

## LEUCODONTACEAE

(Brian J. O'Shea)

**Plants** medium sized to somewhat robust, forming tufts or mats, dark green to yellowish-brown or golden. **Primary stems** creeping; leaves small, scale-like. **Secondary stems** spreading to ascending or erect, curled or not; in cross-section outer few rows of cells small, thick-walled, inner cells larger, firm- or thin-walled, central strand absent or present; pseudoparaphyllia foliose when present. **Leaves** appressed to erect when dry, erect-spreading to spreading when wet, ovate-short lanceolate to  $\pm$  narrowly lanceolate, smooth or distinctly plicate, broadly concave, apex gradually to abruptly short acuminate; margins plane to weakly reflexed at base or occasionally along midleaf margin, entire or weakly serrulate to dentate at apex; costa absent, short and forked or long often with branches; laminal cells smooth, thick-walled, upper ones oblong-linear; median cells oblong-linear or rhomboidal or oval, porose or not; inner basal cells elongate; alar cells few to numerous, subquadrate to irregularly short rectangular and often oblate. **Dioicous or autoicous.** **Perichaetia** lateral, inner leaves elongate, involute, oblong-lanceolate, acute or acuminate. **Seta** erect, short to more commonly elongate, smooth, twisted to the left. **Capsule** immersed to exserted, erect and symmetric to slightly curved and asymmetric, ovoid to cylindrical, neck short, distinct. **Operculum** rostrate, erect or oblique. **Peristome** double or single, exostome absent or teeth 16, smooth to papillose, endostome rudimentary or absent. **Calyptra** cucullate, naked to densely hairy. **Spores** spherical or ellipsoid, uni- or multicellular, smooth to faintly papillose.

DISCUSSION. The Leucodontaceae contain possibly six or eight genera and up to 40 species distributed mostly in temperate regions of the Northern Hemisphere, with five genera and seven or eight species in sub-Saharan Africa. Definition and naturalness of the family is currently in question. Akiyama (1994) has presented the most recent discussion of the problems in the classification of the Leucodontaceae, tentatively recognising eight genera.

LITERATURE. **Akiyama, H. 1994.** Suggestions for the delimitation of the Leucodontaceae and the infrageneric classification of the genus *Leucodon*. Journal of the Hattori Botanical Laboratory 76:1-12. **Manuel, M. G. 1974 [1975].** A revised classification of the Leucodontaceae and a revision of the subfamily Alsiioideae. The Bryologist 77: 531-550.

1. Costa strong, single, c 2/3 leaf length, usually with several (sometimes long) branches from near the costa base, leaves strongly toothed near the apex ..... *Antitrichia*
1. Costa absent or not as above, leaves not toothed ..... 2
2. Costa absent ..... 3
2. Costa present ..... 4
3. Leaves smooth; alar cells little differentiated, few; capsules erect, symmetric ... *Felipponea*
3. Leaves weakly to rather strongly plicate; alar cells differentiated, rather numerous; capsule slightly curved and asymmetric ..... *Leucodon*
4. Costa single; stems and branches rigidly straight when dry ..... *Forsstroemia*
4. Costa split into 2-3(-4) branches; stem and branches curved when dry ..... *Pterogonium*

### **Antitrichia** Brid.(Fig. XX)

A genus of 3 species, only *A. kilimandscharica* Broth. recognised here from sub-Saharan Africa, occurring on the higher mountains of central and east tropical Africa.

**Plants** large, rigid, often in large mats, green through yellow-green to (in older parts) brown green, somewhat glossy when dry. **Stems** often distinctly reddish-brown; primary stems creeping, stoloniform; secondary stems irregularly pinnate, no central strand, cortex of 4-6 layers of incrassate cells; pseudoparaphyllia foliose. **Leaves** smaller and narrower on primary stems, on secondary stems erecto-patent to patent, base ovate to widely-ovate, gradually narrowed to an acuminate apex, plicate; costa single, strong, wide at base, ending in

upper third of leaf, often with several short branches from the base and sometimes along the length; margin usually recurved apart from at the apex, more or less denticulate throughout, more strongly towards the apex; laminal cells smooth, linear, about 6-12:1, slightly flexuose, incrassate, slightly porose, basal cells more strongly incrassate and porose; alar cells quadrate, short-rectangular to rhomboidal, strongly thickened, forming strong group, decurrent and extending up along leaf margin. **Dioicous. Perichaetial leaves** long and sheathing, abruptly subulate, without costa. **Seta** flexuose or arcuate. **Capsule** inclined, ovoid-cylindric. **Spores** 25-35  $\mu\text{m}$ .

**HABITAT.** Trees and rocks in mountainous areas, in forests and more open areas above the forest, 2450--4300 m altitude.

**DISCUSSION.** The genus is characterized by the robust habit and the leaves with a branched nerve, strong alar group of small incrassate cells and strong toothing. De Sloover (1976) reviewed the differences between *A. kilimandscharica* and *A. curtispindula*, and concluded that *A. kilimandscharica* was a synonym of *A. curtispindula*. Frahm (1993) identified two more characters, including a spore difference, that seemed to justify retaining *A. kilimandscharica* as a good species. *A. curtispindula* is known from North America, Europe and North Africa (including Canary and Madeira islands), but all tropical mountain specimens seem to belong to *A. kilimandscharica*. The leaves in the African plant are less strongly plicate, the cells are narrower (9--12:1 vs. 6--9:1) and much less thickened, the costa is less branched and the apical margin lacks the prominent, often recurved teeth.

**LITERATURE.** De Sloover, J.L., 1976. Note de bryologie africaine VII. *Pseudephemerum*, *Bryohumberia*, *Eucladium*, *Streptopogon*, *Ptychomitrium*, *Rhachithecium*, *Antitrichia*, *Pterogonium*, *Lindigia*, *Distichophyllum*. Bulletin du Jardin National de Belgique 46: 427-447. Frahm, J.-P. 1993. Taxonomic Results of the BRYOTROP Expedition to Zaire and Rwanda. 17. Andreaeaceae, Bruchiaceae, Dicranaceae, Rhizogoniaceae, Bartramiaceae, Rhacocarpaceae, Hedwigiaceae, Cryphaeaceae, Leucodontaceae. Tropical Bryology 8: 153-169..

### **Felipponea** Broth. (Fig. XX)

A genus of four species, only one of which, *F. assimilis* (Müll. Hal.) O'Shea, is known from Africa. In Africa it has traditionally been called *Leucodon assimilis* or *L. maritimus*, and is recorded from eastern and southern Africa, including Réunion and Madagascar. It also occurs in southeast Brazil, Bolivia and Uruguay.

**Plants** medium sized, forming mats, dark green. **Stems** creeping, to 5 cm long, with leaves scale-like. **Secondary stems** and branches spreading to ascending, julaceous, irregularly pinnately branched; in cross-section outer 2-4 rows of cells small, thick-walled, inner cells large, thin-walled, central strand absent. **Leaves** crowded, appressed with apices spreading when dry, wide-spreading when wet, broadly to narrowly ovate or ovate-oval, to 1.5 mm long, smooth, apex rather abruptly short acuminate or cuspidate; margins plane, entire or apex weakly dentate; cells thick-walled; apical cells oblong-linear; median cells oblong-rhomboidal to -oval; basal cells linear, porose, golden yellow; alar region weakly differentiated, cells oblate oblong-oval. **Perichaetial** leaves sheathing, to ca. 1/2 seta length, oblong-lanceolate, to 3 mm long, apex acute, ecostate, upper laminal cells linear, weakly porose, lower and basal cells rectangular. **Seta** to 4.5 mm long, twisted. **Capsule** erect, urn ovoid-cylindrical, to 1.8 mm long, symmetric, mouth somewhat constricted when dry; exothecial cells thick-walled; annulus absent. **Operculum** long rostrate. **Peristome** double, whitish, exostome teeth 16, irregular, lanceolate, papillose, partly split; endostome reduced to basal membrane. **Calyptra** cucullate, smooth and naked. **Spores** rounded, granulate, 25--30  $\mu\text{m}$ .

**HABITAT.** On rocks and trees, often associated with streams; in open forests and meadows, at elevations from 150-2300 m.

**DISCUSSION.** The genus is characterized by julaceous branches, smooth, broadly to narrowly ovate or ovate-oval leaves with abruptly acuminate or cuspidate apices, few alar

cells, and symmetric, erect capsules. It differs from *Leucodon* in being smaller, with a different growth form, with non-plicate leaves and the alar cells less-well differentiated.

LITERATURE. **Akiyama, H. 1988.** Rearrangement of two species of *Leucodon* (Leucodontaceae, Musci) with a note on *Felipponea*. Journal of Japanese Botany 63: 265-272. [general review of genus]. **Magill, R.E. & van Rooy, J. 1998.** - see general ref. [illustration, description (as *L. assimilis*)]. **O'Shea, B.J. 2000.** The correct name for African '*Leucodon maritimus*'. Journal of Bryology (in press)

#### **Forsstroemia** Lindb. (Fig. XX)

One species is present in Africa, *F. producta* (Hornsch.) Paris, which is found from Ethiopia southwards in East Africa down to southern Africa. This taxon is also found in N, C and S America, Australia, Himalayas, Korea and China.

**Plants** medium sized, forming tufts. **Primary stems** long, creeping; rhizoids clustered beneath. **Secondary stems** erect or curved, irregularly pinnately branched; in cross-section outer 3-5 rows of cells small, thick-walled; paraphyllia absent; pseudoparaphyllia foliose, narrowly lanceolate. **Stem leaves** crowded, erect to appressed when dry, erect-spreading to spreading when wet, ovate to ovate-short lanceolate, 1--3 mm long, concave, apex apiculate to acuminate, often twisted; margins plane to partially recurved on one or both sides mostly below midleaf, entire to serrulate distally; costa single or mixed with short and forked costae, 1/2--3/4 lamina length, occasionally spurred; apical cells in center of acumen oblong-flexuose or not; median cells oval to elliptic; basal cells weakly porose; alar cells quadrate to subquadrate, extending along margin to ca. 1/3 leaf length. **Propagula** absent. **Branch leaves** similar, smaller, complanate or not when dry. **Autoicous**, (gonioautoicous), rarely synoicous or polyoicous. **Perichaetial** leaves lanceolate, 2--4 mm long. **Seta** relatively short, 0.5--4.5 mm long, smooth, twisted. **Capsule** immersed to exserted, cylindrical, 0.8--2.3 mm long; stomata absent; annulus absent. **Operculum** conic-rostrate, erect or oblique. **Peristome** set below mouth, double or single, exostome teeth smooth and faintly papillose to granulose, occasionally perforate or cribose distally; endostome absent or rudimentary, basal membrane and cilia absent, segments fragmentary, adhering to exostome or not. **Calyptra** sparsely to rather densely hairy. **Spores** spherical, smooth to finely papillose.

HABITAT. Epiphytic on tree trunks or branches, occasionally on rocks or logs; in subtropical and montane forests, but also on roadside trees, 100--2600 m.

DISCUSSION. The genus is characterised by concave, ovate to short ovate-lanceolate leaves, often twisted, apiculate or acuminate apex, entire to serrulate distal leaf margins, single or mixed short and forked, occasionally spurred, costa, thick-walled, oval to oblong median cells, monoicous sexual condition, shortly exserted, cylindrical capsules, double or single peristome, with exostome smooth and faintly papillose or granulose, endostome segments fragmentary or absent, and absence of a basal membrane and cilia. *Forsstroemia producta* is often quite distinctive in the field, with rather rigid, branched, secondary stems arising erect from the substrate, usually with several visible, exserted sporophytes. The leaves are quite similar to those of *Cryphaea*, but that genus has quite different sporophytes (usually present) with immersed capsules in numerous perichaetia attached to the stem.

LITERATURE. **Enroth, J. 1992.** - see family ref. [synonymy, discussion]. **Magill, R.E. 1998.** - see general ref. [description, illustration]. **Stark, L. R. 1987.** A taxonomic monograph of *Forsstroemia* Lindb. (Bryopsida: Leptodontaceae). Journal of the Hattori Botanical Laboratory 63: 133-218 [keys, illustrations, maps].

#### **Leucodon** Schwaegr.(Fig. XX)

Six species recorded for Africa, although the genus is in need of revision; a genus containing nearly 40 species of mostly temperate regions, extending into the montane tropics.

**Plants** medium sized to rather robust, forming rather stiff tufts, green or yellowish-brown to golden. **Primary stems** mostly short, creeping; leaves ovate and abruptly narrowly

acuminate, some apices piliferous. **Secondary stems** suberect to erect, often curled, julaceous or not when dry, 4--10 cm long; in cross-section outer 3-4 rows of cells small, thick-walled, reddish-orange, inner cells larger, firm-walled, central strand absent or present; pseudoparaphyllia foliose. **Leaves** appressed to erect, erect-spreading to spreading when wet, ovate to ovate-lanceolate or  $\pm$  narrowly lanceolate, 1.5--3.5 mm long, distinctly plicate, apex gradually to rather abruptly short acuminate; margins plane to reflexed at base or occasionally along midleaf margin, entire or weakly serrulate at apex; upper and median cells oblong-linear or -rhomboidal, thick-walled, usually porose; inner basal cells elongate; alar region differentiated, cells subquadrate to irregularly short rectangular and often oblate thick-walled; insertion cells golden-red. **Perichaetial** leaves ending below or exceeding the capsule, inner leaves involute, oblong-lanceolate, to 4.5 mm long, acuminate. **Seta** elongate, to 8 mm long, twisted to the left. **Capsule** exserted, suberect to erect, urn ovoid-cylindrical, ca. 1.0--3.5 mm long, puckered at mouth, neck short, distinct. **Operculum** short to long rostrate. **Peristome** with exostome papillose, entire or somewhat perforate; endostome rudimentary or absent. **Calyptra** smooth above, somewhat plicate at base. **Spores** spherical and unicellular or ellipsoid and multicellular, smooth to faintly papillose

HABITAT. Epiphytic on tree trunks and branches, logs and occasionally on rocks; montane forests, 940--3400 m.

DISCUSSION. The genus is distinguished by erect to curled stems and branches, weakly to strongly plicate leaves, well differentiated alar cells, slightly curved and asymmetric capsules, and peristome double or single, papillose exostome, endostome rudimentary or absent. No treatment including the African species exists.

### **Pterogonium** Sw.(Fig. XX)

A genus of 2 species, one known only from Brazil, the other (*Pterogonium gracile* (Hedw.) Sm.) being wide spread in North America, Europe, SW Asia and North Africa, as well as sub-Saharan Africa. There are a number of varieties of *P. gracile* described, of which two occur in Africa.

**Plants** small to medium sized, often in large mats, green or brownish. **Primary stems** creeping. **Secondary stems** sub-dendroid, curved strongly downwards, sometimes extending into flagelloid shoots; central strand present with a cortex of 2-6 rows of thick-walled cells, outer cortical cells smaller; paraphyllia and pseudoparaphyllia absent, axillary hairs present. **Stem leaves** of primary stems small, ovate-triangular; those of secondary stems erect-patent to patent, sometimes spreading, when dry erect and imbricate, broadly ovate-acuminate, concave; costa ill-defined, split into several branches from near base, ending half way along leaf, or below; margin plane, entire at base, but increasingly denticulate to dentate towards apex; mid-leaf cells elongate (ca. 1:4), rhomboid to linear, thick-walled; upper cells shorter, often strongly prorate on dorsal surface; basal cells irregularly quadrate to transversely rectangular, more elongate near costa, very thick-walled and porose; alar cells in well marked group extending up leaf margin up to half the leaf length, short-rectangular at base, rounded-quadrate, rectangular or transverse-rectangular above. **Branch leaves** more rounded, and sometimes obtuse to rounded at apex rather than acute. **Dioicous. Perichaetial leaves** long-sheathing, with single costa. **Capsule** exserted, ellipsoidal. **Peristome** double; exostome teeth papillose-striate below; endostome segments short above basal membrane, cilia absent. **Operculum** conical. **Calyptra** cucullate, with a few hairs. **Spores** small, 14-20 $\mu$ m

HABITAT. Growing most usually on tree trunks and branches, but also on rocks, in gardens and roadsides as well areas of dry montane evergreen forest, 1200--3300 m.

DISCUSSION. Rarely fertile, but when sporophytes are produced they are usually in abundance. Usually recognised by its distinctive habit with the curved, narrowing branches of the secondary stems pointing in the same direction.

LITERATURE. **Magill, R.E. & van Rooy, J. 1998.** - see general ref. [illustration, description].

