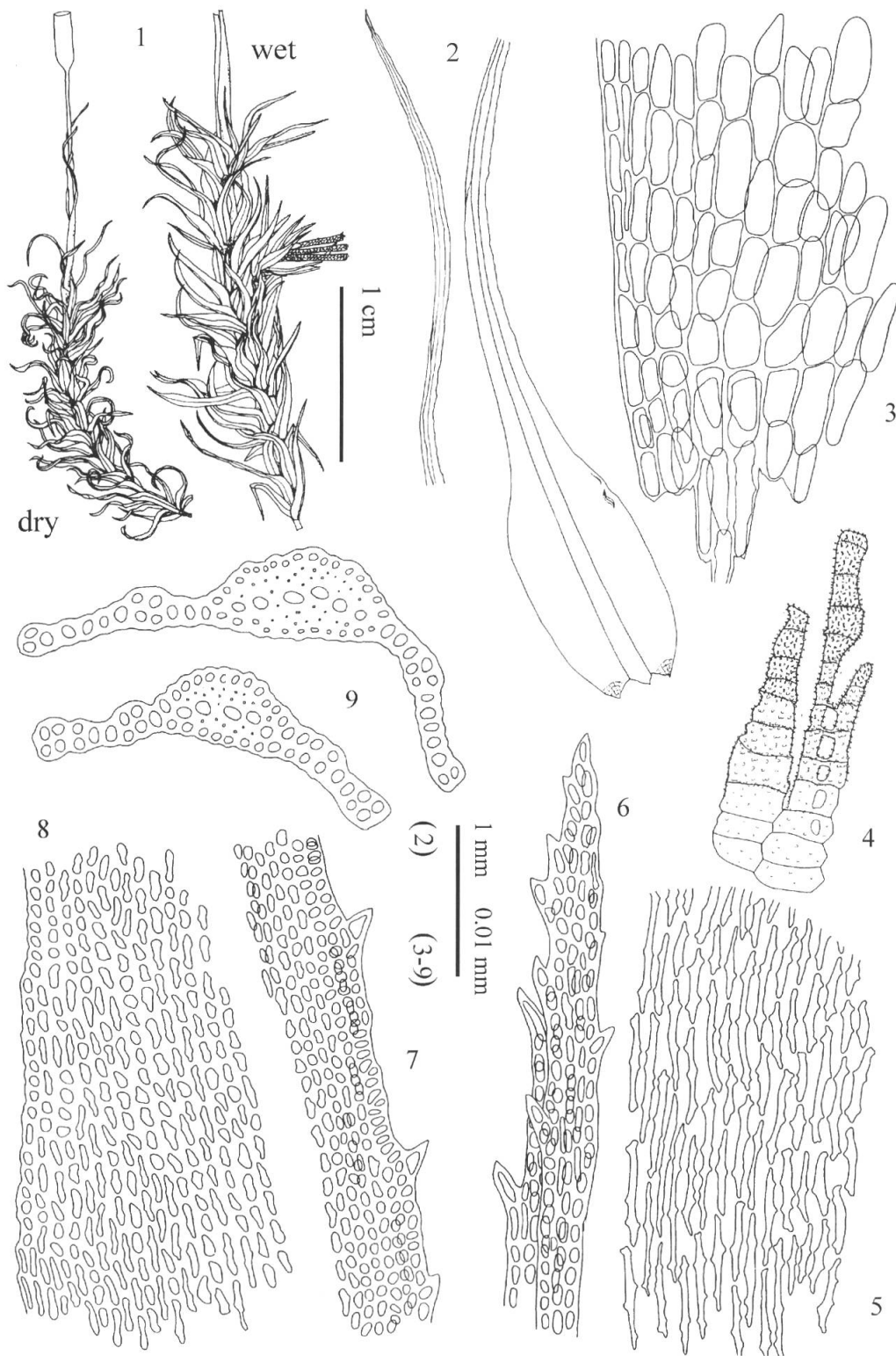


Fig. 3. – Illustration of *Holomitrium calycinum* (Hedw.) Mitt. (1) plants when wet and dry; (2) leaf; (3) alar region of leaf; (4) peristome, internal surface; (5) basal cells; (6) leaf apex; (7) upper leaf margin; (8) leaf shoulder; (9) leaf cross-sections at mid-leaf (upper) and upper leaf (lower).



rectangular to linear, incrassate, pitted,  $31\text{--}108 \times 8\text{--}13 \mu\text{m}$ ; cells not differentiated at leaf shoulder; *median leaf cells* irregularly rectangular or quadrate,  $12\text{--}36 \times 8\text{--}12 \mu\text{m}$ , becoming longer towards costae, incrassate, sometimes weakly pitted; *upper leaf cells* irregularly rectangular, quadrate to isodiametric,  $5\text{--}38 \times 6\text{--}15 \mu\text{m}$ , becoming smaller and more quadrate towards apices, sometimes weakly pitted, cell walls often weakly sinuose from mid-leaf. *Asexual reproduction* by fragile flagellate branches, 1–1.5 cm long, clustered at stem apices or in axils of stem branches, leaves to 1 mm long, costae subpercurrent. *Pseudautoicous*. *Perigonia* on dwarf males, growing on stem tomentum, in leaf axils or perichaetial bracts of female plants, 1–5 mm long, often with 2 antheridial bracts, leaves lanceolate, to 1.5 mm long. *Perichaetia* terminal, becoming lateral by sub-perichaetial branching, outer leaves erect below, erect to erect-spreading above, lanceolate to linear-lanceolate; inner perichaetial leaves long-sheathing, linear-lanceolate, 0.8–1.2 cm long; margins entire throughout, or above shoulder crenulate to serrulate, sometimes toothed at apex; costae subpercurrent; cells similar to vegetative leaves. *Setae* yellow, erect, 1–1.8 cm long, smooth. *Capsules* erect, ovoid-cylindrical, symmetric, 2–3.5 mm long, to 1.5 mm wide, smooth; neck short; mouth slightly constricted; *exothecial cells* irregularly oblong-rectangular, thin-walled, yellow with several rows of small red, incrassate cells at mouth. *Stomata* 8 to 12, scattered at capsule base. *Annuli* persistent, 2 to 4 rows of cells developed above the capsule mouth, cells homogeneous, quadrate to rectangular, thin-walled. *Opercula* rostrate, 2.0–2.5 mm long. *Peristome teeth* 16, inserted at capsule mouth, weakly-divided or entire, fenestrate, irregularly thickened on outer surface, striate, brown at base, hyaline above, narrowly-triangular, 230–260  $\mu\text{m}$  long to base of mostly fragile hyaline tips, densely papillose throughout. *Calyptrae* cucullate, 2 mm long. *Spores* 11–14  $\mu\text{m}$  diameter, spherical, lightly roughened.

*Etymology.* – Derived from the Latin ‘*calycinus*,’ meaning with a well-developed calyx, probably in reference to the sheathing perichaetial leaves of this species.

*Distribution and ecology.* – Known from the Caribbean (Cuba, Dominican Republic, Haiti and Jamaica). Found as an epiphyte on trees, and sometimes on rocks, in montane forest at elevations of 1700–2300 m.

*Specimens examined.* – **CUBA. Oriente:** Pico Turquino, VII.1922, *Leon 11247* (US, NY); **Santiago de Cuba:** Loma del Gato, *Clement 2333* (FH, MICH, NY). **DOMINICAN REPUBLIC. La Vega:** La Nevera, 6700 ft, 13.V.1982, *Steere 23088* (NY). **HAITI.** Pic de Macaya, Morne Le Hotte, 5500–5700 ft, 21.II.1941, *Holdridge 594* (FH, MICH). **JAMAICA. Portland:** John Crow Peak, 5500–6000 ft, 18.IV.1903, *Maxon 1299* (NY, US); **St. Andrew:** Sir John Peak, 5.X.1908, *Britton 1145* (NY); **St. Thomas:** Blue Mountain Peak, 7200–7400 ft, 9.VIII.1966, *Crosby 3451* (MO).

*Illustrations.* – HEDWIG. 1801: Tab. 14.1–5; HEGEWALD, 1978: Figs. 1–17; DUARTE BELLO, 1997: Tab. 57 & 58.

## Discussion

*Holomitrium calycinum* (Fig. 3) is distinguished by its bistratose leaves, broadly ovate leaf base, and extremely narrow upper leaf lamina, which is abruptly narrowed just above the leaf shoulder. *Holomitrium calycinum* varies in the length and shape of its median and upper leaf cells. It also varies in the amount of the upper leaf lamina that is bistratose. In some specimens almost all the lamina above the leaf shoulder is bistratose and in others it is only bistratose in patches. This species is similar in its bistratose leaves and leaf shape to both *H. crispulum* Mart. and *H. nitidum* Herz. which were both described from Brazil. *Holomitrium crispulum* can be distinguished from *H. calycinum* by the much wider upper leaf lamina, smaller upper leaf cells which are isodiametric to quadrate and not pitted (cells are rectangular, and are sometimes pitted in the upper leaf of *H. calycinum*). *Holomitrium nitidum* appears to be closely related to *H. calycinum*. It can be distinguished from *H. calycinum* by its broader upper leaf lamina and upper leaf cells, which are elongate, rectangular and pitted throughout (upper leaf cells in *H. calycinum* vary from rectangular to quadrate and from pitted to not pitted). Although *H. calycinum* sometimes exhibits upper leaf cells that are elongate and pitted, these non-typical forms can be distinguished from *H. nitidum* by the very slender upper leaves with a very narrow leaf lamina in upper leaf. Other species of *Holomitrium* that have bistratose leaf margins (*H. williamsii* E. B. Bartram, *H. antennatum* Mitt., and *H. olfersianum*) can be distinguished from *H. calycinum* by their

strongly differentiated leaf cells between upper and lower leaf, smaller size and very different leaf shape (*H. williamsii* and *H. olfersianum*), and by teeth present on the upper leaf lamina (*H. antennatum* and *H. olfersianum*). Specimens distributed under the name *H. marginatum* (Wright 41, Cuba) were confirmed to belong to *H. calycinum*, as first suggested by HEGEWALD (1978).

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