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# *Barbula ferruginascens* Stirt. (*Musci: Pottiaceae*) in Poland

*Barbula ferruginascens* Stirt. (*Musci: Pottiaceae*) w Polsce

*Barbula ferruginascens* Stirt. (*Musci: Pottiaceae*) в Польше

The present knowledge of the species and generic features of *Barbula ferruginascens* Stirt. has been based mainly on the description of the structure of gametophyte without gametangia. This has directly resulted in distinguishing many new taxa in the range of the species or varieties by European bryologists. On detailed examination, the features of these taxa appeared identical to those in diagnosis given by Stirton. Therefore, the epithets of their names have been included to the synonyms of *B. ferruginascens* in this paper. The discovery of plants with sporophytes as well as the lack of distinct dentate ends of the stem leaves permitted to determine the present status of this species in the genus *Barbula* Hedw. and the characters distinguishing it from small species of the genus *Bryoerythrophyllum* Chen (3).

## TAXONOMIC POSITION

Syn.: *Barbula ferruginascens* Stirt., Ann. Scot. Nat. Hist. 9 (35); 179, 1900. — *B. rubella* var. *ruberrima* Ferg. ex Braithw., Brit. Moss-Fl. 1, 261, 1887. — *B. rubella* var. *brevifolia* Lindb. et Arn., Kungl. Vet. Avd. Handl. 23 (10); 71, 1890. — *B. botelligera* Mönkm. in Murr, Allg. Bot. Zeitschr. 20; 24, 1914; 20; 120, 1916. — *B. tomaculosa* Blockeel, Journ. Bryol. 11; 583—589, f. 1—2, 1981 syn. nov. — *Didymodon botelliger* Hagen, Kungl. Nor. Vid. Selsk. Skrift. 1928, 3; 70, 1929. — *Erythrophyllum rubellum* var. *ruberrimum* (Ferg.) Sav., Acta Inst. Bot. Acad. Sc. URSS, ser. 2, 3; 522, 1936. — *Bryoerythrophyllum ferruginascens* (Stirt.) Giac., Atti Ist. Bot. Univ. Lab. Critt. Pavia, ser. 5, 4 (2); 210, 1947.

In this opinion of various bryologists, *B. ferruginascens* possessed an unstable position in the subfamily *Trichostomoidae* Broth. It was included to three genera as *Barbula*, *Didymodon* and *Bryoerythrophyllum*.

This opinion resulted from the absence of sporophyte and the presence of rhizoidal tubers. The presence of axillary hair in the axis of the upper leaves in sterile plants, beside archegonium in this species, relates it more closely to other genera of *Pottiaceae* (10). On the other hand, the abundantly formed rhizoidal tubers also relate it more closely to some species of the genus *Barbula*. In the recent floras (9, 14), this taxon is included to the genus *Barbula*. Of course, this species is only partially related to *B. recurvirostris* (Hedw.) Dix., and it is mainly for this reason that it was firstly included to the genus *Bryoerythrophyllum* by Giacomini (see synonyms). *B. ferruginascens* differs from the species of the genus *Bryoerythrophyllum* by the presence of not differentiated basal cells and by the lack of more distinct dentate apices of the stem leaves, presence of distinct "c"-shaped papillae in the lamina cells by a one-row ring (Figs. 1—2). It differs from the species of the genus *Barbula* by the presence of quadrate cells distributed on the nerve back. Plant patches are developed vegetatively by rhizoidal tubers. The presence of peristome and ripe spores may only increase the reproduction of plants (4).

Moreover, *B. ferruginascens* is dioicous (2), whereas *B. recurvirostris* is synoicous or paraicous. In the living material examined only 2—3 archegonia were observed on single stems. Until recently the systematic position of *B. botelligera*, firstly distinguished by Mönkemeyer in two Murr's (7, 8) floristic articles, was not clear, either. Specimens with rhizoidal tubers from the Tirol part of Alberg range in the Alps (1600—1650 m a.s.l., leg. Murr) were determined as plants belonging to *B. rubella* var. *ruberrima* Ferg. described earlier, and they were identical to *B. ferruginascens*. This assumption is confirmed by Fig. 61 on page 290 in Mönkemeyer's flora (6). In 1904 this author also gave a description and a new locality of *B. botelligera* on the basis of the specimens collected on serpentine stones from the region of Zöblitz, SE of Chemnitz in the Erzgebirge Mts., Germany.

Recently Blockeel (2) has described a new sterile species *B. tomaculosa* from arable fields of south-west Yorkshire, Great Britain, which, according to the detail description and the presented Figs. 1—2, is undoubtedly identical to *B. ferruginascens*. All the synonymous taxa names described so far and included to this species were only known as sterile. Therefore, the fertile plants of *B. ferruginascens* discovered and examined by us possess ripe sporophytes which have already been described by Zander (16).

## DESCRIPTION OF GAMETOPHYTE
(figs. 1—2)

Dioicous; plants forming deep reddish-brown ± throughout compact bright tufts; stems to 2—4 cm high, slender, tomentose below; leaves 1.8—2.0 mm long, erect, slightly incurved when dry, patent to spreading from erect base when moist, lanceolate, tapering to ± acute apex, at margin strongly recurved below, papillose-crenulate near apex, with three smooth apical cells; basal cells incrassate, narrowly rectangular, above irregularly quadrate, strongly papillose and obscure, 7—9 (8—12) μm wide in central part of leaves; nerve very strong, ending in apex or below; rhizoidal tubers reddish-brown, multi-celled, elongate, very frequent, about 200—400×110—130 (115—140) μm.

## DESCRIPTION OF SPOROGON
(fig. 3a—e)

Seta erect, 8—11 mm long, deep red, red-brownish; capsule ca 2 mm long, brown, elipsoid to cylindrical; lid oblique, conical, obtuse with thick-walled rectangular cells; exothecial cells polymorphous mostly rectangular to quadrate, brown, thick-walled; basal cells small in 3—4 rows; peristome teeth ca 170 μm long, dark yellow, straight, consist of 4—5 papillose segments, last segment hyaline, acute; annulus single with one-row thick-walled, polymorphous cells; spores 15—16 μm, yellow-green, very slightly papillose.

Fructification seldom in autumn (September) and sporadically in spring. On March 4, 1983, young green-brown assimilating setae with developed capsules were found, but abundantly occurring rhizoidal tubers very typical for this species were absent. However, in 42 microscopic preparations of specimens two old red tubers and young yellow 5—6-cell gemmae formed on young rhizoid stems were formed.

## REMARKS TO GEOGRAPHICAL DISTRIBUTION

The taxonomic features of *Barbula ferruginascens* are very typical and stabile, but a great rarity of its localities in the whole geographical distribution is the reason of a poor knowledge of this species. It grows from the Arctic regions to north-western and middle Europe. According to the published data of Lindberg and Arnell (5), Savich (11), Nyholm (9), Abramova et al. (1), Smith (14), and Savich-Lyubitskaya and Smirnova (12), it occurrs on West Greenland, Iceland, Franz Joseph Land and Kumach-Syrt on the Lena River

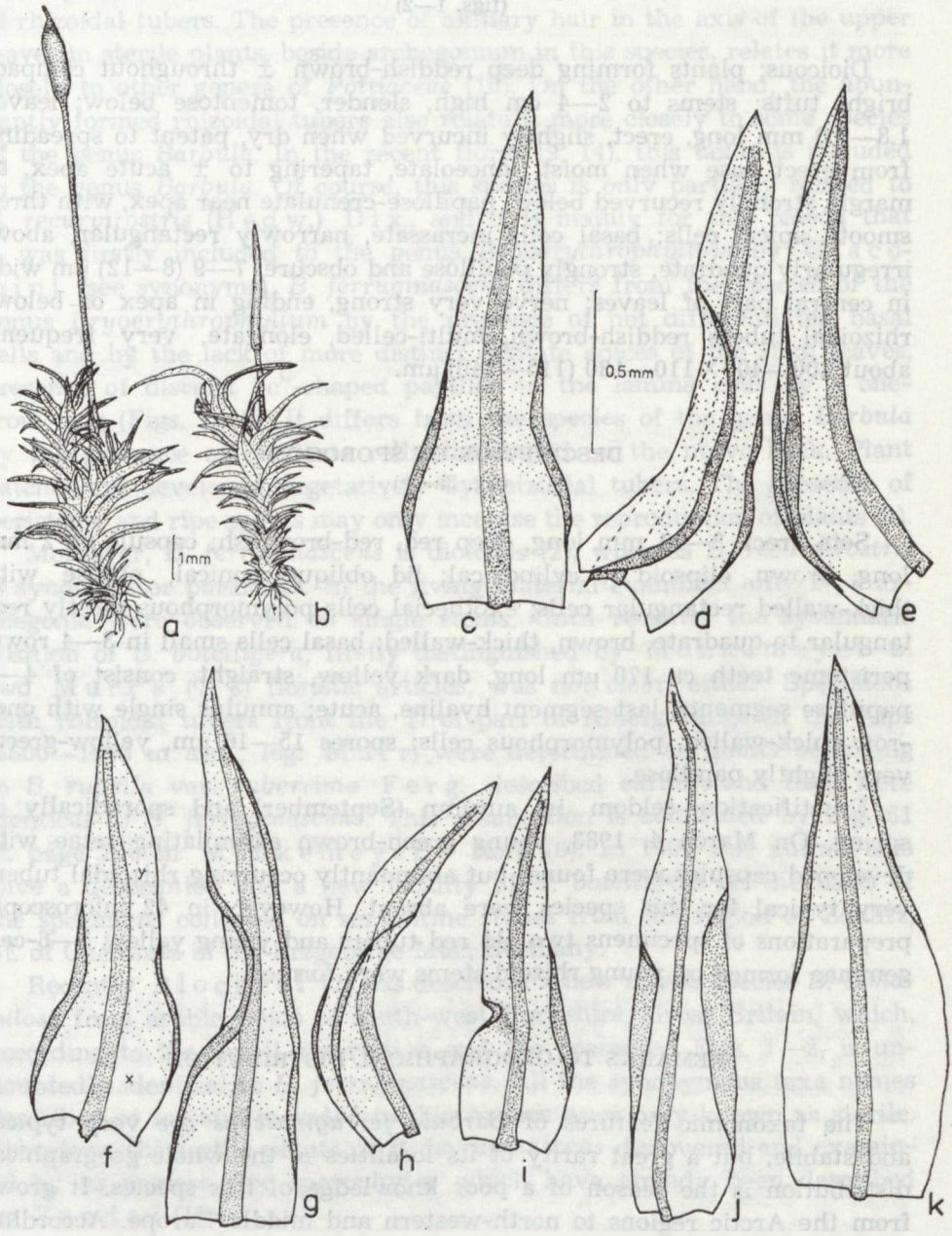


Fig. 1. a—b — stems, c—e — upper stem leaves, f—i — under leaves, j—k — perichaetial leaves (illustrated plants from Oświęcim)

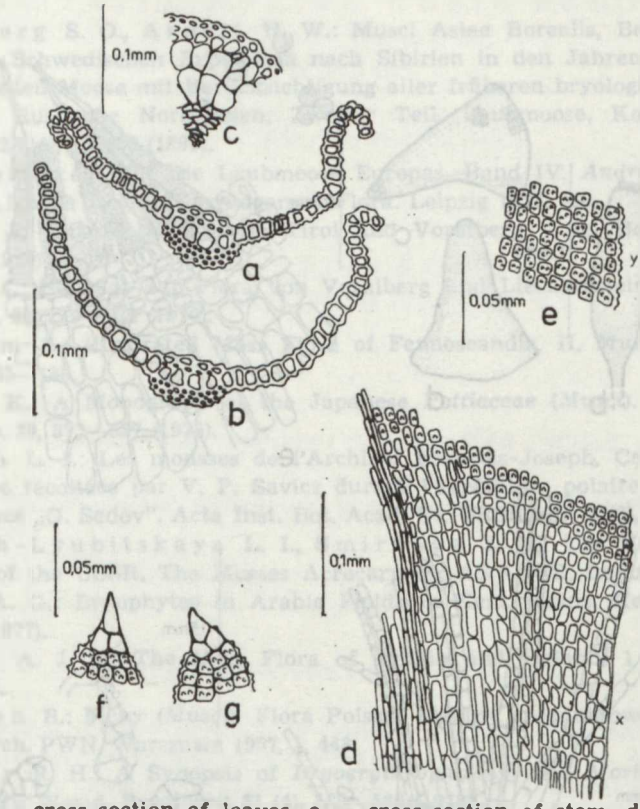


**Fig. 2. a—b — cross-section of leaves, c — cross-section of stem, d — basal cells of under leaves, e — marginal and central parts of leaves, f—g — ends of upper leaves**

in Siberia, 70°30′ N. Lat., Malesia (mountain ranges of Sulawesi) and New Guinea as well as in Great Britain, Yorkshire, in the Tirol Alps, Erzgebirge Mts. and Poland. The present additional geographical records are cited by Z a n d e r (16).

In Poland, sterile specimens determined as *B. ferruginascens* from the Szklarka valley near Krzeszowice in the Kraków—Wieluń Upland, which were given by S z a f r a n (15), belongs to *P. recurvirostris*. Its first locality newly discovered is in the Oświęcim basin: Oświęcim, Zasole, on lime stone walls covered with a thin soil layer and loose tuft of common bryophytes, in the park on the Soła river near Zasole (part of Oświęcim town), beside the new water reservoir, 18 IX 1981. The accompanying eurytopic species of other bryophytes cover stones in 60%. These are: *Amblystegium serpens, Brachythecium glareosum, B. reflexum, Bryum caespiticium, Cephaloziella divaricata, Ceratodon purpureus, Hypnum cupressiforme, Plagiomnium cuspidatum* and *Racomitrium canescens*, and moderate stenotopic species: *Fissidens taxifolius* and *Lophocolea bidentata*.

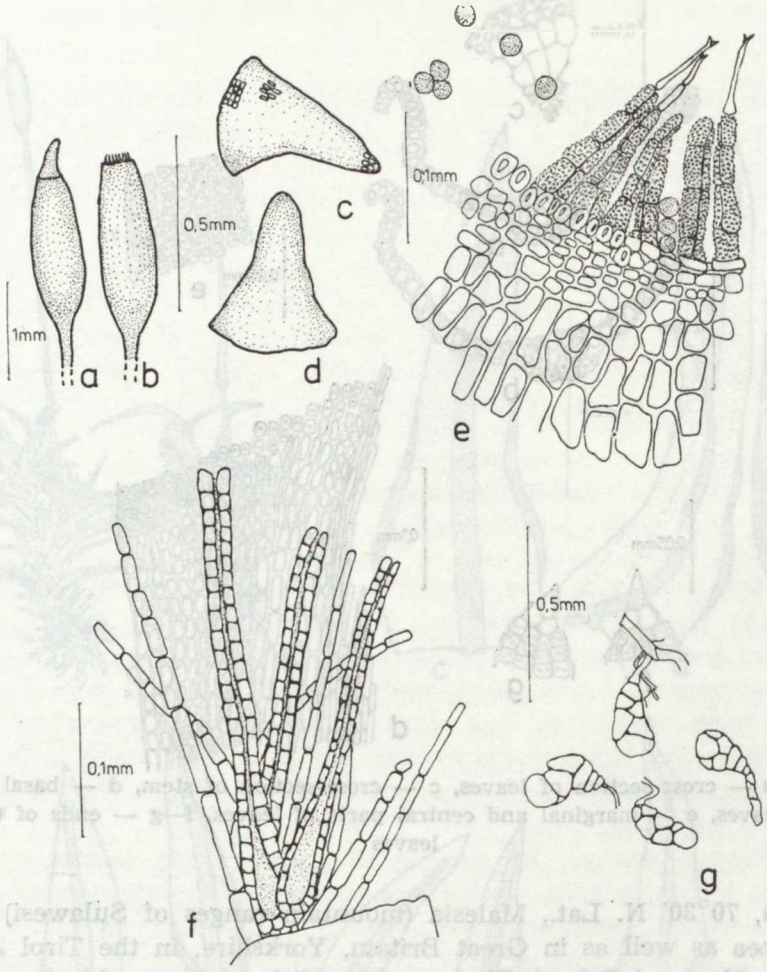


Fig. 3. a—b — capsules, c—d — lids, e — perystome, f — archegonia and cilia as axillary hairs, g — rhizoidal tubers

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## STRESZCZENIE

Przedstawiono pierwsze, udokumentowane materiałami zielnikowymi, stanowisko *Barbula ferruginascens* w Polsce. Gatunek ten zebrano ze sporogonami na kamiennym murku, pokrytym cienką warstwą gleby, w parku nad rzeką Sołą w Oświęcimiu. Ponadto podano opis sporogonu, uwagi o rozmieszczeniu geograficznym oraz dyskusję nad pozycją taksonomiczną *B. ferruginascens*.

## РЕЗЮМЕ

Описано первое, подтвержденное гербарными материалами местообитание *Barbula ferruginascens* в Польше. Этот вид вместе со спорогенами был собран на каменной стене, покрытой тонким слоем почвы, в парке над рекой Солой в Освенциме. Кроме того, описан спорогон, представлены замечания о географическом размещении, обсуждается таксономическое положение *B. ferruginascens*.