蘚苔地衣雑報 Vol. 8, No. 2
服部植物研究所発行
Aug. 15, 1978

MISCELLANEA BRYOLOGICA ET LICHENOLOGICA

Edited by AKIRA NOGUCHI (Bryology, Managing Editor) and MASAMI SATO (Lichenology)
Published by The Hattori Botanical Laboratory (Obi, Nichinan, Miyazaki Pref., Japan)

RICHARD H. ZANDER*: Synopsis of the genus *Tuerckheimia* (Pottiaceae)**

R. H. ザンダー: *Tuerckheimia* 属 (センボンゴケ科) の一覧

Two species of Pleuroweisieae, *Gymnostomum angustifolium* Saito and *G. valerianum* (Bartr.) Zander were pointed out recently (Zander, 1977) as probably best recognized in the Trichostomoideae on account of the subtubulose upper leaf and multiplex, centered papillae. Further study of Middle American Pottiaceae for contribution to a moss flora of Mexico, planned by Dr. A. J. Sharp, reveals that the type of the genus *Tuerckheimia* Broth., *T. guatemalensis* Broth., is nearly identical to *G. angustifolium*. The three species above form a natural genus in the Trichostomoideae based on similar habit, leaf shape, and details of anatomy, especially of the areolation. Three other species presently recognized in *Tuerckheimia* actually belong in other genera. The genus is redescribed below with this emendation.

Tuerckheimia Broth., Oefv. F. Vet.-Soc. Foerh. 52A (7): 2. 1910.

Plants to 2.5 cm tall, light to dark green and often somewhat glaucous, seldom branching; sometimes with red tomentum below; stem central strand present, cortical cells substereid, a thin-walled epidermis rarely differentiated; axillary hairs of up to 16 uniseriate, clear cells, the basal cell occasionally brown. Leaves of about equal size to near stem base, when dry spreading-incurved from the insertion, subtubulose above, weakly twisted to crisped or catenulate, when wet spreading, oblong- to linear-lanceolate, margins plane, entire or dentate, leaf base weakly differentiated in shape to short-ovate, not sheathing; costa percurrent to stoutly excurrent, ventral superficial cells quadrate to elongate, costa in cross section ovate, ventrally bulging-convex, with a single ventral parenchymatous layer of epidermal cells, a single layer of median guide cells between two usually strong stereid bands, and dorsal epidermal layer occasionally differentiated. Upper laminal cells subquadrate to hexagonal or elliptical, walls thickened, papillae usually large, massive, bifid to multiple, usually centered over the lumens, mostly 4—6 salients per lumen, basal laminal cells differentiated in a small group, smooth, rectangular, yellowish to hyaline. Heterotrichous, persistent protonema with green, much branched, aerial chloronema and green to red-brown, trunk-like caulonema. Apparently dioicous. Perigonia not seen. Perichaetia terminal, leaves abruptly sheathing below, otherwise little different from cauline leaves or smaller and apex rounded. Sporophyte seta 3.0—8.0 mm long, urn cylindrical, 0.5—1.7 mm long, peristome absent or rudimentary(?), annulus not differentiated, operculum long-rostrate, straight, 0.8—1.2 mm long, calyptra cucullate, to 2.2 mm long, spores 8—11 μm in diameter, essentially smooth. (Sporophyte characters in part *fide* Saito, 1972.)

The habitat of *Tuerckheimia* is cliffs, ledges, bluffs, especially of calcareous rock, in very mesic areas, from sea level to montane situations.

* Clinton Herbarium, Buffalo Museum of Science, Buffalo, New York, 14211. U.S.A.

** I am grateful to Patricia Eckel for help with the manuscript. I thank the curators of the herbaria mentioned for loans of specimens.

Study of the tribes Leptodontieae (Zander, 1972), Pleuroweisieae (Zander, 1977) and Barbuleae (unpublished) has lead me to believe that characters of the areolation, including leaf cell lumen, wall and papillae sizes and shapes, are relatively conservative at least in these groups. I support Loeske's (1910) opinion that areolation provides good characters now often ignored in modern taxonomy but undoubtedly overemphasized by Karl Mueller (of Halle). Taking all salient characters into account, *Tuerckheimia* is apparently most closely related to *Trichostomum*. The areolation of *Tuerckheimia* species, however, differs widely from that of species of *Trichostomum*, which have thin cell walls and low, flat, multiplex papillae that are often hollow and are nearly contiguous, covering the entire laminal cell. The usually evenly thick-walled laminal cells with relatively distant, massive, centrally located granular or multiplex papillae of *Tuerckheimia* species are approached closely in some few species such as *Trichostomum cuspidatissimum* Card. & Thér.

Key to species of *Tuerckheimia* Broth.

1. Leaf margins coarsely and distantly dentate above mid-leaf; upper laminal cells usually obscured by papillae, papillae with 4—6 salients, crowded, usually one multiplex papilla centered over each lumen. . . . . .*T. valeriana* (Bartr.) Zander
1. Leaf margins entire or seldom sinuose; upper laminal cells little obscured by papillae, papillae with 2—4 very blunt salients, not crowded, usually 2—4 papillae centered over each lumen but occasionally scattered. . . . . .2.
2. Plants often glaucous, stems to 2.5 cm long, persistent protonema absent, leaves 3—5 mm long, apices fragile, usually broken off in a large proportion of leaves, upper laminal cells usually with a single, massive multiplex papilla over each lumen, perichaetial leaves little different from cauline leaves, seta 3.3—4.2 mm long, urn 0.9—1.7 mm long, peristome absent. . . . . .*T. angustifolia* (Saito) Zander
2. Plants not glaucous, stems 0.2—0.3 cm long, leaves 1.5—2.5 mm long, apices not fragile, upper laminal cells with 2—4 multiplex papillae over each lumen, inner perichaetial leaves often small, with rounded apices, seta 5—8 mm long, urn 0.5—1.0 mm long, peristome rudimentary(?). . . . . .*T. guatemalensis* Broth.

Tuerckheimia guatemalensis Broth. is well described and illustrated by Brotherus (1910) and Bartram (1949). It is known only from the type specimen (holotype: Guatemala, Livingston, *Tuerckheim*, 1908—H). As *T. angustifolia* is always eperistomate (Saito, 1972), the possibility that *T. guatemalensis* may have a peristome is significant. Britton (1913), in a discussion of *T. linearis*, and Bartram (1949) both allude to "traces of a peristome" in *T. guatemalensis* not noted in the original description. The type of *T. guatemalensis*, in fact, does have what look like remnants of a yellow-brown, weakly papillose basal membrane, 2—3 cells high, protruding from the mouths of some of the capsules. This has much the same appearance of the basal membrane seen in some specimens of *Trichostomum jamaicense* (Mitt.) Jaeg. but no peristome teeth are attached. After much study, I find that the rather poor condition of the several capsules, all deoperculate and mostly empty of spores, does not allow a satisfactory interpretation. Some spore sacs are not attached at the capsule mouth and protrude with only the appearance of an eroded basal membrane. Other spore sacs, however, seem to be attached distally with a "basal membrane" exerted beyond. In any case, plants of *Tuerckheimia guatemalensis* and of *Gymnostomum angustifolium* are very similar and certainly belong in the same genus. Also, vast variation in peristome morphology within and between species is rather common in other genera of Trichostomoideae.

The bistratose margins of the upper lamina of *T. guatemalensis* emphasized by Brotherus (1910) and Bartram (1949) are actually only occasional patches, although these apparently lead K. Saito to annotate the type as a new combination in *Trichostomopsis*. This latter genus probably belongs in the Barbuloideae near *Didymodon*.

Tuerckheimia angustifolia (Saito) Zander, *comb. nov.*

Basionym: *Gymnostomum angustifolium* Saito, J. Hattori Bot. Lab. 36: 163. 1972. Type: Japan, Saitama Pref., Chichibu, Mt. Buko, Urayama, *Nagano 3142* (TENN—isotype).

Illustrations and description of this species are given by Saito (1972), Iwatsuki and Sharp (1958) and by Breen (1963--as *Molendoa sendtneriana*). Additional notes on relationships and morphological variation are presented by Zander (1977) in discussions of *Gymnostomum aeruginosum*, *G. valerianum* and *Molendoa sendtneriana*. Seen under the dissecting microscope, *T. angustifolia* often has much the same aspect as *M. sendtneriana* when in dense turf, the plant apices being vivid, light green, often with a glaucous tinge and the lower portions of the plants whitish-tan. But in *M. sendtneriana* the leaves are often in three rows along the stem, not inwardly circinate or subtubulose when dry and the costa is not prominent. The geographic range according to Saito (1972, 1975) includes Japan, Korea, Formosa and eastern North America. Representative New World specimens I have seen that may be added to the list of Saito (1972), including a new report in Mexico, follow.

Representative New World collections. U.S.A. Alaska: Adak Island, near Sweeper Cove breakwater, *Smith 4000* (TENN); Baranof Island, below Blue Lake, Sitka, *Worley and Hamilton 9201* (DUKE). Arkansas: Stone Co., Blanchard Springs, *Anderson 11650* (DUKE). Florida: Jackson Co., Florida Caverns St. Pk., *Anderson and Crum 13686* (DUKE), *13690* (DUKE). North Carolina: Jones Co., NE of Pollocksville, Trent River, *Anderson 9818* (DUKE); McDowell Co., Linville Caverns, *Anderson and Jones 9585* (DUKE), *9698* (DUKE), *9705* (DUKE, TENN). Tennessee: Anderson Co., Savage's Garden near Coal Creek, *Sharp 34142* (TENN), *3989* (TENN), *596* (TENN); Blount Co., Kinzel Springs, *Sharp 34184* (TENN); Cheatham Co., Sycamore Creek, *Bold and Sharp 34290* (TENN); Claiborne Co., at Clinch River bridge, *Sharp 626* (TENN); Knox Co., near Hog Hollow, Keller Bend, *Sharp 562* (TENN); Montgomery Co., Red Rocks Bluff on Cumberland River, *Clebsch 528* (TENN), *978* (TENN); Sevier Co., Jones Cove, *Sharp 746* (MEXU, TENN); White Co., Caney Fork, near Virgin Falls, *Sharp 6635* (DUKE). Mexico. Nuevo León: Santiago, Horsetail Falls, *Frye and Frye 2669* (WTU).

Tuerckheimia valeriana (Bartr.) Zander, *comb. nov.*

Basionym: *Leptodontium valerianum* Bartr., J. Washington Acad. Sci. 19: 18. 1929. Type: Costa Rica, San José, Piedra Blanca, *Valerio 86* (FH—holotype; PC—isotype).

Gymnostomum valerianum (Bartr.) Zander, Bryologist 75: 277. 1972.

Bartram (1949) and Zander (1977) illustrate and describe this distinctive species. It has been collected in Mexico (Sinaloa), Costa Rica, Guatemala and Panama (Zander, 1977) but sporophytes are yet unknown. The report of lateral perigonia in this species by Zander (1977) is incorrect, being due to mixture with *Anoectangium aestivum* (Hedw.) Mitt.

Four other combinations have been made in *Tuerckheimia*, of which three are recognized by the Index Muscorum (Wijk et al., 1959—1969). *Tuerckheimia angustinervis* (Card.) Broth. (isotype: Mexico, Veracruz, Orizaba, *Pringle 8*—FH) is a new synonym of *Trichostomum jamaicense*. I agree with most recent authors in recognizing *T. barbula* (Schwaegr.) Hilp. as *Luisierella barbula* (Schwaegr.) Steere. *Tuerckheimia longifolia* Thér. (syntype: Cuba, Pico Turquino, *Acuña 414*—DUKE) is a new synonym of *Trichostomum cylindricum* var. *gemmiparum* (Schimp.) Limpr. The large, red, multicellular, rhizoidial propagula are distinctive and a new combination in *Oxystegus* is in manuscript form.

Tuerckheimia linearis (Web. & Mohr) Britt. of the West Indies should be recognized as *Barbula linearis* Web. and Mohr being near or within the *Barbula indica* complex, which includes as the American component *B. cruegeri* Sond. *ex* C. Muell., in the appearance of the peristome, the often plane leaf margins, the deep ventral groove along the costa, the costa dorsally prorulate at least in young leaves, and in details of the

areolation. *Barbula linearis* as represented at NY differs from the rather variable *B. cruegeri* in the narrowly cylindric capsule with a large, vesiculose annulus, nearly straight peristome (but variable in *B. cruegeri*), leaves oblong- to linear-lanceolate with often narrowly acute to acuminate apices, laminal papillae always massive, thickened, capitulate and crowded, and propagula not present (often present in *B. cruegeri*). Britton's (1913) description of the leaf section of *B. linearis* is not applicable to the NY collections, which have only one layer of guide cells in the costa. Likewise, the illustration of *B. linearis* by Crum and Steere (1957) is probably *Oxystegus cylindricus* (Brid.) Hilp. judging from the leaf shape, plane margins, areolation and the naked ventral stereid band near apex of costa. *Barbula linearis* has much the same appearance under the dissecting microscope as has *T. guatemalensis* but differs from the latter by the long peristome teeth, broad annulus, the often blunt leaf apices, laminal papillae usually single, multiplex and thickened-capitulate, covering the entire laminal cell, crowded, the narrow ventral groove along the costa and the presence of prorulae in in young leaves.

Literature Cited

Bartram, E. B. 1949. Mosses of Guatemala. Fieldiana: Botany 25: i-v, 1-442.

Breen, R. S. 1963. Mosses of Florida, An Illustrated Manual. Univ. of Florida Press, Gainesville, Florida.

Britton, E. G. 1913. West Indian mosses, I. Bull. Torrey Bot. Club 40: 653-676.

Brotherus, V. F. 1910. Neue Laubmoosgattungen. Oefv. Fin. Vet.-Soc. Foerh. 52A(7): 1-12, pl. 1-4.

Crum, H. A. and W. C. Steere. 1957. The mosses of Porto Rico and the Virgin Islands. New York Acad. Sci., Sci. Surv. Porto Rico and the Virgin Islands 7(4): 395-599.

Iwatsuki, Z. and A. J. Sharp. 1958. *Molendoa sendtneriana* in the United States. Bryologist 61: 356-359.

Loeske, L. 1910. Studien zur vergleichenden Morphologie und phylogenetischen Systematik der Laubmoose. Max Lande Verlag: Berlin.

Saito, K. 1972. Taxonomic and phytogeographic studies of specimens previously reported as *Molendoa sendtneriana*. J. Hattori Bot. Lab. 36: 163-170.

———. 1975. A monograph of Japanese Pottiaceae (Musci). J. Hattori Bot. Lab. 39: 373-537.

Wijk, R. van der, W. D. Margadant, and P. A. Florschuetz. 1959-1969. Index Muscorum. Vol. 1-5. Reg. Veg. 17, 26, 33, 48, 65. Utrecht.

Zander, R. H. 1972. Revision of the genus *Leptodontium* (Musci) in the New World. Bryologist 75: 213-280.

———. 1977. The tribe Pleuroweisieae (Pottiaceae, Musci) in Middle America. Bryologist 80: 233-269.