SEVEN NEW GENERA IN POTTIACEAE (MUSCI) AND A LECTOTYPE FOR SYNTRICHIA

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A revisionary study of the moss family Pottiaceae at the generic level has progressed to the point that certain new genera, all belonging to the tribe Pottieae, can be published forthwith. A more complete discussion of each genus will be given when the full study is finally produced, probably as a volume of the Bulletin of the Buffalo Society of Natural Sciences. These new genera are considered distinctive through various combinations of unique or otherwise presumably advanced characteristics for the family, such as presence of laminal border, inflated upper laminal cells, thin and subpercurrent costae, absence of a dorsal costal epidermis, specialized photosynthetic organs, papillose red brood bodies and other perennating organs, pleurocarpy, plicate thecae, and red color response of the upper laminal cell walls to two percent KOH solution.

Chenia Z and., gen. nov.

Folia ligulata vel spathulata, margine superiore irregulatim dentata projectionibus medicellularibus acutis in papillam lateralem simplicem tenuem terminantibus armata; costa tenuis; stratum costale stereidarum pertenue vel interdum absens; epidermis costalis dorsalis praesens; cellulae laminales superiores magnae, hexagonale protuberantes, parietibus tenuibus praeditae, tenuiter trigonae, epapillosis; color laminalis in hydroxido kalii rubescens.

Plants forming turf, occasionally rosulate, green above, brownish below. Stems seldom branching, 0.2-1.0 cm in length, transverse section rounded, central strand weak to strong, sclerodermis present, hyalodermis absent; rhizoids usually few. Leaves appressed and somewhat contorted when dry, spreading when moist, ligulate to spathulate, 1.5-2.5 mm in length, upper lamina occasionally grooved along costa, plane or broadly channeled, margins plane above, weakly recurved below, irregularly dentate above with sharp mid-cell projections ending in a weak simple papilla, marginal cells often smaller than the medial; apex rounded to broadly acute, occasionally sharply apiculate; costa weak, ending several (6-9) cells before the apex or percurrent, ventral and dorsal superficial cells short-rectangular, narrower than laminal cells, costal transverse section rounded to elliptical, stereid band very weak or occasionally absent, rounded in shape, ventral and dorsal epidermis present, guide cells 2 in 1 layer, hydroid strand present, small to large; upper laminal cells large, bulging-hexagonal, 15-18 um in width, 1:1, walls thin, weakly trigonous, superficially convex on both sides; papillae absent (upper marginal teeth may be interpreted as ending in sharp, simple papillae); basal cells differentiated across the leaf base (except for one row of marginal cells similar to the upper cells), rectangular, ca. 20-25 um in width, 2-4:1, walls thin, weakly trigonous. Propagula when present borne on rhizoids in soil, irregularly rounded to clavate, ca. 100-130 um in longest dimension. Dioicous.

Perichaetia terminal, inner leaves little different from the cauline, slightly larger. Seta ca. 1.2 cm in length, reddish brown, twisted clockwise; theca ca. 2 mm in length, brown, cylindrical, exothecial cells rectangular, 20-25 um in width, 2-4:1, thin-walled, stomates at base of theca, phaneropore, annulus of 2-3 layers of strongly vesiculose cells, persistent; peristome teeth 16, filamentous, somewhat anastomosing, densely branching-spiculose, ca. 400 um in length, with ca. 5 articulations, nearly straight or weakly twisted counterclockwise, basal membrane 25-35 um in height, low spiculose. Operculum short- to long-conic, 500-650 um in length, cells twisted weakly counterclockwise. Calyptra cucullate, smooth, 1.5-2.0 mm in length. Spores ca. 10 um in diameter, light brown, essentially smooth. Laminal KOH color reaction red.

Type: Tortula subobliqua Williams.

Named as a tribute to Pan-chieh Chen, whose 1941 "Studien über die ostasiatischen Arten der Pottiaceae" remains a superb treatment of the Chinese representation of the family.

Chenia is a genus of two species found on soil from sea level to nearly 3000 meters elevation in North and South America, Europe, eastern Asia and Australia. This genus is easily distinguished from other Tortula-like species by the combination of the dentate upper leaf margins, large, epapillose upper laminal cells, a thin costa, and red coloration in KOH. The last may have to be determined by examination of the upper laminal cell walls under high magnification because of the dense yellow-green of the chlorophyll overwhelming the coloration of the very thin cell walls. The leaf teeth are each tipped with a single simple papilla. The Andean C. obliqua, unlike the weedy species C. rhizophylla, bears sporophytes. The relationships of Chenia are possibly closest with Gymnostomiella.

New combinations: **Chenia rhizophylla (Sak.) Zand.** (Physcomitrium rhizophyllum Sak., Bot. Mag. Tokyo 52: 469, 1938; Tortula rhizophylla (Sak.) Iwats. & Saito); BUF!, PAC!; illustration in Bull. Nat. Sci. Mus. Tokyo 16: 78, 1973 and elsewhere. **Chenia subobliqua (Williams) Zand.** (Tortula subobliqua Williams, Field Mus. Nat. Hist. Bot. 4(5): 128, 1927, type: Peru, Huariaca, Bryan 353, NY!); illustration: Field Mus. Nat. Hist. Bot. 5: 128, 1927.

Dolotortula Zand., gen. nov.

Folia spathulata, margine angusta cartilaginea e cellulis stereidarum composita, usque in crassitudine 4 cellulas, in vel sub apicem terminanti; epidermis costae dorsalis praesens; cellulae laminales supernae hexagonae vel brevirectangulares, parietibus magnis tenuibus, saepe tenuiter trigonis, epapillosis praeditae; color laminalis in hydroxido kalii rubescens.

Plants in a loose turf, green above, brownish green below. Stems seldom branching, to 1.5 cm in length, transverse section round, central strand present, distinct, sclerodermis and hyalodermis absent; weakly rhizoidiferous. Leaves contorted, appressed when dry, widely spreading and somewhat rosulate when moist, spathulate, 2.5-4.0 mm in length, upper lamina flat, very weakly channeled along the costa, margins weakly recurved below midleaf, entire, with a narrow cartilaginous border of stereid cells, to 4 cells in thickness, ending at or just before apex; apex rounded or emarginate, often bluntly apiculate; costa thin, percurrent or ending up to 4 cells below apex, superficial cells ventrally long-rectangular, dorsally narrowly elongate, costal transverse section round, stereid band weak and round in shape, ventral and dorsal epidermis present, guide cells 2 in 1 layer, hydroid strand present, small; upper laminal cells hexagonal to short-rectangular, large, ca. 22-28 um in width, 1-2:1, walls thin, often weakly trigonous, superficially weakly convex

on both sides; papillae absent; basal cells scarcely differentiated, short-rectangular, ca. 30 um in width, 2-3:1, walls thin. Dioicous. Perichaetia terminal, inner leaves slightly larger than the cauline. Seta 1.0-1.3 cm in length, red-brown, twisted clockwise; theca ca. 1.7-2.0 mm in length, red- or yellow-brown, cylindrical, exothecial cells thin-walled, hexagonal to short-rectangular, 25-35 um in width, stomates at base of theca, phaneropore, annulus of 3-4 rows of vesiculose cells, persistent; peristome teeth ca. 32, filamentous, anastomosing at base, densely spiculose, ca. 1000 um in length, with many articulations, weakly twisted counterclockwise, basal membrane ca. 70 um in height, densely spiculose-papillose. Operculum not seen (blunt-conic e descr.) Calyptra not seen. Spores 10-13 um in diameter, yellowish, weakly papillose. Laminal KOH color reaction red.

Type: Barbula mniifolia Sull.

A rare monotypic genus of scattered distribution, found on soil (often calcareous), at moderate elevations in Mexico, West Indies, Central America and the Andes of South America. Among the three genera with epapillose, very large upper laminal cells (Chenia, Dolotortula and Sagenotortula), Dolotortula is unusual in its strong, multistratose border of stereid cells. Species of Tortula with bordered leaves and large upper laminal cells have somewhat the same appearance as Dolotortula, but these have (broadly) acute leaf apices, uni- to bistratose borders of substereid cells, at least weakly papillose upper laminal cells, and have a yellow laminal KOH reaction It appears unrelated to Sagenotortula because of the Syntrichia-like costal section of the latter genus, while Chenia is probably derived from borderless, serrate-margined species of Tortula or from ancestors of Gymnostomiella. Tortula domingensis, which Crum and Steere indicated was "doubtfully distinct" from D. mniifolia (as Tortula), is actually a Brachymenium (isotype, US!).

New combination: **Dolotortula mniifolia (Sull.) Zand.** (Barbula mniifolia Sull., Proc. Amer. Acad. 5: 277, 1861, type: Cuba, Wright, Musc. Cub. 33, BM!; Tortula mniifolia (Sull.) Mitt.); also BUF!, FH!, TENN!; illustration in Nat. Pfl. ed. 2, 10: 298, 1924.

Ganguleea Zand., gen. nov.

Plantae rosulatae; caules filo centrali carentes; folia in sicco incurva tubulosaque spathulata vel oblongo-elliptica; lamina superna marginam incurvam formans; basis folii perangusta supra insertionem constricta; cellulae laminales supernae ventraliter valde protuberantes, dorsaliter subplanae; papillae absentes; pleurocarpae, perichaetia in ramulo laterali brevi ferentes; theca 8-plicata, dentibus peristomialibus carens; color laminalis in hydroxido kalii lutescens.

Plants in a loose turf, green above, brown to blackish brown below, rosulate. Stems branching rather often, to 0.3 cm in length, transverse section rounded elliptical to triangular, central strand absent, sclerodermis absent or present (variable in same stem), hyalodermis absent; rhizoids sparse. Leaves incurved and tubulose when dry, spreading when moist, spathulate to oblong-elliptical, 1.5-2.0 mm in length, upper lamina broadly channeled, margins incurved, entire; apex broadly rounded and apiculate; base very narrow, constricted above the insertion; costa subpercurrent to short-excurrent as a sharp mucro, costa with lamina inserted ventrally but divergent at 180 degrees, superficial cells rounded quadrate, bulging ventrally, dorsally elongate, 2-4 rows of cells across costa ventrally at midleaf, costal transverse section circular, stereid band strong and circular in shape, ventral and dorsal epidermis present, cells flattened, guide cells 2, flattened-elliptical, in 1 layer, hydroid strand absent; upper laminal cells rounded-quadrate to hexagon-

al, 8-12 um in width, 1:1, lumens usually rounded, walls usually evenly thickened, superficially strongly bulging ventrally, nearly flat dorsally; papillae absent; basal cells differentiated only in a small, triangular, juxtacostal area near the insertion, bulging rectangular, ca. 18 um in width, 2-3:1, walls thin to thickened and trigonous. Autoicous, paroicous, occasionally apparently rhizautoicous. Pleurocarpous. Perichaetia borne on a short lateral branch, inner perichaetiate leaves lanceolate, entire to weakly serrulate, short, to 0.8 mm in length, not sheathing, lower cells short-rectangular to rhomboidal, walls thin. Perigonia borne in clusters just below perichaetia, occasionally terminal on a separate plant. Seta 2.5-5.5 mm in length, brown, twisted clockwise; theca 0.5-0.8 mm in length, brown, often glistening, ovate, macrostomous, with 8 plicae, exothecial cells thin-walled, quadrate to short-rectangular, ca. 18 um in width, 8 rows of thick-walled cells in two ranks each along ridges of plicae, stomates phaneropore, at base of capsule, annulus of 2 rows of thin-walled, weakly vesiculose cells; peristome teeth absent. Operculum long-conic to rostrate, erect, ca. 0.7 mm in length, cells straight. Calyptra long-conic, not cleft, inserted on operculum, smooth to somewhat rough apically with projecting cell walls, ca. 1 mm in length. Spores 10-13 um in diameter, light yellow, essentially smooth. Laminal KOH color reaction yellow.

Type: Merceyopsis angulosa Broth. & Dix.

Named in honor of H. C. Gangulee, whose "Mosses of Eastern India and Adjacent Regions," finished in 1980, is an important and valuable treatment for the mosses of this bryologically rich area.

A rarely collected monotypic genus found on soil over rock in the Himalayas of India and Nepal, and recently collected in a mountainous region of southeastern Brazil (Schäfer-Verwimp 8403, BUF). Like Anoectangium, Molendoa and Pleurochaete, this genus bears its sporophytes laterally on the main stem axis, at the ends of very short branches bearing rather highly modified perichaetial leaves. It is, however, monoicous. There is considerable resemblance to Weisiopsis, reflected in the combination Weisiopsis angulosa (Broth. & Dix.) Hilp., especially in the leaves with narrowed base, colliculate ventral surface, margin incurved, and costal section with a usually very strong and rounded stereid band. Ganguleea may be derived from that genus through loss of the stem central strand, further narrowing of the leaf base, loss of peristome, and development of pleurocarpy.

New combination: **Ganguleea angulosa (Broth. & Dix.) Zand.** (Merceyopsis angulosa Broth. & Dix., J. Bot. 48: 302, 1910, type: India, Sikkim, Decoly & Schaul 1899, H!; Weisiopsis angulosa (Broth. & Dix.) Hilp.); also BM!, BUF!; illustration in Gangulee, Mosses East. India Adj. Reg. 3: 769, 1972.

Hilpertia Zander, gen. nov

Folia ovata vel orbicularia; lamina superna plerumque concava, margine valde revoluta, apice hyalino in area distincta apicali praedita; costa angusta sed apicem versus sensim latior, in aristam excurrens, epidermide dorsaliter carens; cellulae laminales supernae parietibus dorsalibus superficialibus perincrassatis praeditae, apicales rhomboidales vel fusiformes, laeves, marginales amplificatae valde chlorophyllosae; papillae cellulares in folii mediano absentes, plerumque in margine revoluta cavae; color laminalis in hydroxido kalii rubescens.

Plants forming loose cushions, greenish brown above, light brown below. Stems branching irregularly, to 1.0 cm in length, transverse section rounded-pentagonal, central strand distinct, sclerodermis not or weakly differentiated,

hyalodermis absent; rhizoids rare. Leaves crowded, larger above, appressed and tightly spiralled when dry, weakly spreading when moist, ovate to orbicular, 1.3-2.0 mm in length (including awn), upper lamina flat to more usually quite concave, margins strongly revolute (to 2 times), entire or broadly toothed at or near the base of the awn; apex broadly acute, hyaline in an apical patch or triangle; costa narrow but broader above, excurrent as a hyaline awn, superficial cells long-rectangular and smooth on both sides, costal transverse section rounded, stereid band rounded in shape, ventral epidermis present but dorsally absent, guide cells 2 in 1 layer, hydroid strand present; upper laminal cells hexagonal to short-rectangular or rhomboidal, 14-25 um in width, 2-4:1, internal walls thin to thickened and porose, dorsal superficial walls much thickened, weakly convex superficially on both sides, cells of leaf apex rhomboidal to fusiform, smooth, cells of revolute margin enlarged, strongly chlorophyllose; papillae absent on medial cells, usually hollow-papillose on cells of revolute margins; basal cells weakly differentiated, rectangular, ca. 16-18 um in width, 2-3:1, walls thin. Propagula when present (1-)3-4 celled, brown, spherical to elliptical, mostly 30-50 um in length, borne on basal rhizoids. Synoicous, paroicous, autoicous or apparently dioicous but probably rhizautoicous. Perichaetia terminal, inner leaves usually differentiated, long-oval, margins usually little differentiated, to 1.7 mm in length, sheathing, lower cells rectangular, very thin-walled. Perigonia lateral or occasionally terminal on a separate plant. Seta 3.5-4.0 mm in length, yellow-brown, twisted counterclockwise above, clockwise below; theca 1.2-1.5 mm in length, yellow-brown, elliptical, occasionally weakly ventricose, exothecial cells ca. 16-23 um in width, 2-3:1, thin-walled, stomates phaneropore, on capsule neck, annulus of 3 rows of smaller, quadrate, highly vesiculose cells; peristome teeth 32, linear, densely branching-spiculose, 300-700 um in length, with many articulations, twisted counterclockwise about 1/2 turn, basal membrane short, to 45 um in height, papillose-spiculose. Operculum broadly short- to long-conic, 0.4-1.0 mm in length, cells twisted 1/2 turn counterclockwise. Calyptra cucullate, smooth, ca. 2.8 mm in length. Spores 13-16 um in diameter, light brown, indistinctly papillose. Laminal KOH color reaction red.

Type: Tortula scotteri Zand. & Steere.

Named for Friedrich Hilpert, a student of T. Herzog. Hilpert's 1933 publication of his doctoral dissertation "Studien zur Systematik der Trichostomaceen" provided a detailed overview of the genera of Pottiaceae exclusive of Pottioideae.

This is a genus of two species found on soil in the Northwest Territories of Canada and several countries of eastern Europe. The modification of the upper laminal margins of Hilpertia into tubes of photosynthetic tissue is paralleled in species of Pseudocrossidium and to a lesser extent in Tortula revolvens (Schimp.) Roth. Hilpertia has many of the features of species of Acaulon including the ovate (rather concave) leaf shape, thin costa, upper laminal cells often hyaline apically and dorsally thick-walled (as easily seen in section), a hyaline awn, and red KOH color reaction. Hilpertia is easily distinguished from Acaulon by its revolute leaf margins, elongate stems, elongate setae, and peristomate, cylindrical capsules. On the other hand, the leaves of Stegonia latifolia (Schwaegr.) Vent. ex Broth., are in most respects identical morphologically with those of Hilpertia. Hilpertia differs by the elaboration of the leaf margins and development of a red KOH reaction.

New combinations: **Hilpertia scotteri (Zand. & Steere) Zand.** (Tortula scotteri Zand. & Steere, Bryologist 81: 463, 1978, type: Canada, Northwest Territories, Nahanni Natl. Park, Scotter 24114, BUF!); illustration in Bryologist

81: 464, 1978. **Hilpertia velenovskyi (Schiffn.) Zand.** (Tortula velenovskyi Schiffn., Nov. Act. Ac. Leop. Car. 58(7): 480, 1893); FH!; illustration with orig. descr.

Sagenotortula Zand., gen. nov.

Filum caulis centralis praesens, saepe valdum, caulisque centraliter fistulosus; folia in sicco subtorta, late ligulata vel spathulata, marginem planam integram formantia; costa sub 4 cellulas apicis terminales terminans vel percurrens, strato stereidarum subevoluto praedita, tenuiter substereida et reniformis; cellulae supernae laminales hexagonae, permagnae, parietibus tenuibus praeditae, saepe subtrigonae, papillis carentes; propagula e corporibus generationis rubris projectiones superficiales breves dispersos ferentibus composita, in tomento plantarum perigonigenarum prodientia; color laminalis in hydroxido kalii rubescens.

Plants loosely caespitose or turf-forming, green above, greenish brown below. Stems branching occasionally, especially from just below perichaetia, to 2.0 cm in length, transverse section round to elliptical, central strand present, often strong, or stem centrally hollow, sclerodermis absent, hyalodermis absent; stem thickly matted with rhizoids. Leaves appressed, incurved and little contorted when dry, erect to weakly spreading when moist, broadly ligulate to spathulate, 3-5 mm in length, upper lamina flat or very broadly and shallowly channeled, margins plane, occasionally broadly incurved above, entire (occasionally distantly bluntly toothed, especially evident in young leaves); apex broadly acute, occasionally with a broad, blunt apiculus; costa ending ca. 4 cells below apex to percurrent, superficial cells quadrate to hexagonal or short-rectangular ventrally, dorsally rectangular, costal transverse section somewhat rounded, stereid band little developed, weakly substereid and reniform in shape, ventral epidermis present, dorsal epidermis absent, guide cells 2 in 1 layer, hydroid strand present, often large; upper laminal cells hexagonal, occasionally quadrate or short-rectangular, very large, (25-)40-60(-75) in width, 1(-2):1, walls thin, occasionally evenly somewhat thickened, often weakly trigonous, superficially convex on both sides; papillae absent; basal cells differentiated in lower 1/4 of leaf either completely across leaf or just medially, rectangular, ca. 35-60 um in width, 2-4:1, walls thin to somewhat thickened. Red brood bodies borne on tomentum of perigoniate plants, ellip-tical to spherical, 50-65 um in longest dimension, bearing superficially scattered short peg-like projections. Dioicous. Perichaetia terminal, inner leaves slightly larger than the cauline, to 6 mm in length. Perigonia terminal, comparatively large, inner leaves ovate. Seta ca. 2.5 cm in length, red-brown, twisted counterclockwise above, occasionally clockwise below; theca 3-4 mm in length, red-brown, cylindrical, exothecial cells long-rectangular, thin-walled, 20-25 um in width, 3:5-1, stomates at base of theca, phaneropore, annulus of 2-3 rows of vesiculose cells, apparently deciduous in pieces; peristome teeth 32, filamentous, low-spiculose, ca. 1000 um, with many articulations, twisted counterclockwise once, basal membrane to 200 um in height, low-spiculose to crazed. Operculum conic, 1.5-1.7 mm in length, cells twisted counterclockwise. Calyptra cucullate, smooth, ca. 4.5 mm in length. Spores 10-12 um in diameter, tan, essentially smooth. Laminal KOH color reaction red

Type: Tortula quitoensis Tayl. in Hook.

A monotypic genus found on rocks and soil at rather high elevations in Mexico and the Andes of South America. Sagenotortula is distinguished from other genera of Pottiaceae by the unique red brood bodies that have numer-

ous short, narrow, blunt papilla-like projections, and from other genera of Pottieae that have large, epapillose upper laminal cells by the entire, unbordered margins and the extremely large upper laminal cells. The brood bodies were found only on perigoniate plants, being uncolored and transparent when young, and were distributed in the tomentum along the entire length of the stem; rhizoids are occasionally produced apically from the longer superficial projections. The lack of a dorsal costal epidermis indicates that this genus could have been derived from Syntrichia (see key below) through loss of papillae, inflation of the laminal cells, and elaboration of the unique brood body.

New combination: **Sagenotortula quitoensis (Tayl. in Hook.) Zand.** (Tortula quitoensis Tayl. in Hook., London J. Bot. 6: 332, 1847, type: Ecuador, Jameson s.n., NY!); additional specimen at TENN!; illustration in Nat. Pfl. ed. 2, 10: 299, 1924.

Saitoa Zand., gen. nov.

Folia late oblongo-ovata, elliptica vel suborbicularia, lamina superna concava formantia, margine e cellulis crasso-muralibus luminibus subrotundis ornatis in seriebus 15-18 dispositis composita; costa sub 2-3 cellulas apicis terminales terminans, distaliter crassissima, in superficie costali folii distali regionem incrassatam ventaliter protuberantem, eamdem regionem dorsaliter planam, cellulis ducum carens; papillae laminales in area parva laminali juxta costam restrictae; color laminalis in hydroxido kalii saturatim rubescens.

Small terete plants growing in dense turf, deep reddish brown above, reddish tan below. Stems pseudodichotomously branching occasionally, to 4 mm in length, transverse section rounded pentagonal, central strand distinct, sclerodermis absent, hyalodermis absent; sparsely radiculose. Leaves closely appressed when dry, weakly spreading when moist, broadly oblong-obovate, elliptic or suborbicular, 0.5-0.6 mm in length, upper lamina concave and apex therefore somewhat cucullate, margins usually recurved at midleaf and below, crenulate in upper half by projecting cell walls, bordered by ca. 15-18 rows of smooth rhomboidal thick-walled cells with somewhat rounded lumina; apex broadly rounded to weakly emarginate; leaf widest above middle; costa ending 2-3 cells below apex, thickest distally, superficial cells ventrally quadrate to short-rectangular, papillose, dorsally elongate, smooth or papillose, 4-5 rows of cells across costa ventrally at midleaf, ventral surface of upper costa forming a bulging pad of 1 layer of papillose cells, costal transverse section reversed semicircular (dorsally flattened), stereid band present dorsally, strong, ventral epidermis strongly differentiated, of thin-walled, papillose cells, dorsal epidermis absent or of thick-walled bulging cells with larger lumens, guide cells absent, hydroid strand absent; upper laminal cells subquadrate to short-rectangular, 6-10 um in width, 1-2:1, walls thin to thickened, superficially weakly and equally bulging on both sides of lamina; papillae restricted to a small area of the lamina near the costa, small, mostly bifid, hollow or solid, about 4-6 per lumen; basal cells differentiated across the leaf base, quadrate to short-rectangular, ca. 16-18 um in width, 1-2:1, walls thin. Sexual structures and sporophyte unknown. Laminal KOH color reaction deep red.

Type: Globulina peruviana Williams.

Named for Kamezo Saito in recognition of his important contributions to the study of the Pottiaceae, especially his 1975 "Monograph of the Japanese Pottiaceae."

A monotypic genus found on soil over volcanic rock at high elevations

in Peru, Ecuador and Mexico. This genus is set up to contain S. peruviana, which has been recognized in Globulinella for some time, being similar in the concave, ovate to rounded leaf shape and rather thick costa ending before the apex. Saitoa considerably differs, however, in the upper lamina bordered by many rows of rhomboidal, thick-walled cells, upper laminal cells papillose in a medial patch, costa lacking guide cells, and red KOH reaction. There are no immediately apparent close relatives to Saitoa. The presence of a clearly differentiated dorsal costal epidermis in at least some leaves is indication of a lack of relationship with Syntrichia.

New combination: **Saitoa peruviana (Williams) Zand.** (Globulina peruviana Williams, Bull. Torrey Bot. Club 43: 325, 1916, type: Peru, Araranca, Cook & Gilbert 177a, NY!; Globulinella peruviana (Williams) Steere ex Steere & Chapm.); also BUF!, FH! MICH!, TENN!; illustration in Bull. Torrey Bot. Cl. 43: 325, 1916.

Stonea Zander, gen. nov.

Caules perbreves; folia obovata vel brevi-lingulata, plerumque latioria quam longa, laminas supernas late profundeque concavas et margines planas, apices saepe cucullatos facientes; costa percurrens, cellullas superficiales plerumque ventraliter protuberenti-capitulatas, dorsaliter acutim apicem versus papillosas, stratum stereidarum tenuem et in ambitu rotundatum, epidermidem ventralem plerumque valde protuberantem, dorsalem praesentem vel non faciens, saepe in excrescentia magna ventraliter protuberanti rotundata oleacea expansa; papillae laminales dorsaliter juxta costa in apice folii solo praesentes; color laminalis in hydroxido kalii rubescens.

Plants gregarious, mostly buried in soil, green above, reddish-brown below. Stems seldom branching, very short, to 0.3 mm in length, transverse section rounded, central strand absent, sclerodermis absent, hyalodermis absent; lower stem clothed with fine rhizoids. Leaves incurved when dry, weakly spreading when moist, obovate or short-lingulate, occasionally wider than long, short, ca. 0.4-0.5 mm in length, upper lamina broadly and deeply concave, margins plane, entire or dentate at apex; apex usually broadly and often also sharply apiculate, usually cucullate; costa percurrent or occasionally ending 1-2 cells below apex, superficial cells quadrate, papillose, usually bulging-capitulate ventrally, dorsally elongate, sharply papillose near apex dorsally, ca. 3 rows of cells across costa ventrally at midleaf, costal transverse section semicircular to circular, stereid band weak and rounded in shape, ventral epidermis present, often strongly bulging, dorsal epidermis usually present, guide cells 2 in one layer or absent, hydroid strand absent, costa often expanded as a large, ventrally bulging, rounded, oil-rich excrescence nearly as wide as the leaf but this present in only the easily detached uppermost leaves; upper laminal cells quadrate, ca. 13 um in width, 1:1, walls thin, superficially weakly convex on both sides of lamina; laminal papillae present only dorsally at leaf apex near costa, 1-3 per lumen, simple, hollow to solid; basal cells only weakly differentiated, quadrate to short-rectangular, ca. 15 um in width, 1-2:1, walls thin. Apparently dioicous (naked axillary archegonia reported in original description). Sporophytes and androgametophytes unknown. Laminal KOH color reaction red.

Named for Ilma G. Stone, whose treatments of Australian aridland mosses are important contributions to the study of Pottiaceae.

Type: Tortula oleaginosa Stone.

A monotypic genus found on soil or thin soil over limestone in dry areas of southern Australia. Stonea has a swollen, oil-rich lenticular knob on

the ventral surface of the upper costa of the very uppermost leaves on the stem. Leaves farther down on the stem lack this excrescence, but instead have protruding, bottle-shaped, papillose cells much like those on the costa of Crossidium aberrans Holz. & Bartr.; the new genus is entirely red in KOH and has plane margins, characters absent in Crossidium. Stonea has some of the characteristics of Syntrichia; S. caninervis Mitt. has a similar spinose-papillose dorsal surface of the costa, a very small immature habit, and similar oil globules in its upper laminal cells, but Stonea differs by its obovate leaves with plane margins, upper laminal cells smooth except for the extreme upper marginal cells and the tip of the costa, and a dorsal epidermis present in the costa.

New combination: **Stonea oleaginosa (Stone) Zand.** (Tortula oleaginosa Stone, J. Bryol. 10: 117, 1978, type: Australia, Victoria, Murray Vally Hwy, Stone 1552, MELU!); illustration with orig. descr.

Lectotypification of Syntrichia

Study to date supports recognition of the genus Syntrichia Brid., the correct name at the genus level for Tortula sect. Rurales De Not. (Mem. R. Acc. Sc. Torino 40: 286, 1838. Type: Tortula ruralis (Hedw.) Gaetrn., Meyer & Scherb.) as conceived by W. Kramer (Bryoph. Biblioth. 21, 1980). Kramer justifiedly emphasized the taxonomic importance of the dorsally exposed stereid band, it being not covered by parenchymatous or otherwise differentiated epidermal cells. Bridel's genus Syntrichia lacked indication of a type and has not to date been lectotyped. It was meant by Bridel to contain species with a high basal membrane that were previously recognized in Barbula; the actual combinations were made later. Syntrichia originally included as syntypes S. ruralis (Hedw.) Web. & Mohr, S. agraria (Hedw.) Web. & Mohr and S. ericetorum (With) Brid. Of these, Syntrichia ruralis most appropriately fits Bridel's generic description, and I here designate it the lectotype of Syntrichia Brid.: Syntrichia Brid., J. Bot. (Schrader) 1(2): 299, 19 April 1801 (fide Sayre, Dates of Publications Describing Musci, 1801-1821, Troy, New York, 1959). Type: Barbula ruralis Hedw (Syntrichia ruralis (Hedw.) Web. & Mohr), lectotypus nov.

Key to Pottieae

This key distinguishes the seven new genera from other genera with one stereid band (except Neohyophila which occasionally has two) and broad, usually obovate leaves. The key summarizes my studies to date and reflects a strong emphasis on characters of the gametophyte Thus, recognition of sporophyte reduction series in several genera of the Pottieae provides an acceptable way to group taxa by many, distinctive, shared, mostly presumably advanced characters of the gametophyte. For this reason, species with very similar gametophytes but reduced sporophytes may be placed together: e g. Tortula Hedw. must include the generitypes of Desmatodon Brid., Pottia (Reichenb.) Ehrh. ex Fuernr. and Phascum Hedw. Laminal color reaction refers to color of the upper cell walls (examination at high magnification is sometimes necessary) in two percent KOH solution. Formal lists of synonymy and new combinations at the species level appropriate for these species concepts will be made anon with the full generic revision. The key requires sectioning of the leaves; the reader is refered to Taxon 28: 643-644, 1979 and Bryologist 88: 215-220, 1985 for a review of appropriate techniques.

1 Upper laminal cells epapillose; stem lacking a central strand 2
2 Upper laminal cells rectangular to rhombic, occasionally fusiform in apex of leaf, 15-20 um in width, 2(-3):1; propagula often present on leaves; laminal color reaction usually KOH red, rarely yellow Streptopogon
2 Upper laminal cells rounded quadrate to hexagonal or short-rectangular, ca. 8-14 um in width; propagula rare, borne on stalks in leaf axils; laminal color reaction KOH yellow Scopelophila
1 Upper laminal papillae or stem central strand present, or, more usually, both present at once 3
3 Small (to 0.6 cm in height) plants with obovate leaves, upper margins closely crenulate or serrulate; costa thin, ending several cells below the apex; upper laminal cells thin-walled, rhomboidal to short-rectangular, with one or two simple papillae per lumen; propagula often present and relatively large, usually longer than the leaves; lamina K yellow, pink or black Gymnostomiella
3 Not the above combination of characters; propagula much shorter than leaves 4
4 Upper lamina KOH yellow (occasionally brick red locally at leaf base or medially in upper leaf associated with local wall thickening) or rarely orange throughout (if so then hydroid strand absent or smooth hyaline awn present); stereid band rounded, or if semicircular, then consisting of only a few stereid cells; dorsal costal epidermis usually present, usually completely covering the dorsal costal surface 5
5 Cauline leaves lanceolate or ligulate, grooved narrowly and deeply along the costa; perichaetia lateral on main stem, dioicous Anoectangium
5 Not this combination of characters (cauline leaves usually ovate to spathulate, usually shallowly grooved along costa; perichaetia seldom lateral on main stem, or if so then monoicous) 6
6 Upper laminal cells bulging ventrally and nearly flat dorsally (Globulinella may be sought here) 7
7 Stem central strand absent; leaves very strongly constricted at base, 1/3 to 1/4 the leaf width; perichaetia lateral on main axis Ganguleea
7 Stem central strand present; leaves not strongly narrowing basally; perichaetia terminal on main axis 8
8 Leaf basal cells usually sharply differentiated, inflated; costa never with two stereid bands; peristome when present consisting of 16 widely spaced, mostly entire filaments Weisiopsis
8 Leaf basal cells gradually and only somewhat differentiated in size from upper cells; costa occasionally with two stereid bands; peristome of 16 closely spaced teeth cleft in two Neohyophila
6 Upper laminal cells about equally convex on both free sides 9
9 Upper lamina KOH orange; leaf hydroid strand absent; upper laminal marginal cells swollen (ca. 4 rows having larger lumens than the medial cells as seen in section) Crumia
9 Upper lamina KOH yellow; leaf hydroid strand usually present; upper laminal marginal cells not or scarcely different from the medial, or their lumens generally narrowly rectangular and smaller in section than those of the medial cells 10
10 Upper margins broadly incurved; leaf apex cucullate, often deeply so 9

11 Costa with a ventral pad of filaments Aloinella
11 Costa ventral cells merely bulging Globulinella
10 Upper margins usually plane or recurved; leaf apex occasionally somewhat cucullate 12
12 Specialized photosynthetic tissue elaborated as ventral costal filaments or lamellae 13
13 Costa with ventral longitudinal lamellae of 2 or more cells in height Pterygoneurum
13 Costa with a ventral pad of filaments (these occasionally only one cell in height) Crossidium
12 Specialized photosynthetic tissue absent or represented by a ventral costal bulging pad of fused cells 14
14 Leaves very broadly ovate or nearly circular (usually as broad as long, dorsal superficial cell walls thicker (as seen in section) than those of the ventral; costa thin, ending before the apex or excurrent as a smooth hyaline awn from a triangular hyaline leaf apex Stegonia
14 Leaves usually ovate to elliptical or spathulate, superficial cell walls equally thick; costa usually excurrent as a short, greenish yellow, weakly serrulate mucro or a hyaline awn; apex not of differentiated hyaline laminal cells Tortula

4 Upper lamina KOH brick red, rarely nearly colorless or orange (if orange then with a strong laminal border); stereid band crescent-shaped, semicircular or less commonly rounded; dorsal costal epidermis variously present or absent 15
15 Upper laminal cells large (most at least 18 um in width, in one species to 50 um in diameter), not papillose, weakly trigonous; costa very weak and often ending below the apex, stereid band much reduced or absent 16
16 Leaves with a multistratose border of stereid cells Dolotortula
16 Leaves unbordered 17
17 Leaves entire, upper laminal cells 35-50 um in diameter Sagenotortula
17 Leaves sharply dentate above, upper laminal cells 18-22 um in diameter Chenia
15 Upper laminal cells usually small or moderately enlarged (9-18 um in width), papillose with bi- to multifid papillae, not trigonous or if so then costa strong; costa usually well developed, often percurrent or excurrent, stereid band distinct, consisting of several stereid cells (or if costa thin then costa excurrent or upper leaf margins recurved) 18
18 Upper ventral costal surface of some upper leaves bearing a large, oil-rich excrescence (but cf. Phascopsis brood leaves) nearly the width of the leaf Stonea
18 Upper ventral costal surface lacking outgrowths or these consisting of chlorophyll-rich filaments 19
19 Upper laminal cells consisting of mostly a very broad border of smooth, thick-walled and rhomboidal cells, with a small triangular region (1-4 rows) of hollow-papillose, relatively thin-walled and subquadrate cells found medially next to the costa Saitoa
19 Upper laminal cells relatively homogeneous except occasionally with a narrow border of differentiated cells 20

20 Leaves plane throughout; upper laminal cells laxly rectangular, often 2:1 thin-walled, usually with many (ca. 6) small bifid papillae, superficial walls flat to very weakly convex (best viewed in section); dorsal costal epidermis often not clearly differentiated 21

21 Leaves without a differentiated border; stereid band "wrapping around" the hydroid strand in some leaves, guide cells often apparently absent Phascopsis

21 Leaves with a distinct marginal or intramarginal border of short-rectangular to elongate cells; stereid band dorsal to hydroid strand when present, guide cells present Hennediella

20 Leaf margins plane or more often recurved below, if bordered then usually by thicker walled isodiametric cells; upper laminal cells subquadrate to hexagonal, mostly 1:1, walls firm, thin to somewhat thickened or collenchymatous, usually with 1-4 bifid or multiplex papillae, superficial walls usually strongly convex; dorsal costal epidermis often clearly differentiated 22

22 Dorsal costal epidermis (best viewed in section) of enlarged cells or thin-walled cells present, usually completely covering the stereid band 23

23 Photosynthetic filaments present on the broad costa and the medially bistratose lamina Aloina

23 Photosynthetic filaments absent, lamina unistratose 24

24 Upper laminal margins deeply revolute, marginal cells enlarged, thin-walled and highly chlorophyllose Hilpertia

24 Upper laminal margins plane to recurved, marginal cells similar to the medial cells or modified as a border of rectangular, rhomboidal or thick-walled cells 25

25 Stems very short, leaves deeply concave and short-ovate, capsule spherical or very short-ovoid, cleistocarpous and lacking an apiculus, seta usually very short and very thin, calyptra smooth Acaulon

25 Stems elongate, leaves ovate-lanceolate, elliptical or lanceloate, capsule ovate to cylindrical, cleistocarpous and apiculate or stegocarpous, seta short and stout or elongate, calyptra often roughened with simple, hemispherical papillae Microbryum

22 Dorsal epidermis absent, dorsal superficial cells of costa (best viewed in section) not being distinctly different from the internal stereid cells 26

26 Upper laminal papillae one over each lumen, simple or forking; upper laminal cells collenchymatous; clavate to raspberry-like propagula often present on lamina or costa Calyptopogon

26 Upper laminal papillae bi- to multifid; upper laminal cells with thin or evenly thickened cell walls or occasionally collenchymatous; propagula seldom present 27

27 Stereid band usually semicircular; seta short (less than 3 mm in length); annulus bulging-reflexed; propagula when present borne on leaves; perichaetial leaves sometimes very strongly differentiated Willia

27 Stereid band usually crescent-shaped; seta elongate (more than 3.5 mm in length); annular cells generally vesiculose, not bulging-reflexed; propagula rare, axillary and leaf-like, consisting of fragile leaf apices or very rarely borne on lamina; perichaetial leaves usually not or only weakly differentiated Syntrichia

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