



Field key

to commoner and/or distinctive mosses and liverworts

This key will not provide you with infallible identifications of every moss and liverwort you find. There are three reasons for this:

- the key does not include every species (and indeed, neither does the main body of the field guide). The key covers almost all of those likely to be encountered during your first year or so of bryology, plus a few distinctive but uncommon species;
- the key does not include every form of each species (sometimes a form with curved leaves is diagnostic of a species, but other forms with straight leaves are unidentifiable without a microscope);
- many bryophytes can only be confidently identified to species level by examining microscopic features, and for these species you will have to also refer to a moss Flora or a liverwort Flora (see p. 3).

You must also carefully read the account of the species that you think you have keyed to (as well as those of 'similar species') before deciding whether you have correctly identified the bryophyte you have found.

■ *Note on using the key*

Choose which of the paired sentences best fits your specimen and follow the number at the end of the line to the next pair. Drawings to illustrate some of the sentences are provided, with the labels (a) and (b) indicating the first and second options, respectively. The small numbers in parentheses underneath the main numbers are provided to assist you in going back through the key.

■ *Dissecting mosses in the field*

Some features of mosses that the field key refers to are difficult to see on intact shoots; for example, the relative width of the nerve at the base of the leaf, or the colour and extent of any specialized cells in the basal angles of the leaf; you may also need to measure the size of a leaf. In *Sphagnum*, too, you will need to determine the difference between the spreading and hanging branches and the shape, relative size and orientation of stem leaves, all of which may be difficult with an intact shoot. In these circumstances you may wish to dissect your specimen. You do not need special equipment for this; just use your fingers and thumbs.

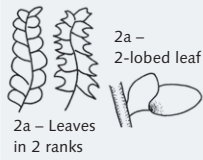
■ *Removing moss leaves for examination*

Choose a typical shoot and with its tip towards you and the base pointing away from you, hold it against the tip joint of your index finger with your thumb. Using the corner of the nail of your other thumb, scrape down the stem away from you. This usually strips some leaves from the stem. Transfer these leaves to the scale in the margin of one of the following pages, and examine and measure them using your hand lens.

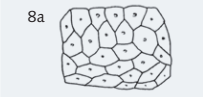
■ *Sporophyte*

This key uses vegetative features as much as possible, but many mosses are most readily identified by characters of their capsules and setae. In some cases, such as *Ditrichum heteromallum* vs. *Dicranella heteromalla* or *Orthotrichum anomalum* vs. *O. cupulatum*, identification is only possible with fertile material. Non-fertile plants may therefore have to remain unidentified.

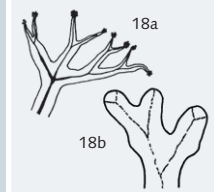
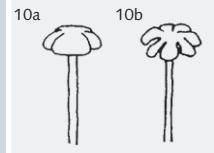
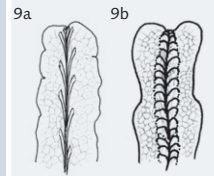
Key to Groups



Thallose liverworts (& hornworts)



- 1 ■ Plant without distinct leaves ■ **Thallose liverworts (5, p. 22) & ■ Hornworts**
 - Plant with distinct leaves 2
 - 2 ■ Leaves arranged either strictly in 2 ranks or in 3 ranks (one on each side of the stem and one in mid-ventral line); the leaves most commonly round or 2-lobed, without nerves (sometimes leaves are so deeply divided as to appear 4- or 5-ranked) ■ **Leafy liverworts (24, p. 24)**
 - Leaves not arranged strictly in ranks (except in *Fissidens* and *Distichium*, which have nerved leaves, and *Schistostega*, which has a shining green protonema); the leaves never 2-lobed, most often tapering to an acute or rounded tip, with or without nerves. 3
 - 3 ■ Plants consisting of numerous upright stems on which branches are in groups arranged spirally down the stem; all grow in bogs or wet ground, and look pale when dry, but are vivid green, orange-brown or purple-red when moist, and hold water like a sponge ■ ***Sphagnum* (p. 61)**
 - Plants never showing the regular, whorled branching of *Sphagnum*; habits and habitats various. 4
 - 4 ■ Separate, upright or ascending shoots which are simple, forked, or with a few short lateral branches; leaves very seldom like thin, glossy scales; seta arising from tip of shoots (except in some species of *Fissidens*, *Racomitrium*, etc.). ■ **Acrocarpous mosses (78, p. 30)**
 - Mat-like growth of much-branched stems, which are irregularly intertwined and most often prostrate or arched; branching most often irregular or pinnate (occasionally growth is upright from a horizontal stolon, branched above to give plant a miniature tree habit, e.g. *Climacium*); leaves most often like thin, glossy scales; seta not arising from tip of stems. ■ **Pleurocarpous mosses (285, p. 50)**
- The acrocarp/pleurocarp split may appear difficult at first. Looking at the gallery of images on pp. 9–18 may help.*
- 5 ■ **Thallose liverworts (& hornworts)**
 - Thallos with gemmae in very obvious receptacles. 6
 - Thallos without gemmae in receptacles 8
 - 6 ■ Gemmae visible in open-topped receptacles; no gemmae on thallus tips; upper surface of thallus with raised pores 7
 - Gemmae hidden in receptacles like flasks with a long neck; thallus tips with star-shaped gemmae on the surface; upper surface of thallus without raised pores. ***Blasia pusilla* (p. 240)**
 - 7 ■ Gemmae in cup-shaped receptacles. ***Marchantia polymorpha* (p. 258)**
 - Gemmae in crescent-shaped receptacles ***Lunularia cruciata* (p. 252)**
 - 8 ■ Upper surface of thallus with polygonal markings; a more or less raised pore in the centre of each polygon 9
 - Upper surface of thallus without such markings and pores. 11



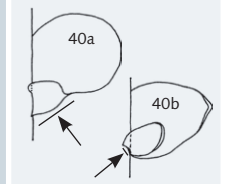
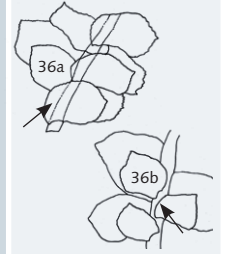
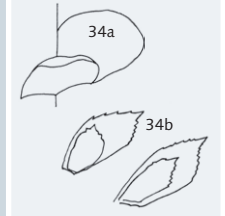
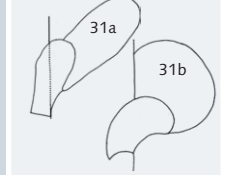
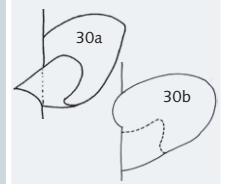
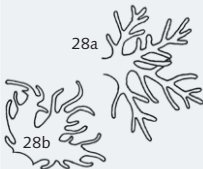
- 9 ■ Thalli usually >1 cm wide; plant strongly scented; pores on upper surface easily visible to naked eye; scales on lower surface not overlapping each other ***Conocephalum* spp. (p. 255)**
- Thalli always <1 cm wide; plant scentless; pores on upper surface hardly visible to naked eye; scales on lower surface overlapping one another 10
- 10 ■ Diamond-shaped markings prominent; thallus tastes peppery; young female heads dull green and 4-lobed. ***Preissia quadrata* (p. 257)**
- Diamond-shaped markings very faint; thallus not peppery to taste; young female heads bright green and with 5–7 lobes ***Reboulia hemisphaerica* (p. 256)**
- 11 ■ Plants growing in pale green rosettes on bare soil, or floating in pools 12
- Plants deep or vivid green; habit various 15
- 12 ■ Upper surface of thallus with round-topped cells and a spongy appearance; on wet mud. ***Riccia cavernosa* (p. 263)**
- Upper surface of thallus with flat-topped cells, or some round-topped cells, not appearing spongy 13
- 13 ■ Thallus narrow, forming mats of Y-shaped plants; either floating or on periodically flooded mud ***Riccia fluitans* (p. 261)**
- Thallus with sort, wide branches, plants ±forming rosettes; on soil 14
- 14 ■ V-shaped groove in upper surface of thallus; thallus edges curved up; clear margin of long, narrow cells along sides of thallus (hand lens) ***Riccia sorocarpa* (p. 266)**
- Wide, shallow groove in upper surface of thallus; thallus edges curved down; no clear margin along sides of thallus (hand lens) .. ***Riccia glauca* (p. 267)**
- 15 ■ Thallus <2 mm wide (check in case of branches of *Pellia endiviifolia*, p. 237). 16
- Thallus 3 mm wide or more 19
- 16 ■ Midrib strongly differentiated from much thinner margins of thallus; growing on trees or rocks 17
- Midrib lacking; growing in marshes, on wet soil, etc ***Riccardia* spp. (pp. 243–244)**
- 17 ■ Entire plant covered with short hairs, making it look furry ***Apometzgeria pubescens* (p. 249)**
- Hairs restricted to margins and underside of plant 18
- 18 ■ Narrow shoot tip with abundant gemmae; tip sticking away from substrate ***Metzgeria fruticulosa*/M. *temperata* (p. 245)**
- Shoot tip usually without gemmae (occasionally a few); tip not narrower than rest of thallus, not sticking away from substrate ***Metzgeria furcata* (p. 246)**
- 19 ■ Midrib well-defined (obvious when viewed from underside of thallus) ... 20
- Midrib not well-defined. 23

- 20 ■ Thallus with narrow, forking branches at the tip *Pellia endiviifolia* (p. 237)
- (19) ■ Thallus without forking branches at the tip 21
- 21 ■ Plant monoicous (female part in a flap on upper side of thallus; male parts in small volcano-like hollows on same thallus; non-fertile plants should be recorded as *Pellia* sp.) *Pellia epiphylla* (p. 235)
- Plant dioicous (female part in a short tube on upper side of thallus; male parts in small volcano-like hollows on separate thallus; non-fertile plants should be recorded as *Pellia* sp.) 22
- 22 ■ Female plants with tubes that have fringed mouths
- (21) *Pellia endiviifolia* (p. 237)
- Female plants with tubes that have mouths which are slightly wavy *Pellia neesiana* (p. 236)
- 23 ■ Plants vivid mid-green, with a greasy appearance; thalli parallel-sided; margins curved upwards; fertile parts on thallus sides; capsules egg-shaped, held on a colourless seta *Aneura pinguis* (p. 241)
- Plant forming dark green rosettes; margins not curved upwards; fertile parts in pits on upper surface; capsules long, horn-like and green *Anthoceros* spp. (p. 272)/*Phaeoceros* spp. (p. 273)



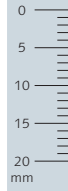
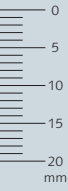
Leafy liverworts

- 24 ■ Leaves divided into 2 unequal lobes, the smaller one lying more or less flat on or under the larger one, thus sometimes giving impression that leaves are in 4 ranks 30
- (2) ■ Leaves not divided into 2 unequal lobes, may be 2-toothed 25
- 25 ■ Leaves irregular, wavy, not distinctly separated from each other or from the stem; appearance like a small lettuce 26
- (24) ■ Leaves in regular rows and quite distinct from stem 27
- 26 ■ Plant pale or dark green; rhizoids purple; on soil (only identifiable to species using spores – collect ripe, black capsules)
- (25) *Fossombronina* spp. (pp. 228–233)
- Plant bright green; rhizoids pale; in dune slacks *Petalophyllum ralfsii* (p. 234)
- 27 ■ Leaves split into many finely divided parts, sometimes appearing almost furry 28
- (25) ■ Leaves not finely divided; may have toothed or entire margins 29
- 28 ■ Plant forming strikingly pale whitish-green patches, with bi- or tripinnately branched shoots 5–12 cm long *Trichocolea tomentella* (p. 84)
- (27) ■ Plant reddish-brown (or yellow, orange, or olive-green), with once pinnate to bipinnate shoots; leaf lobes fringed with long teeth . . . *Ptilidium ciliare* (p. 204)
- 29 ■ Leaves 2-, 3-, or 4-cleft, more or less symmetrical 45 (p. 26)
- (27) ■ Leaves simple and rounded, the margins either entire or with numerous, minute teeth 65 (p. 28)



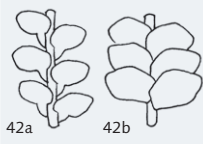
Liverworts with 2 unequal lobes to each leaf

- 30 ■ Smaller lobe lying on top of larger lobe, distinct when plant *in situ* 31
- (24) ■ Smaller lobe under larger lobe, not visible when plant *in situ* 38
- 31 ■ Each leaf divided to near base into 2 narrow oblong segments; very common on acidic banks, rocks, etc. *Diplophyllum albicans* (p. 166)
- (30) ■ Each leaf divided to about 1/3 or less, the segments round or nearly so, not narrowly oblong; habitats various 32
- 32 ■ Smaller lobe only marginally smaller than larger one
- (31) *Scapania compacta* (p. 168)
- Smaller lobe <3/4 of the size of the larger one 33
- 33 ■ Shoot tip bearing conspicuous clusters of red or brown gemmae 34
- (32) ■ Gemmae green (if present) 35
- 34 ■ Leaf lobes rounded or sometimes pointed, not tapering to a point; gemmae brown *Scapania nemorea* (p. 172)
- (33) ■ Leaf lobes tapering to a sharp point; gemmae bright red *Scapania umbrosa* (p. 171)
- 35 ■ Larger leaf lobe with base running down stem (hand lens, view from behind); smaller leaf lobe with base not running down stem *Scapania undulata* (p. 175)
- (33) ■ Either both leaf lobes have bases running down the stem, or neither does 36
- 36 ■ Smaller leaf lobe crossing beyond the stem by a long way 37
- (35) ■ Smaller leaf lobe not crossing the stem *Scapania irrigua* (p. 173)
- 37 ■ Tiny teeth visible at base of smaller lobe (20 hand lens), just above junction with stem; acid-lover, typical of wooded valleys *Scapania gracilis* (p. 180)
- (36) ■ No teeth at base of smaller lobe; lime-lover, typical of humid limestone or lime-rich sandstone *Scapania aspera* (p. 179)
- 38 ■ Colonies composed of red/purple, cylindrical worm-like shoots
- (30) *Pleurozia purpurea* (p. 201)
- Shoots not cylindrical and worm-like; usually tightly pressed to a substrate 39
- 39 ■ Shoots forming black patches, tipped yellowish-green, on limestone or lime-rich rock *Marchesinia mackaii* (p. 217)
- (38) ■ Shoots not black 40
- 40 ■ Plants yellowish-green; leaves with basal part folded over underneath, but without lobule 41
- (39) ■ Plants dark green, brownish, reddish, etc.; leaves with a lobule on the lower surface, attached to the stem only at the base 43



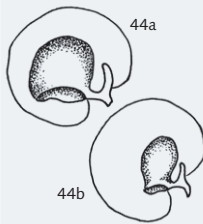


41 ■ Plants minute (shoots <0.5 mm wide); tiny, oval leaves spaced out along the stem like beads
(40) *Cololejeunea minutissimum* (p. 226)/*Microlejeunea* (p. 220)
■ Plants larger (shoots at least 1 mm wide) **42**



42 ■ Shoots about 1 mm wide; leaves with angle on back edge; underleaves present. *Lejeunea* spp. (pp. 221–223)
■ Shoots about 2 mm wide; leaves round, with no angle; underleaves absent *Radula complanata* (p. 202)

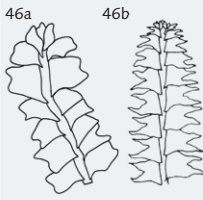
43 ■ Plant deep green when dry, vivid green when moist; edges of many leaves curled upwards, giving shoots an untidy appearance from above *Porella platyphylla* (p. 206)
■ Plant usually reddish or brown, occasionally green; leaf edges not curled upwards, so leaves look like neat scales. **44**



44 ■ Lobule as wide as long; common on trees and branches, growing appressed to bark. *Frullania dilatata* (p. 213)
■ Lobule much longer than wide; frequent on rocks, where often grows appressed; on trees and branches in western Britain, usually hanging loose from the bark *Frullania tamarisci* (p. 211)

Liverworts with more or less symmetrical, 2- to 3- or 4-cleft lobes to each leaf

45 ■ Plants with a strong, peppery or musty smell (some people cannot detect it; if in doubt then look up these very common species); leaves 2-lobed **46**
■ Plants with no distinctive smell; leaves 2-, 3- or 4-lobed **47**



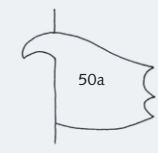
46 ■ Some leaves entire, others with 2 sharp lobes
(45) *Lophocolea heterophylla* (p. 184)
■ All leaves with 2 sharp lobes *Lophocolea bidentata* (p. 183)

47 ■ Individual leaves scarcely visible with the naked eye; like tiny hands, with 3 or 4 symmetrical lobes (20 hand lens) **48**
■ Individual leaves easily visible with the naked eye, or if not so then with 2 symmetrical lobes **50**



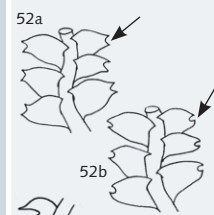
48 ■ Leaves with 3 or 4 'fingers' shorter than the 'palm'; branching pinnate *Lepidozia reptans* (p. 80)
■ Leaves with 3 or 4 'fingers' clearly longer than the 'palm'; branching irregular. **49**

49 ■ Leaves composed entirely of 'fingers'; a species of dry but humid places *Blepharostoma trichophyllum* (p. 77)
■ Leaves with a short but distinct 'hand'; species of bogs, peat or humus. *Kurzia* spp. (p. 78)

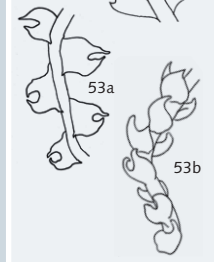


50 ■ Tip of each leaf split into 3 small but distinct teeth; leaf tapering from very wide base, asymmetrical; very robust, olive-green species of humid woods, etc. (shoots up to 5 mm across) *Bazzania trilobata* (p. 82)
■ Leaves more or less symmetrical: either showing 2 shallow teeth at tip only, or more deeply divided into 2 or 3 lobes **51**

51 ■ Leaves almost flat, with the leading edge lying on top of the next leaf up the shoot; plants pale white- or blue-green **52**
■ Leaves concave, usually obviously so, or if flat then the leading edge of each leaf tucked under the next leaf up the shoot; plants less obviously pale **53**



52 ■ Tips of leaf lobes divergent, with a wide angle between them
(51) *Calypogeia arguta* (p. 90)
■ Tips of leaf lobes ending close together, with an acute or rounded angle between them *Calypogeia fissa* (p. 85)



53 ■ Shoots almost flat; leaves with 2 lobes pointing towards each other and with a wide, crescent-shaped gap between them *Cephalozia connivens* (p. 94)/*C. lunulifolia* (p. 96)
■ Shoots with somewhat to strongly concave leaves; lobes usually not pointing towards each other; gap between lobes various. **54**

54 ■ Leaves divided more than halfway to the base into 2 lobes; plants very slender, with shoots <2 mm wide **55**
■ Leaves divided to much less than halfway to the base into 2 or 3 lobes **57**

55 ■ Very long leaf lobes curve so the tips nearly meet; shoots often bright red *Nowellia curvifolia* (p. 97)
■ Leaf lobes only slightly curved, tips more or less divergent; shoots never red **56**

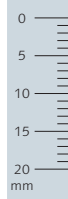
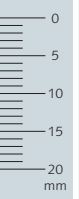
56 ■ Stem translucent *Cephalozia bicuspidata* (p. 92)
(55) ■ Stem opaque *Cephaloziella* spp. (pp. 104–108)

57 ■ Many leaves with 3 lobes **58**
(54) ■ All leaves with 2 lobes **60**

58 ■ Shoot tip clearly different from the remainder of the shoot, with tightly pressed, narrowed leaves, tipped with pale gemmae *Barbilophozia attenuata* (p. 111)
■ Shoot tip not differentiated; gemmae absent or present. **59**



59 ■ One leaf edge much longer than the other, so that the 3 lobes point 90° to the stem; gemmae occasionally present *Tritomaria quinquedentata* (p. 136)
(58) ■ Both leaf edges of similar length, so the 3 lobes point about 45° to the stem; gemmae absent *Barbilophozia floerkei* (p. 112)





- 60 ■ Gemmae conspicuous on leaf tip 61
- (57) ■ Gemmae absent from leaf tip. 63

- 61 ■ Gemmae green or very pale 62
- (60) ■ Gemmae red or brown
 *Lophozia excisa* (p. 120)/*L. bicrenata* (p. 121)/*L. sudetica* (p. 119)

- 62 ■ Underside of stem brown; plants bright mid-green; leaves with
 (61) 2 lobes, but no extra teeth. *Lophozia ventricosa* (p. 116)
- Entire stem green; plants very pale green; leaves with 2 lobes,
 and with extra teeth on leaf margins (hand lens) *Lophozia incisa* (p. 117)

- 63 ■ Leaves with broadly rounded lobes; leaf edges not recurved 64
- (60) ■ Leaves with sharply pointed lobes; 20 hand lens shows that at
 least some leaves have recurved edges. *Marsupella emarginata* (p. 155)

- 64 ■ Plant dark green, brown or black; inflated perianths <2 times
 (63) as long as wide; mostly in acidic habitats *Gymnocolea inflata* (p. 129)
- Plant pale green, often looking very translucent; perianths
 tubular, >2 times as long as wide; mostly in lime-rich habitats
 *Leiocolea turbinata* (p. 128)



Liverworts with unlobed, rounded leaves

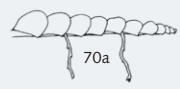
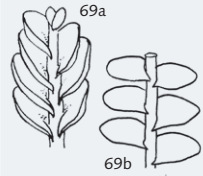
- 65 ■ Robust (shoot 3 mm wide), variegated red and yellow-green;
 (29) forming conspicuous, erect cushions *Mylia taylorii* (p. 141)
- Not red and not forming cushions 66

- 66 ■ Shoots usually with obvious gemmae 67
- (65) ■ Gemmae absent. 69

- 67 ■ Leaves with the leading edge lying on top of the next leaf up
 (66) the shoot. *Calypogeia* spp. (pp. 85–90)
- Leaves with the leading edge of each leaf tucked under the
 next leaf up the shoot 68

- 68 ■ Gemmae produced on leaves that are clearly longer and more
 (67) pointed than those on the rest of the shoot. *Mylia anomala* (p. 142)
- Gemmae produced on leaves that look the same as or smaller
 than those on the rest of the shoot *Odontoschisma denudatum* (p. 103)

- 69 ■ Shoot laterally compressed, especially near tip, so that there
 (66) are 2 ranks of leaves on opposite sides of the stem and more or
 less appressed to it 70
- Shoot dorsi-ventrally compressed, the 2 ranks of obliquely
 inserted leaves lying more or less flat, one on each side of the stem. 74

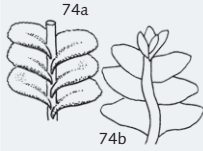


- 70 ■ In *Sphagnum* bogs; shoots usually orange-brown, with
 (69) numerous very slender, thread-like branches that appear
 leafless and grow downwards from the stem . . . *Odontoschisma sphagni* (p. 102)
- Not in *Sphagnum* bogs; very slender, thread-like, apparently
 leafless branches absent, any slender shoots not growing
 downwards 71

- 71 ■ Plants usually with some very slender, creeping shoots with
 (70) small leaves; leaf margins often with a border of enlarged cells
 (hand lens) *Jungermannia gracillima* (p. 147)
- Very slender shoots absent; border absent. 72

- 72 ■ Leaves very tightly appressed to each other, so shoots appear
 (71) strongly flattened and the stem is scarcely visible from above
 *Nardia compressa* (p. 151)
- Leaves less tightly appressed; stem clearly visible 73

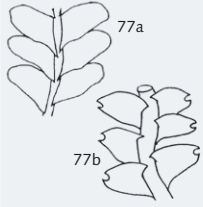
- 73 ■ Underleaves present (20 hand lens; check carefully near the
 (72) shoot tip). *Nardia scalaris* (p. 152)
- Underleaves absent *Jungermannia* spp. (pp. 143–150)



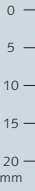
- 74 ■ Leaves convex, with one margin extending down onto stem 75
- (69) ■ Leaves flat, margin not running down along stem. 77

- 75 ■ Leaves entire; plants of very wet places *Chiloscyphus* spp. (p. 187)
- (74) ■ Leaf margins toothed, although teeth may be very sparse;
 plants of humid but dry places. 76

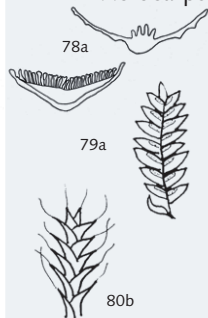
- 76 ■ Leaves broadly rounded; leaves not deciduous; plants
 (75) unscented *Plagiochila asplenioides* (p. 192)/*P. porelloides* (p. 193)
- Leaves tapering to a squared-off or 2-lobed tip; leaves often
 deciduous; plants scented when lightly crushed; restricted to
 western Britain
 *Plagiochila killarniensis* (p. 195)/*P. punctata* (p. 198)/*P. spinulosa* (p. 194)



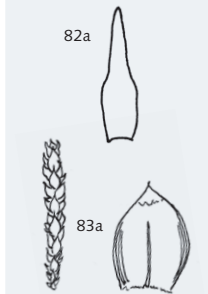
- 77 ■ Leaves in opposite pairs on stem; relatively long and narrow;
 (74) underleaves joined to lateral leaves (hand lens), and toothed along
 margin but not notched at tip *Saccogyna viticulosa* (p. 190)
- Leaves alternate along stem; relatively short and broad;
 underleaves free, broadly rounded, with (sometimes shallow)
 notch at tip *Calypogeia* spp. (pp. 85–90)



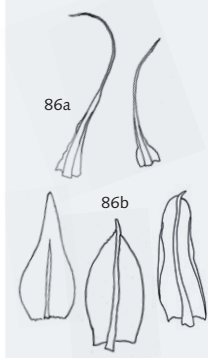
Acrocarps



- 78 ■ Leaves with very obvious vertical plates of green tissue on upper surface of the nerve (hand lens), either closely packed, making the leaf appear opaque, or loosely packed *Polytrichum, Atrichum, etc.* (88)
 - Leaves lacking vertical plates of green tissue on upper surface 79
- 79 ■ Leaves arranged strictly in 2 ranks 80
 - (78) ■ Leaves not strictly in 2 ranks. 81
- 80 ■ Shoots look like miniature ferns *Fissidens, etc.* (96)
 - (79) ■ Shoots with very long, slender leaves, not looking like miniature ferns *Distichium* spp. (pp. 352–353)
- 81 ■ Some or all of the leaves ending in almost white hair point
 - (79) *Grimmia, Tortula, etc.* (104)
 - Leaves lacking almost white hair point 82



- 82 ■ Dense cushions whitish-green when dry; leaves broadly spearhead-shaped, blunt at tip, 6–8 mm long, appearing nerveless *Leucobryum* spp. (p. 403)
 - Colonies not whitish-green when dry; leaves not appearing nerveless 83
- 83 ■ Leaf tip almost white, making whole shoots appear silvery; shoots with appressed leaves, making them catkin-like *Bryum argenteum* (p. 596)
 - Whole leaf green, brownish, almost black, etc., but not looking silvery . . . 84
- 84 ■ Capsules disproportionately large compared with leafy parts 85
 - (83) ■ Capsules not disproportionately large, or absent 86



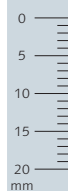
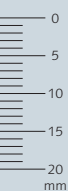
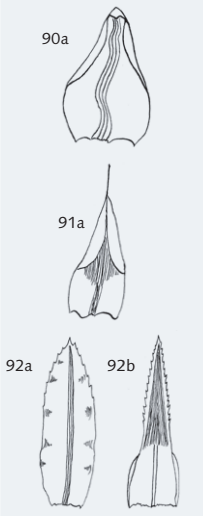
- 85 ■ Capsules on a long seta; leaves almost invisible
 - (84) *Buxbaumia* spp. (pp. 336–337)
 - Capsules on a very short seta, looking like cereal grains surrounded by strap-like leaves *Diphyscium foliosum* (p. 338)
- 86 ■ Leaves narrowly spearhead-shaped, >5 times as long as wide; each leaf tapering to a long, fine point into which the nerve runs. *Dicranella, Dicranum, etc.* (126)
 - Leaves either with rounded outlines, or parallel-sided, or if gradually tapering then not >5 times as long as wide 87
- 87 ■ Leaves large to very large (largest leaves 3.5–10 mm long and 1–3 mm wide); plants mostly robust (sometimes bud-like or forming short rosettes), in wide patches rather than compact cushions *Mnium, Plagiomnium, etc.* (156)
 - Leaves medium-sized to very small (3–5 mm long or less, most commonly 1–2 mm long and seldom as much as 1 mm wide); plants mostly small and slender (occasionally tall and small-leaved); habit various, often forming compact cushions, sometimes forming turfs or scattered shoots. This large section is subdivided into five, according to habitat, growing on:

- tarmac or concrete paths 172
- walls in towns and villages, on bridge parapets, etc. 181
- rocks, including surfaces of boulders, cliffs and drystone walls 196
- soil, including gravelly detritus, sand, clay, loam, peaty humus, soil-capped walls, and thin soil on roadsides or paths 225
- trees, logs, fence posts or decaying tree stumps 267

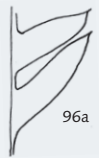


Acrocarps with plates of green tissue on the nerve's upper surface

- 88 ■ Margins of leaves inrolled and untoothed (hand lens); shoots
 - (78) 2 mm–7 cm tall 89
 - Margins of leaves plane and toothed (hand lens); shoots 1–25 cm tall 92
- 89 ■ Scattered, tiny plants (2–4 mm across) on lime-rich soil
 - (88) *Aloina* spp. (pp. 471–473)
 - Scattered plants (>5 mm across) or dense patches on acidic soil 90
- 90 ■ Longest leaves <3 mm; vertical plates of green tissue on upper surface of the nerve few, wavy and loosely packed; north-western *Oligotrichum hercynicum* (p. 327)
 - Leaves longer; vertical plates of green tissue on upper surface of the nerve dense, straight and crowded 91
- 91 ■ Leaves with almost white hair point *Polytrichum piliferum* (p. 324)
 - (90) ■ Almost white hair point lacking; leaves ending in short but acute, brown point *Polytrichum juniperinum* (p. 325)
- 92 ■ Each leaf with fewer than 5 loosely packed, vertical plates of green tissue restricted to the upper surface of the nerve *Atrichum undulatum* (p. 330)
 - (88) ■ 25+ densely packed plates covering almost entire leaf surface 93
- 93 ■ Plant pale bluish-green (glaucous) above *Pogonatum urnigerum* (p. 317)
 - (92) ■ Plant mid-green or dark green above 94
- 94 ■ Shoots 0.5–1 cm tall, leaves forming a rosette . . . *Pogonatum aloides* (p. 316)
 - (93) ■ Shoots 3–25 cm tall, leaves along stem 95
- 95 ■ Chiefly on wet moorland; leaf sheath glossy (visible when upper leaves are stripped off a stem); plants often >15 cm tall *Polytrichum commune* (p. 322)
 - (94) ■ Chiefly in woods; leaf sheath dull; plants rarely >9 cm tall *Polytrichastrum formosum* (p. 320)



Acrocarps with shoots like miniature ferns



96 ■ Leaves nerveless; protonema shining green like glow-worm tails; scarce plant of caves, rabbit holes, etc. *Schistostega pennata* (p. 419)
■ Leaves nerved to tip or near it; protonema not shining. **97**

97 ■ Minute (shoots <5 mm long); fruiting plants with <5 pairs of leaves (non-fruiting plants unidentifiable) *Fissidens exilis* (p. 411)/*F. pusillus* (p. 405)/*F. viridulus* (p. 404)
■ Larger (shoots 5 mm or longer); fruiting plants with >5 pairs of leaves **98**

98 ■ On rocks and masonry in rivers or streams *Fissidens crassipes*/*F. rufulus* (p. 410)/*F. rivularis* (p. 409)
■ Not on rocks in rivers or streams **99**

99 ■ Leaves bordered with long, narrow cells (hand lens); small (stems 0.5–2 cm); seta terminal **100**
■ Leaves not bordered (hand lens); larger (stems 1–8 cm); seta various. **101**

100 ■ Capsule upright (not conclusively identifiable without capsules) *Fissidens bryoides* (p. 407)
■ Capsule inclined, more or less horizontal (not conclusively identifiable without capsules). *Fissidens incurvus* (p. 406)/*F. curvovii* (p. 408)

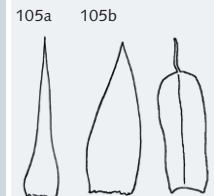
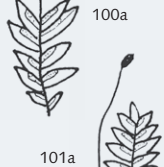
101 ■ Nerve ending at leaf tip in a short, protruding point; seta basal *Fissidens taxifolius* (p. 415)
■ Nerve ending below leaf tip; seta terminal or lateral **102**

102 ■ Shoots about 4 mm wide; leaves down-curved at tip, giving shoots rounded backs; leaf margins untoothed; seta terminal *Fissidens osmundoides* (p. 414)
■ Shoots flat, about 8 mm wide; leaf margins irregularly toothed; seta lateral. **103**

103 ■ Leaves with very distinct pale marginal band; on dry, calcareous rocks (needs checking with microscope) *Fissidens dubius* (p. 416)
■ Leaves with indistinct or no pale marginal band; in flushes, fens or on wet, calcareous rocks (needs checking with microscope). *Fissidens adianthoides* (p. 416)

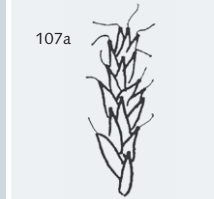
Acrocarps with some or all leaves ending in an almost white hair point

104 ■ Nerve projecting from leaf tip as a fine, greenish hair; leaves corkscrew-curved when dry *Bryum capillare* (p. 586)
■ Nerve projecting as a colourless or white, very distinct hair point; leaves not corkscrew-curved when dry **105**



105 ■ Leaves very long, narrow and sword-shaped **106**
(104) ■ Leaves relatively shorter – roughly triangular or tongue-shaped **108**

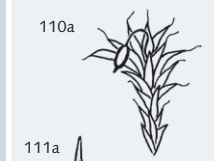
106 ■ Plants dark, blackish-green; leaves 6–9 mm long, with long, untidy-looking hair point *Campylopus atrovirens* (p. 398)
■ Plants light or mid-green; leaves 4–5 mm long, with relatively short hair point **107**



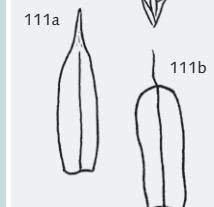
107 ■ Hair points bent back when dry, looking star-like; nerve >1/4 of leaf width at base (hand lens) *Campylopus introflexus* (p. 400)
■ Hair points not bent back when dry; nerve <1/4 of leaf width at base (hand lens). *Campylopus brevipilus* (p. 401)

108 ■ On trees or fence posts **109**
(105) ■ On some other substrate **113**

109 ■ Prominent line of powder-like gemmae on upper side of nerve *Syntrichia papillosa* (p. 500)
■ Gemmae absent from leaves **110**



110 ■ Capsules on curved seta (straight when old and dry) *Grimmia pulvinata* (p. 526)
(109) **111**
■ Capsules with straight, sometimes very short, seta **111**

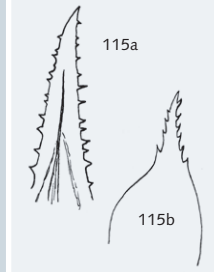


111 ■ Leaves tapering into wide-based hair point; capsule scarcely raised above leaves *Orthotrichum diaphanum* (p. 654)
(110) ■ Narrow hair point projects from middle of broad leaf tip; capsule (if present) on seta long enough to hold capsule base clear of leaves **112**

112 ■ Hair point smooth (hand lens) *Syntrichia laevipila* (p. 499)
(111) ■ Hair point with sharp teeth throughout its length (hand lens) *Syntrichia virescens* (p. 498)

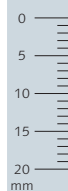
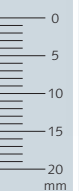
113 ■ On sand dunes; plants bright golden green to orange-brown when moist; leaves strongly bent back, tapering to a narrow tip, with strongly recurved margins *Syntrichia ruralis* subsp. *ruraliformis* (p. 495)
■ Some other habitat and appearance. **114**

114 ■ Forming straggling patches; stems freely branched **115**
(113) ■ Forming neat tufts or cushions; stems little branched (mostly simple or merely forked) **117**

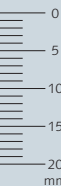
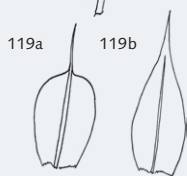
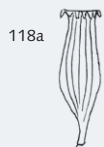


115 ■ Hair point with narrow teeth at 90° to base (hand lens); plants very robust; forming loose carpets, 20 cm to 1 m or more across, on peat or rock (individual stems often 12–25 cm long) *Racomitrium lanuginosum* (p. 539)

■ Hair point with forward-pointing teeth; plants much more slender, in loose tufts or thin, straggling patches a few centimetres across, on rock (individual stems 2–8 cm) **116**

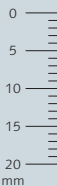
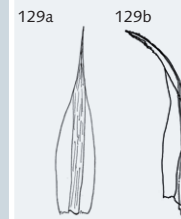


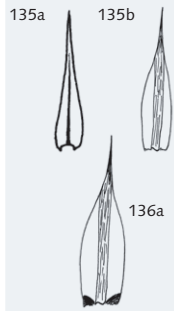
- 116 ■ Leaves very concave, with rounded backs and no nerve;
(115) capsules on short seta, hidden among leaves *Hedwigia stellata* (p. 665)
■ Leaves flat or with keeled backs and an obvious nerve; capsules
on long seta (>5 times length of capsule)
. *Racomitrium heterostichum* agg. (p. 537)
- 117 ■ Capsules always present (search carefully for old ones) on short
(114) seta so capsule base is hidden among sheathing leaves 118
■ Capsules (if present) on seta long enough to hold capsule base
clear of leaves 119
- 118 ■ Plants squat and unbranched; old capsules with folds when dry;
(117) young capsules with slightly hairy calyptra . . . *Orthotrichum diaphanum* (p. 654)
■ Plants loosely branched; old capsules smooth; calyptra without
hairs *Schistidium crassipilum* (p. 511)
- 119 ■ Leaves abruptly narrowing into hair point (may be parallel-sided
(117) or tapering before abrupt narrowing) 120
■ Leaves gradually tapering into hair point 123
- 120 ■ Hair point smooth (hand lens) 121
(119) ■ Hair point with sharp teeth throughout its length (hand lens) 122
- 121 ■ Leaves tongue-shaped, appearing thickened on margins (hand
(120) lens); capsules on long (>1.5 cm) straight seta *Tortula muralis* (p. 479)
■ Leaves gradually tapering from base, then abruptly narrowing
into hair point; margins recurved, but not thickened; capsules on
short (<8 mm) curved seta (*NB* straightens when dry)
. *Grimmia pulvinata* (p. 526)
- 122 ■ Leaf margins recurved for most of its length; upper part of
(120) leaves curved upwards and inwards . . . *Syntrichia ruralis* subsp. *ruralis* (p. 494)
■ Leaf margins not recurved; upper part of leaves flat
. *Syntrichia intermedia* (p. 496)
- 123 ■ Shoots with abundant, short branches; usually on gravelly soil,
(119) mine waste, etc. *Racomitrium ericoides* (p. 540)
■ Shoots with long, irregular branches or unbranched; on rock 124
- 124 ■ Tiny (<8 mm deep), almost black cushions; almost always
(123) with pale green capsules on short (as long as capsule), straight
seta *Grimmia donniana* (p. 522)
■ Cushions at least 1 cm deep; seta either curved or much
longer than capsules 125
- 125 ■ Capsules on long, straight seta; hair point flattened where it
(124) joins the rest of the leaf *Racomitrium heterostichum* (p. 537)
■ Capsules on short, curved seta (but rarely produced); hair point
not flattened where it joins the rest of the leaf . . . *Grimmia trichophylla* (p. 529)



Acrocarps with leaves narrowly spearhead-shaped, tapering to a long, fine point

- 126 ■ Robust, 2.5–15 cm tall 127
(86) ■ Small, up to 2 cm tall 137
- 127 ■ Leaves strongly curved and turned to one side, at least at the
(126) shoot tip 128
■ Leaves straight 130
- 128 ■ Leaves very long (the longest being 10–14 mm), all sickle-
(127) shaped and very strongly turned to one side of shoot; chiefly in
sheltered, humid woods *Dicranum majus* (p. 379)
■ Leaves shorter (the longest 6–8 mm), less strongly and
regularly turned to one side of shoot; habitats various 129
- 129 ■ Nerve at base of leaf $\frac{1}{3}$ to $\frac{1}{2}$ width of base of leaf (hand lens); plants
(128) dark green; leaves wavy when dry, 4–5 mm long . *Campylopus flexuosus* (p. 395)
■ Nerve at base of leaf $<\frac{1}{5}$ width of base of leaf (hand lens); leaves
4–8 mm long, little altered when dry; shoots brownish below and
bright, yellowish-green above *Dicranum scoparium* (p. 378)
- 130 ■ Forming deep cushions or scattered in bogs and wet places on
(127) moors; leaves dull, yellowish-green, spreading when moist, shrivelled
and curled when dry *Aulacomnium palustre* (p. 625)
■ Habitat different; if on bogs or moors then leaves shiny 131
- 131 ■ Leaves much twisted and curled when dry 132
(130) ■ Leaves little altered when dry 134
- 132 ■ Cushions yellow-green; leaf margins untoothed (but sometimes
(131) irregularly notched near tip) and undulate; very rarely fertile; strict
lime-lover *Tortella tortuosa* (p. 428)
■ Cushions dull green or pale green; leaf margins toothed, not
undulate; usually fertile; on acidic or mildly limey substrate 133
- 133 ■ Cushions dark green near shoot tip and black near the centre;
(132) leaves with bluntly toothed margins (clearly visible with $\times 10$ hand lens);
usually with pale brown, cylindrical capsules; on siliceous, upland
rocks *Ptychomitrium polyphyllum* (p. 541)
■ Cushions pale green; leaves rigidly straight; leaf margins finely
toothed (just visible with $\times 10$ hand lens); characteristic apple-shaped
capsules usually present; habitats various *Bartramia pomiformis* (p. 630)
- 134 ■ Leaves widely spreading to give shoot a bottle-brush effect; orange
(131) or red-brown rhizoids on stems very obvious . . . *Breutelia chrysocoma* (p. 640)
■ Leaves not as above; orange rhizoids seldom obvious 135





- 135 ■ Leaves with evident expanded blade either side of nerve, all the way to the leaf tip; plant yellow-green *Dicranum scoparium* (p. 378)
- 136 ■ Leaves bristle-like, abruptly narrowed to form long, fine tip composed almost entirely of nerve (if leaf blade is not very obvious then key here) 136
- 136 ■ Leaves almost straight when moist, and slightly wavy when dry; orange-brown patch at basal angles of leaf; on acidic substrate *Campylopus flexuosus* (p. 395)
- 137 ■ Leaves markedly wavy when moist or dry; no orange-brown patches; on calcareous substrate *Ditrichum gracile* (p. 349)
- 137 ■ Minute plants on base-rich rock; leaves <1 mm long; tiny capsule on seta <3 mm long 138
- 138 ■ Plants taller; on soil or acidic rock, or on base-rich rocks in flushes 139
- 138 ■ Seta curved, leaves brownish-green *Seligeria recurvata* (p. 546)
- 137) ■ Seta straight, leaves vivid green other *Seligeria* spp. (pp. 545, 547–551)

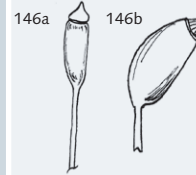


- 139 ■ Leaves with evident blade either side of nerve, all the way to the leaf tip; plant yellow-green *Dicranum scoparium* (p. 378)
- 139) ■ Leaves bristle-like, abruptly narrowed to form long, fine tip composed almost entirely of nerve (if leaf blade is not very obvious then key here) 140
- 140 ■ Leaves appearing thick, opaque & dull green; leaves narrow and strap-like, scarcely tapering from base *Diphyscium foliosum* (p. 338)
- 140) ■ Leaves translucent, usually shiny green; leaves tapering, so wider at base than tip 141
- 141 ■ Leaves bent back from a sheathing base, held at 90° to vertical 142
- 140) ■ Leaves not bent back from a sheathing base 144

- 142 ■ Limb of leaf composed almost entirely of nerve, appearing cylindrical through a hand lens *Trichodon cylindricus* (p. 342)
- 142) ■ Limb of leaf with blade apparent to tip, appearing flat through a hand lens 143
- 143 ■ Upper and lower leaves of the same length; tubers absent from stems *Dicranella schreberiana* (p. 368)
- 143) ■ Upper leaves much longer than lower leaves; red tubers often produced on short rhizoids between leaves on lower part of stem *Leptobryum pyriforme* (p. 576)



- 144 ■ Leaves strongly curved and turned to one side 145
- 141) ■ Leaves straight or wavy, spreading, not turned to one side 147

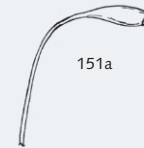


- 145 ■ Shoots bright green; in lime-rich places *Dicranella varia* (p. 366)
- 144) ■ Shoots dark green; in acidic places 146
- 146 ■ Capsule erect, cylindrical, symmetrical (not identifiable when non-fertile), mostly in uplands *Ditrichum heteromallum* (p. 346)
- 145) ■ Capsule inclined, curved and asymmetrical; both in lowlands and uplands and very common on acidic woodland banks *Dicranella heteromalla* (p. 371)
- 147 ■ Leaf and shoot tips fragile; colonies usually covered with shoot fragments 148
- 144) ■ Leaf and shoot tips not detaching from rest of plant 150



- 148 ■ Colonies dark green; red-brown patch at basal corners of leaves (20 hand lens) *Campylopus flexuosus* (p. 395)
- 147) ■ Colonies vivid light green; red-brown patches lacking (20 hand lens) 149
- 149 ■ Individual shoots narrow and scarcely distinct in colonies; leaves widest at base (hand lens) *Campylopus pyriformis* (p. 394)
- 148) ■ Colonies composed of clearly distinct, rather wide shoots; leaves widest a short way above the base (hand lens) *Campylopus fragilis* (p. 393)

- 150 ■ Leaves with very distinct red base (10 hand lens); plants shiny dark green; on base-rich rocks, often in springs *Blindia acuta* (p. 544)
- 147) ■ Leaves without red base; plants mid- or light green; in other habitats 151

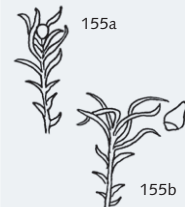


- 151 ■ Curved seta supporting egg-shaped capsule; on rotting logs, peat, acidic rock, etc. *Orthodontium lineare* (p. 580)
- 150) ■ Seta straight or very short; on soil 152

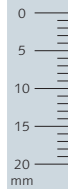
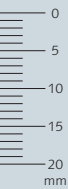
- 152 ■ Lowest 1/4 of shoot (stem and leaves) red; on acidic soil *Dicranella rufescens* (p. 367)
- 151) ■ Shoots entirely green; on base-rich, neutral or acidic soil 153

- 153 ■ Upper leaves only slightly longer than lower ones, not strikingly different 154
- 152) ■ Upper leaves of shoots strikingly different from lower leaves 155

- 154 ■ Capsules dark red, inclined, on long, red seta *Dicranella varia* (p. 366)
- 153) ■ Capsules absent *Dicranella staphylinia* (collect to check for tubers) (p. 369)



- 155 ■ Upper leaves held vertically; capsule oval, without separate lid, immersed between bristle-like leaves at top of shoots *Pleuroidium acuminatum*/*P. subulatum* (p. 340)
- 153) ■ Upper leaves spreading horizontally; capsule pear-shaped, with separate lid falling to reveal peristome, on long seta *Leptobryum pyriforme* (p. 576)



Acrocarps with large leaves (3.5–10 mm long and 1–3 mm wide), and forming large patches

156 ■ Leaves spearhead- or tongue-shaped or gradually tapering, (87) at least 4 times as long as broad 157

■ Leaves rounded or egg-shaped, 2 to 3 times as long as broad 165

157 ■ Leaves wrinkled transversely 158

(156) ■ Leaves not wrinkled transversely 159

158 ■ Upright stem with few or no branches; leaves with teeth on (157) back and double teeth on margins (hand lens); narrowly cylindrical capsules common in winter *Atrichum undulatum* (p. 330)

■ Stem usually branched above, branches often arching; leaves with single teeth, only on margins; usually without capsules *Plagiomnium undulatum* (p. 618)

159 ■ Leaf margins toothed (double teeth fine, but clearly visible with (157) 10 hand lens) and with thickened border *Mnium hornum* (p. 612)

■ Leaf margins entire 160

160 ■ Leaf tip rounded; tufts vivid green when moist; dull, glaucous (159) and with much curled leaves when dry; stem with abundant, brown rhizoids; lime-lover, commonest on limestone walls and mortar, or on limestone outcrops. *Encalypta streptocarpa* (p. 557)

■ Leaf tip acute or with shortly excurrent nerve; appearance and habitat various, but not forming tufts on mortar of walls as above 161

161 ■ Stems short, <2 cm tall, upright or forming turfs 162

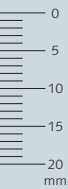
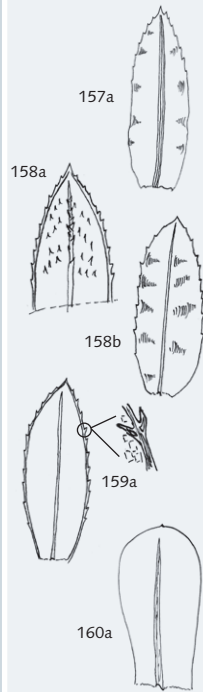
(160) ■ Stems elongated, 3–10 cm or more, either straggling or forming very deep cushions 163

162 ■ Leaves 2.5–4 mm long, without pale margins (hand lens); plants (161) growing as turfs or patches on soil; shoots usually without capsules; common, especially abundant on coasts *Trichostomum brachydontium* (p. 433)

■ Leaves 3–6 mm long, with pale margins (hand lens); forming short rosettes about 5 mm tall; nearly always with capsules (or starting to produce them); capsule 7–9 mm long, erect and narrowly cylindrical, on long seta; moderately common, mostly inland. *Tortula subulata* (p. 475)

163 ■ Shoots straggling and dark green; margins of leaves thickened (161) to form a narrow border (hand lens); capsules common, almost hidden by leaves; mostly by rivers *Cinclidotus fontinaloides* (p. 502)

■ Shoots light yellowish-green; margins of leaves not bordered; capsules on long seta, rarely produced. 164



164 ■ Forming hanging patches on lime-rich rocks or walls, or the (163) base of trees *Anomodon viticulosus* (a pleurocarp) (p. 694)

■ Growing as cushions, hummocks or scattered plants in bogs, heaths or flushes *Aulacomnium palustre* (p. 625)

165 ■ Leaf tip rounded; nerve not excurrent 166

(156) ■ Leaf tip acute; nerve often excurrent in short point 168

166 ■ Leaf margins not thickened; leaves very opaque; only on (165) limestone, mortar on walls, etc. *Encalypta streptocarpa* (p. 557)

■ Leaf margins thickened; leaves translucent; habitats various 167

167 ■ Leaf margins untoothed; shoots upright. *Rhizomnium punctatum* (p. 616)

(166) ■ Leaf margins toothed; if apparently untoothed then shoots creeping *Plagiomnium* spp. (*affine/rostratum*, etc.) (pp. 618–623)

168 ■ On dung in wet places; leaves strongly and irregularly toothed; plants (165) usually very fertile, with flask-shaped capsules *Splachnum ampullaceum* (p. 571)

■ Habitat, leaves and capsules not as above. 169

169 ■ Erect stems crowned by striking, flower-like leaf rosettes (168) which are 1.5–2.5 cm across *Rhodobryum roseum* (p. 600)

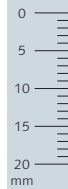
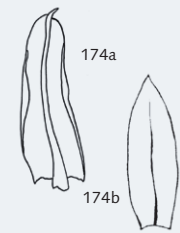
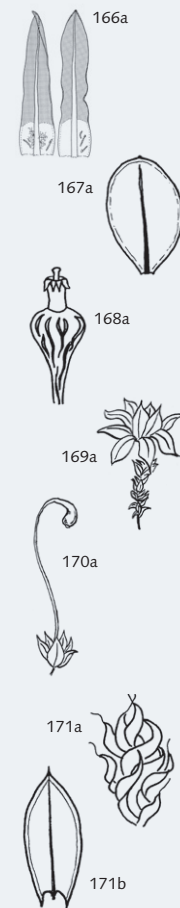
■ Not forming wide, flower-like rosettes of leaves. 170

170 ■ Leaf without well-defined border; nerve not excurrent; unripe (169) capsule asymmetrical, on curved seta; ripe capsule furrowed when dry. *Funaria hygrometrica* (p. 561)

■ Leaf with well-defined border; nerve excurrent; capsule symmetrical, on straight seta, not furrowed when dry 171

171 ■ Nerve excurrent in long, pale greenish, hair-like point; leaves spirally (170) curled when dry; on dry ground, walls, trees, etc. *Bryum capillare* (p. 586)

■ Nerve shortly excurrent or ending in tip; leaves shrunken or slightly curled, but not spiral when dry; tall plants (3–10 cm) in wet, lime-rich places *Bryum pseudotriquetrum* (p. 592)



Other acrocarps growing on tarmac or concrete paths

(Remember to rule out species in couplets 78–87)

172 ■ Leaf parallel-sided or with rounded outline 173

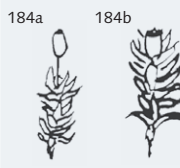
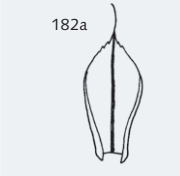
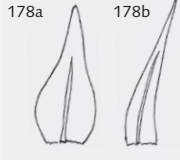
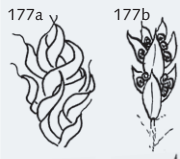
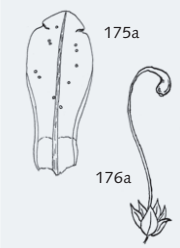
(87) ■ Leaf gradually tapering to tip 178

173 ■ Leaves parallel-sided, opaque and yellowish-green. 174

(172) ■ Leaves rounded, opaque or translucent, and bright or brownish green. 175

174 ■ Nerve excurrent in short point. *Barbula unguiculata* (p. 455)

(173) ■ Nerve ending in leaf tip *Barbula convoluta/B. sarda* (p. 454)



175 ■ Leaves opaque, dirty brownish-green; nerve ending in (173) tip *Syntrichia latifolia* (p. 501)
 ■ Leaves translucent **176**

176 ■ Capsule on long, wavy seta; young capsule tightly sheathed by (175) bunched leaves *Funaria hygrometrica* (p. 561)
 ■ Capsule on straight seta, although capsule itself nodding; young capsule not tightly sheathed by leaves **177**

177 ■ Nerve excurrent in a wispy point; bulbils absent *Bryum capillare* (p. 586)
 (176) ■ Nerve ending in leaf tip or shortly excurrent; yellowish-green bulbils present in leaf axils *Bryum dichotomum* (p. 595)

178 ■ Leaf tip narrow but rounded (hand lens) **179**
 (177) ■ Leaf tip sharply pointed (hand lens) **180**

179 ■ Leaves 2–3 mm long, >3 times as long as wide (178) *Didymodon nicholsonii* (p. 460)
 ■ Leaves 2 mm long or shorter, <2 times as long as wide *Didymodon luridus* (p. 461)

180 ■ Leaves curved to one side, looking like a spiral from above (178) *Didymodon insulanus* (p. 463)
 ■ Leaves straight when viewed from above *Ceratodon purpureus* (p. 354)

Other acrocarps growing on walls in towns and villages, on bridge parapets, etc.

(Remember to rule out species in couplets 78–87)

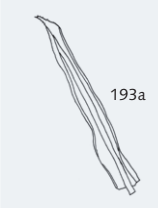
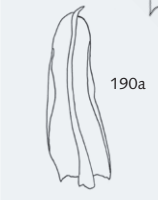
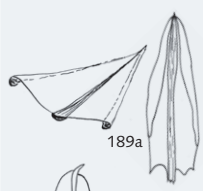
181 ■ Medium-sized plants with leaves at least 4 mm long **182**
 (87) ■ Very small plants, with leaves 3 mm long or shorter **188**

182 ■ Leaves corkscrew-curled when dry, egg-shaped; nerve (181) projecting from leaf tip as a fine, greenish hair *Bryum capillare* (p. 586)
 ■ Leaves not corkscrew-curled when dry, gradually tapering to tip; nerve ending in leaf tip **183**

183 ■ Plants dull, dark green; capsules usually present, covered by (182) hairy calyptra **184**
 ■ Plants yellowish-green or mid-green; capsules rare, calyptra not hairy **185**

184 ■ Capsules projecting above leaves on long seta (183) *Orthotrichum anomalum* (p. 656)
 ■ Capsules hidden among leaves on short seta *Orthotrichum cupulatum* (p. 657)

185 ■ Leaf margins with notches; leaf tip sometimes missing **186**
 (183) ■ Leaf margins without notches; leaf tip never missing **187**



186 ■ Leaf base with sharp V-shaped division between colourless (185) basal cells and green upper cells (remove a leaf) *Tortella tortuosa* (p. 428)
 ■ Leaf base with a few colourless cells, but no sharp V-shaped division from upper cells *Didymodon sinuosus* (p. 464)

187 ■ Leaf tip shaped like a boat's prow (view from side through a (185) hand lens) *Trichostomum crispulum* (p. 434)
 ■ Leaf tip not shaped like a boat's prow **188**

188 ■ Leaves parallel-sided to just below tip; on mortar courses **189**
 (181, 187) ■ Leaves tapering to tip; on mortar, tops or sides of walls **192**

189 ■ Leaf margins rolled back underneath, almost to nerve (188) *Pseudocrossidium revolutum* (p. 441)
 ■ Leaf margins not rolled back, may be down-curved **190**

190 ■ Leaf margins down-curved; nerve protruding beyond tip of leaf (189) in short point *Barbula unguiculata* (p. 455)
 ■ Leaf margins not down-curved; nerve not protruding **191**

191 ■ Leaf margins wavy; plants yellowish-green (190) *Barbula sardoa* (p. 454)
 ■ Leaf margins flat; plants vivid mid-green *Zygodon viridissimus* (p. 642)

192 ■ Nerve ending below rounded leaf tip (188) *Didymodon luridus* (p. 461)/*D. tophaceus* (p. 466)
 ■ Nerve protruding beyond the acute leaf tip **193**

193 ■ Shoots reddish-brown below; leaf tip often with a few teeth; (192) leaf gradually tapering, then abruptly angled in at tip *Bryoerythrophyllum recurvirostrum* (p. 442)
 ■ Shoots green or orange below; leaf tip untoothed; leaf gradually tapering all the way to the tip **194**

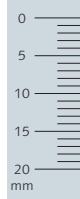
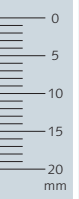
194 ■ Leaves curved to one side, looking like a spiral when viewed (193) from above *Didymodon insulanus* (p. 463)
 ■ Leaves more or less straight **195**

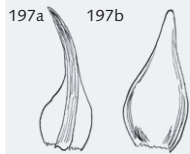
195 ■ Plants dark green *Didymodon rigidulus* (p. 459)
 (194) ■ Plants yellow-green *Didymodon vinealis* (p. 462)

Other acrocarps growing on rocks, drystone walls, etc.

(Remember to rule out species in couplets 78–87)

196 ■ Tiny, almost black or red-brown cushions on acidic, upland rocks; (87) leaves <1 mm long; capsules opening with 4 slits **197**
 ■ Green cushions (sometimes brownish) or patches in various habitats; leaves usually >1 mm long; capsules opening with a single hole **198**

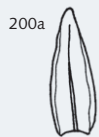




197 ■ Leaves curved, mostly composed of nerve *Andreaea rothii* (p. 314)
 (196) ■ Leaves straight, nerveless *Andreaea rupestris* (p. 312)

198 ■ Stems prostrate or ascending at tip, with plenty of irregular
 (197) branching **199**
 ■ Stems erect or nearly so, unbranched or sparsely so **205**

199 ■ Leaf tip rounded (hand lens) **200**
 (198) ■ Leaf tip acute **201**

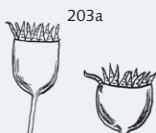


200 ■ Leaf tip with teeth (hand lens), about half as wide as leaf base, so
 (199) leaves appear short and blunt; mostly on rocks by streams
 *Racomitrium aciculare* (p. 534)
 ■ Leaf tip without teeth (hand lens), about 1/4 as wide as leaf base; usually
 forming patches on damp, upland cliffs *Racomitrium aquaticum* (p. 535)



201 ■ Leaf margins much thicker than rest of leaf (hand lens), not
 (199) recurved *Cinclidotus fontinaloides* (p. 502)
 ■ Leaf margins not thicker than rest of leaf (hand lens) (may look
 thicker if recurved, so check carefully) **202**

202 ■ Leaves curved (examine colony as a whole); capsules hidden
 (201) among sheathing leaves **203**
 ■ Leaves straight (examine colony as a whole); capsules not
 hidden, held above leaves on long seta **204**



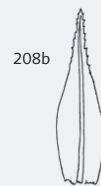
203 ■ Capsule longer than wide (about 1 1/2 times as long as wide)
 (202) *Schistidium apocarpum* (p. 510)
 ■ Capsule as long as wide *Schistidium rivulare* (p. 507)

204 ■ Shoots tightly appressed to rocky surfaces, with short tassel-like
 (202) branches *Racomitrium fasciculare* (p. 538)
 ■ Shoots loosely or not appressed to rocky surfaces; branches long
 and irregular . . . *Racomitrium heterostichum* (forms without hair points) (p. 537)

205 ■ Individual colonies forming discrete, well-defined cushions **206**
 (198) ■ Colonies forming turfs, loose ill-defined tufts, etc. **211**

206 ■ Capsules hidden among sheathing leaves; dense, olive-green,
 (205) rounded cushions on coastal rocks. *Schistidium maritimum* (p. 506)
 ■ Capsules, if present, not sheathed by leaves; generally not
 on coastal rocks (a few of the following are occasional by the sea) **207**

207 ■ Short (<2 cm tall) cushions on acidic boulders or rocks;
 (206) dull green; capsules abundant **208**
 ■ Tall (>2 cm tall) cushions on base-rich cliffs, especially under
 overhangs, or on calcareous boulders; bright or yellow-green;
 capsules uncommon **209**



208 ■ Leaves 1–2 mm long, untoothed *Dicranoweisia cirrata* (p. 364)
 (207) ■ Leaves 2–3 mm long, margins obviously toothed (hand lens)
 *Ptychomitrium polyphyllum* (p. 541)

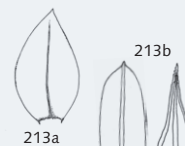
209 ■ Mid-green cushions; leaves long and narrow (>3 times as long
 (207) as wide), with parallel sides and acute tip *Amphidium mougeotii* (p. 641)
 ■ Yellow-green cushions; either leaves shorter (<3 times as long
 as wide), or gradually tapering and with wavy margins **210**



210 ■ Leaves short (<3 times as long as wide), tipped with a
 (209) single pointed cell (20 hand lens); leaf margins not undulate;
 cushions vivid yellow-green *Anoetangium aestivum* (p. 452)
 ■ Leaves long (>4 times as long as wide), gradually tapering
 to one or two blunt cells (20 hand lens); leaf margins undulate;
 cushions pale green *Tortella tortuosa* (p. 428)

211 ■ Leaf margins toothed (hand lens); plants of wet places. **212**
 (205) ■ Leaf margins untoothed (hand lens), but may be notched (see **220**);
 plants of various habitats **213**

212 ■ Leaves tapering sharply; margins recurved; plants glaucous green;
 (211) stem with matted rhizoids among lower leaves *Philonotis fontana* (p. 636)
 ■ Leaves acute or blunt; margins plane; plants not blue-green; stem
 without matted rhizoids among lower leaves . . . *Dichodontium* spp. (pp. 361–362)



213 ■ Leaves with rounded or egg-shaped outline **214**
 (211) ■ Leaves parallel-sided or gradually tapering to tip **216**

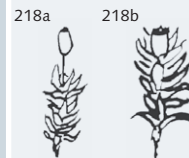


214 ■ Leaves corkscrew-curved when dry; nerve projecting from
 (213) leaf tip as a fine greenish hair. *Bryum capillare* (p. 586)
 ■ Leaves more or less straight when dry; nerve ending in leaf tip **215**

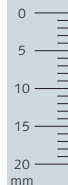
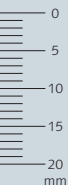
215 ■ Margins recurved; plants wine red (sometimes dark green);
 (214) shoots without tightly appressed leaves *Bryum alpinum* (p. 599)
 ■ Margins plane; plants always dark green; shoots with tightly
 appressed leaves often projecting above main colony . . . *Pohlia nutans* (p. 605)

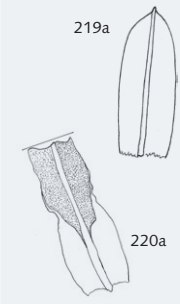
216 ■ Leaves >4 mm long, parallel-sided **217**
 (213) ■ Leaves <3 mm long, tapering gradually from base to leaf tip. **221**

217 ■ Plants dull, dark green; leaf margins recurved; capsules usually
 (216) present, covered by hairy calyptra **218**
 ■ Plants yellowish-green or mid-green; leaf margins not recurved;
 capsules very rare, calyptra not hairy **219**



218 ■ Capsules projecting above leaves on long seta
 (217) *Orthotrichum anomalum* (p. 656)
 ■ Capsules hidden among leaves on short seta
 *Orthotrichum cupulatum* (p. 657)





219 ■ Leaf margins without notches; leaf tip never missing; nerve protruding beyond leaf tip as a blunt point (217) *Trichostomum brachydontium* (p. 433)

■ Leaf margins with notches; leaf tip sometimes missing; nerve ending in leaf tip **220**

220 ■ Leaf base with sharp V-shaped division between colourless basal cells and green upper cells (remove a leaf) *Tortella tortuosa* (p. 428)

■ Leaf base with a few colourless cells, but no sharp V-shaped division from upper cells *Didymodon sinuosus* (p. 464)

221 ■ Plants on damp, calcareous rock faces **222**

(216) ■ Plants not on damp, calcareous rock faces **223**

222 ■ Leaf tip rounded (hand lens) *Gymnostomum aeruginosum* (p. 451)

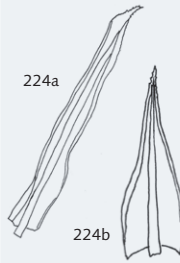
(221) ■ Leaf tip sharply pointed (hand lens) *Eucladium verticillatum* (p. 420)

223 ■ Leaves with narrow upper part composed mostly of nerve; (221) leaves never toothed at tip (hand lens) *Didymodon rigidulus* (p. 459)

■ Leaves with leaf blade continuing all the way to leaf tip; 1 or 2 obscure teeth near leaf tip (hand lens) **224**

224 ■ Leaf gradually tapering, then suddenly angled in at tip; upper leaves (223) dull, yellow-green and opaque. *Bryoerythrophyllum recurvirostrum* (p. 442)

■ Leaf gradually tapering all the way to the tip; leaves glossy green (or pink or reddish) and translucent *Ceratodon purpureus* (p. 354)



Other acrocarps growing on soil, etc.

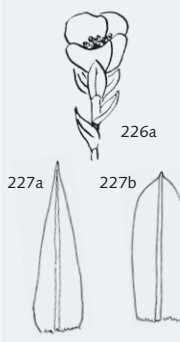
(Remember to rule out species in couplets 78–87)

225 ■ Stem with matted rhizoids among lower leaves; leaves sharply (87) tapering; margins recurved; plants glaucous green ... *Philonotis fontana* (p. 636)

■ Stem without matted rhizoids, or rhizoids very sparse; if leaves tapering and margins recurved, then plants yellow-green or mid-green ... **226**

226 ■ Leaves at tip of shoot forming a nest-like group, holding several (225) gemmae *Tetraphis pellucida* (p. 333)

■ Leaves not forming a nest; gemmae absent from shoot tip **227**



227 ■ Leaves tapering from base to tip **228**

(226) ■ Leaves parallel-sided until just below tip, or with egg-shaped outline ... **243**

228 ■ Minute (<3 mm tall) plants with capsules on very short seta, (227) hidden among leaves; capsules without differentiated lid (hand lens); leaves translucent **229**

■ Capsules on long seta or absent, mostly with differentiated lid; if seta very short, then plants >5 mm and leaves opaque **230**



229 ■ Bud-like plants arising from green mat of protonema; leaves (228) nerveless and with toothed margins *Ephemerum minutissimum/E. serratum* (p. 504)

■ Upright (but tiny) plants with no mat of protonema; leaves with faint nerves and without teeth *Pseudophemerum nitidum* (p. 341)

230 ■ Leaf margins wavy; leaf base with sharp, V-shaped division between (228) colourless basal cells and green upper cells (remove a leaf); robust, yellow-green cushions in limestone grassland *Tortella tortuosa* (p. 428)

■ Leaf margins not wavy; leaf base without V-shaped division **231**

231 ■ Leaf tip with a few teeth (hand lens) **232**

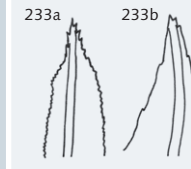
(230) ■ Leaf tip without teeth (hand lens) **234**

232 ■ Leaf margins recurved only in lower half of leaf; irregular teeth in (231) upper half of leaf *Dichodontium* spp. (pp. 361–362)

■ Leaf margins recurved almost to leaf tip (to upper 1/4 at least); teeth restricted to extreme tip **233**

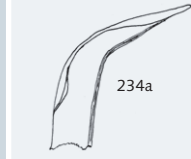
233 ■ Leaf gradually tapering, then abruptly angled in at tip; upper (232) leaves dull, yellow-green and opaque, lower leaves brick red *Bryoerythrophyllum recurvirostrum* (p. 442)

■ Leaf gradually tapering all the way to the tip; leaves glossy, green, pink or red, and translucent *Ceratodon purpureus* (p. 354)



234 ■ Leaves with very broad upright base then bent back 90° to (231) point away from stem *Dichodontium palustre* (p. 362)

■ Leaf tip not abruptly bent back: straight or gradually curved **235**



235 ■ Upper leaves curved to one side when viewed from above, (234) looking like a spiral **236**

■ Upper leaves straight, not looking like a spiral **237**

236 ■ Lower leaves with tip pointing downwards to the ground (235) *Didymodon fallax* (p. 457)

■ Lower leaves with tip at 90° to stem or angled up *Didymodon insulanus* (p. 463)

237 ■ Nerve ending below rounded leaf tip *Didymodon tophaceus* (p. 466)

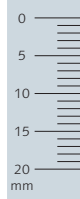
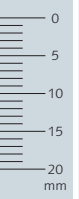
(235) ■ Nerve excurrent from or ending in acute leaf tip **238**

238 ■ Plants dark green; shoots 1 cm tall or taller; in tuft-forming (237) flushes *Hymenostylium recurvirostrum* (p. 447)

■ Plants yellow green; shorter than 1 cm; on dry, calcareous or acidic soil **239**

239 ■ Plants shiny and with translucent leaves **240**

(238) ■ Plants dull, leaves opaque **241**



240 ■ Most shoots short and upright; inclined capsules on long, purple seta. *Ceratodon purpureus* (p. 354)
 ■ Most shoots sprawling on the ground; spherical capsules with very short seta hidden by sheathing leaves. *Archidium alternifolium* (p. 339)

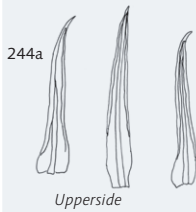


241 ■ Plants orange-green or brownish-green; leaves curved, with tip pointing slightly downwards *Didymodon fallax* (p. 457)
 ■ Plants yellow-green; leaves more or less straight **242**



242 ■ Leaf margins strongly recurved (margins recurved to nerve) all the way to leaf tip *Pseudocrossidium hornschuchianum* (p. 440)
 ■ Leaf margins slightly recurved and not all the way to leaf tip *Didymodon vinealis* (p. 462)

243 ■ Leaves parallel-sided until just below tip **244**
 (227) ■ Leaves with rounded outline **250**



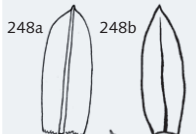
244 ■ Leaf margins turned upwards or incurved (hand lens) **245**
 (243) ■ Leaf margins plane or recurved (hand lens) **248**

245 ■ Leaf margins turned upwards; leaf tip hooded (shaped like the prow of a boat); capsules seldom present *Trichostomum crispulum* (p. 434)
 ■ Leaf margins incurved; capsules common (only identifiable in fruit) **246**

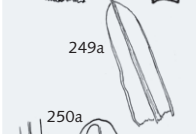
246 ■ Seta very short; spherical capsules hidden among leaves (245) *Weissia longifolia* (p. 427)
 ■ Seta >4 times the length of capsule, so capsules clearly visible **247**



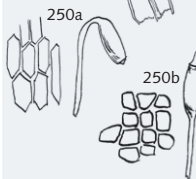
247 ■ Capsule with wide mouth; peristome present (although sometimes very hard to detect) *Weissia controversa* (p. 422)
 ■ Capsule with narrow mouth covered by a membrane; peristome absent. *Weissia brachycarpa* (p. 423)



248 ■ Nerve excurrent as short point. **249**
 (244) ■ Nerve ending in or below leaf tip. *Barbula convoluta/B. sardoa* (p. 454)



249 ■ Leaf margins recurved; capsules common *Barbula unguiculata* (p. 455)
 (248) ■ Leaf margins plane; capsules rare *Trichostomum brachydontium* (p. 433)



250 ■ Leaves with elongated cells (hand lens), usually translucent; capsules nodding (some species identifiable without capsules) (*Bryum* & *Pohlia*) **251**
 ■ Leaves with square cells (hand lens), usually looking opaque; capsules upright or hidden among leaves (only identifiable with capsules) (Pottiales) **258**



251 ■ Bulbils present in leaf axils (between leaves and stem) **252**
 (250) ■ No bulbils in leaf axils **253**

252 ■ Leaves <3 times as long as wide, concave and usually pressed to stem *Bryum dichotomum* (p. 595)
 ■ Leaves >3 times as long as wide, flat and held well back from stem *Pohlia annotina* (p. 607)

253 ■ Plants dark green; shoots with tightly appressed leaves often projecting above main colony; on peat or acidic soil *Pohlia nutans* (p. 605)
 ■ Plants mid-green or pale green; shoots without appressed leaves. **254**

254 ■ Leaves pale green, contrasting strongly with red stem; margins not recurved **255**
 (253) ■ Leaves and stem of similar colours; leaf margins recurved **256**

255 ■ Usually tall plants (>5 mm), occasionally smaller; usually forming loose tufts; strikingly pale, dull, whitish-green *Pohlia wahlenbergii* (p. 611)
 ■ Short plants (<5 mm); usually growing as scattered patches; shiny, pale green, but not almost white *Pohlia melanodon* (p. 610)

256 ■ Whole plants pale, vivid pink *Bryum pallens* (p. 584)
 (254) ■ Plants green, brown, red, etc., but not vivid pink. **257**



257 ■ Red, spherical tubers between leaves near stem base (hand lens) (256) *Bryum rubens* (p. 598)
 ■ Tubers, if present, only on long rhizoids (collect plants with ripe capsules if present, or small tufts if on disturbed soil, arable land or river banks) *Bryum* spp. (pp. 581–599)

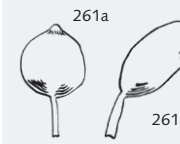


258 ■ Capsule completely covered by very large, pale calyptra with a long, drawn-out tip. *Encalypta vulgaris* (p. 556)
 ■ Calyptra short, not completely covering capsule, or capsules absent **259**



259 ■ Seta very short; capsule spherical, hidden among leaves (258) *Phascum cuspidatum* (p. 486)
 ■ Seta longer than capsule **260**

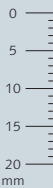
260 ■ Capsule spherical or egg-shaped, without a deciduous lid **261**
 (259) ■ Capsule oblong or wide-mouthed, with a separate lid **262**

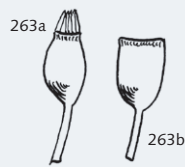


261 ■ Capsule spherical; tiny (<4 mm tall) plants *Microbryum rectum* (p. 488)
 (260) ■ Capsule egg-shaped; small (5–8 mm tall) plants *Protobryum bryoides* (p. 485)



262 ■ Capsule hardly longer than wide, with a wide mouth and no peristome *Tortula truncata* (p. 482)
 ■ Capsule at least 2 times as long as wide; peristome present or absent **263**



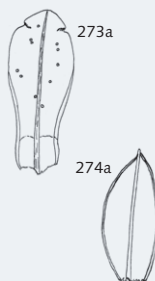
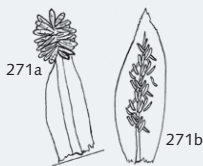
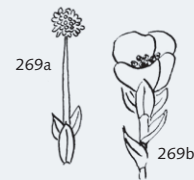


- 263 ■ Peristome present 264
(262) ■ Peristome absent 265
- 264 ■ Peristome at least 1/4 length of capsule; tall plants >8 mm
(263) *Tortula lanceola* (p. 481)
■ Peristome very short; tiny plants <5 mm tall
..... *Pottia davalliana*/*P. starkeana* (p. 487)
- 265 ■ Leaves with a few teeth near tip; tall (about 1 cm), brown
(263) plants on upper saltmarsh or salty cliff tops *Henediella heimii* (p. 491)
■ Leaves without teeth; green, or if brown then tiny (<5 mm) 266
- 266 ■ Tiny (<5 mm tall) plants with brown leaves *Pottia davalliana* (p. 487)
(265) ■ Tall (>8 mm) plants with green leaves *Tortula modica* (p. 483)

Other acrocarps growing on trees, logs, stumps, fences, etc.

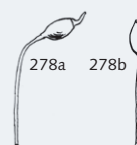
(Remember to rule out species in couplets 78–87)

- 267 ■ Gemmae clearly visible with 10 hand lens on shoot tip, on
(87) leaves or between leaves and stem 268
■ Gemmae absent or only clearly visible under a microscope 272
- 268 ■ Green gemmae on shoot tip; on decaying wood or acidic bark 269
(267) ■ Brown gemmae on leaves or between leaves and stem; on
bark of living trees 270
- 269 ■ Gemmae clustered on stalks projecting above shoot tips,
(268) giving the impression of pin-heads. *Aulacomnium androgynum* (p. 627)
■ Gemmae lying in a cup of leaves at shoot tip *Tetraphis pellucida* (p. 333)
- 270 ■ Gemmae looking like brown hairs between leaves and stem;
(268) leaves relatively short and wide, clearly <4 times as long as wide
..... *Bryum laevifilum* (p. 587)
■ Gemmae on the leaves themselves; leaves >4 times as long as wide. 271
- 271 ■ Clusters of brown gemmae like pom-poms on tip of leaves
(270) *Ulota phyllantha* (p. 664)
■ Gemmae abundant all over leaf surfaces *Orthotrichum lyellii* (p. 648)
- 272 ■ Mosses on trees by silty rivers 273
(267) ■ Mosses on trees away from silty rivers 276

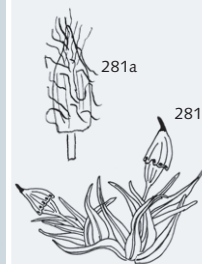


- 273 ■ Leaves with rounded outline and blunt tip, opaque, dirty
(272) green *Syntrichia latifolia* (p. 501)
■ Leaves with parallel sides or gradually tapering; translucent if
with rounded outline (*Bryum capillare*). 274
- 274 ■ Leaf margins much thicker than rest of leaf (20 hand lens), not
(273) recurved, nerve excurrent in short, blunt point . *Dialytrichia mucronata* (p. 446)
■ Leaf margins not thickened, sometimes recurved. 275

- 275 ■ Capsules partly hidden among leaves; leaf tip bluntly rounded;
(274) plants dark green *Orthotrichum rivulare*/*O. sprucei* (p. 650)
■ Not fitting all three of these characters. 276
- 276 ■ Leaves with rounded outline, corkscrew-curved when dry;
(275) nerve projecting from leaf tip as fine greenish or pale brown hair;
capsules pendulous *Bryum capillare* (p. 586)
■ Leaves parallel-sided or gradually tapering from base; nerve
ending in leaf tip; capsules not pendulous 277
- 277 ■ Plants vivid green; leaves very short (<2 mm long), with acute
(274) tip; leaves appressed to stem when dry, rapidly spreading when
wetted. 278
■ Plants dull green or with longer, blunter leaves; if vivid green
then leaves curled when dry 279



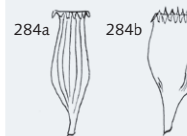
- 278 ■ Capsules on long, curved seta *Zygodon conoideus* (p. 642)
(277) ■ Capsules on long, straight seta or absent *Zygodon* spp. (pp. 642–645)
- 279 ■ Capsule on seta long enough to hold it well above leaves; leaves
(277) curled when dry 280
■ Capsule either hidden among leaves or only just visible projecting
from among them; leaves straight when dry. 282



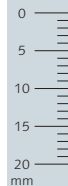
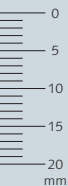
- 280 ■ Calyptra hairless and without dark tip; seta >5 times
(279) as long as capsule *Dicranoweisia cirrata* (p. 364)
■ Either calyptra very hairy, or with a dark tip 281
- 281 ■ Calyptra covered with abundant, orange-brown hairs; calyptra
(280) >3 times as long as wide, with hairs obscuring dark tip
..... *Ulota bruchii*/*U. crispa* (p. 658)
■ Calyptra with sparse, pale hairs; <3 times as long as wide,
with dark tip and with dark spots around its lower edge
..... *Orthotrichum pulchellum* (p. 652)

- 282 ■ Calyptra hairless, with dark tip contrasting strongly with
(279) papery, pale lower part; plants forming compact, rounded
cushions *Orthotrichum stramineum* (p. 653)
■ Calyptra hairy; plants loosely branched, or tiny and narrow 283

- 283 ■ Calyptra very narrow, pale green, >3 times as long as
(282) wide; plants <1 cm tall, with very narrow individual shoots
..... *Orthotrichum tenellum* (p. 651)
■ Calyptra <3 times as long as wide; plants >1 cm tall 284



- 284 ■ Dry capsules furrowed; leaves with acute tip . . . *Orthotrichum affine* (p. 647)
(283) ■ Dry capsules smooth; leaves with very narrow, sharply
pointed tip *Orthotrichum striatum* (p. 646)



Pleurocarps



- 285 ■ Some or all of the leaves ending in almost white hair point (4) **Branched acrocarps (115, p. 33)**
- Leaves lacking almost white hair point (no true pleurocarps have hair points) **286**
- 286 ■ Shoots not strongly flattened in one plane **287**
- (285) ■ Shoots strongly flattened in one plane **288**
- 287 ■ Leaves strongly curved and turned downwards or to one side, (286) at least near tip of shoots **297** (p. 51)
- Leaves straight or evenly spreading-recurved, not turned to one side, even at the shoot tip **323** (p. 54)

Pleurocarps with shoots strongly flattened in one plane



- 288 ■ Plants growing as fans on trees, calcareous rocks or walls **289**
- (286) ■ Plants growing in patches on soil or rotting wood **292**
- 289 ■ Leaves transversely wrinkled **290**
- (288) ■ Leaves not transversely wrinkled **291**
- 290 ■ Shoots 4–5 mm wide at tip, often golden brown; mostly on (289) calcareous rocks **Neckera crispa** (p. 680)
- Shoots 1.5–3 mm wide at tip, pale green; on trees and shrubs in western woodlands **Neckera pumila** (p. 681)
- 291 ■ Nerve short and single, but hard to see with a hand lens; (289) shoots brownish, with leaves curving down on either side, giving a rounded back to branches; loose, untidy habit; looks like a leafy liverwort **Homalia trichomanoides** (p. 683)
- Nerve absent; branches with leaves less down-curved; plant forming dense, pale whitish-green patches **Neckera complanata** (p. 682)



- 292 ■ Leaves tapering gradually to an acute tip; often down-curved (288) at tip **293**
- Leaves not gradually tapering; flat or concave, but not obviously down-curved **294**



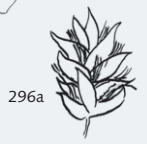
- 293 ■ Long nerve present **Leptodictyum riparium** (p. 707)
- (292) ■ Nerve absent, or very short and double **Hypnum jutlandicum** (p. 806)



- 294 ■ Shoots 6–8 mm wide; leaves about 5 mm long and 3 mm (292) wide, translucent, with rounded tip and extremely large cells that are easily seen with a hand lens **Hookeria lucens** (p. 667)
- Shoots 4–5 mm wide or less; leaves smaller, less translucent, more or less parallel-sided, acute-tipped; individual cells scarcely visible with a hand lens **295**



- 295 ■ Shoots robust (4–5 mm wide), strikingly pale green, scarcely (294) glossy; leaves transversely wrinkled **Plagiothecium undulatum** (p. 785)
- Shoots medium-sized (2–4 mm wide), deeper green, moderately to very glossy; leaves not wrinkled **296**



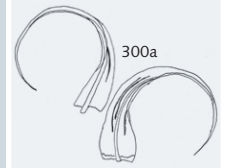
- 296 ■ Plant slender, forming neat patches with many parallel shoots (295) about 1 mm wide; minute, deciduous branchlets often present in axils of some leaves **Pseudotaxiphyllum elegans** (p. 788)
- Plant larger; shoots lacking deciduous branchlets **Plagiothecium spp.** (pp. 779–785)

Pleurocarps with leaves strongly curved or turned downwards or to one side (at least near the tip of shoots)

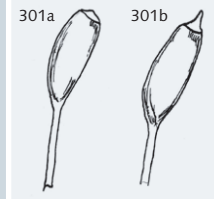
- 297 ■ Stems red; robust, rigid, irregularly pinnately branched; (287) abundant in upland woods and on hillsides in the north and west **Rhytidiadelphus loreus** (p. 817)
- Stems green, or almost black; habitats various **298**
- 298 ■ On trees **299**
- (297) ■ On some other substrate **302**



- 299 ■ Leaves only slightly curved, nerve present; capsules <2 times as (298) long as wide, with short beak to lid **Brachythecium velutinum** (p. 745)
- Leaves moderately to strongly curved, often forming almost complete circles, nerve present or absent; capsules >2 times as long as wide **300**



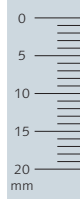
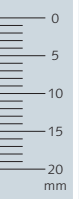
- 300 ■ Leaves very narrow, very strongly curved, forming complete (299) circles up to about 3 mm in diameter; nerved more or less to leaf tip; leaves with longitudinal folds **Sanionia uncinata** (p. 728)
- Leaves moderately to strongly curved; nerveless and without longitudinal folds **301**



- 301 ■ Capsules frequent in winter, with a very short lid; plants (300) consistently very slender, appearing combed down vertical surfaces **Hypnum andoi** (p. 804)
- Capsules occasional in winter, with a long-beaked lid; plants very variable in size and appearance **Hypnum cupressiforme** (p. 802)

- 302 ■ On dry ground, soil, wall tops, stony ground, etc. **303**
- (298) ■ In wetlands, marshes, flushes or bogs, or on wet rocks by streams and lakes **307**

- 303 ■ Plant with numerous nearly erect shoots, themselves sparingly (302) branched; glossy, very pale green plant of grassy banks, etc., chiefly on acidic soils **Brachythecium albicans** (p. 741)
- Shoots mainly prostrate or ascending, with numerous pinnate branches **304**





304 ■ Branches very crowded; shoot tip contrastingly pale green, (303) the leaves strongly curled in various directions; abundant in calcareous habitats. *Ctenidium molluscum* (p. 812)

■ Branches not crowded; all leaves regularly curved and turned downwards (but not strongly curled as above) **305**

305 ■ Pale to silvery green species of heathland and other acidic (304) ground; shoots flattened and pinnately branched. *Hypnum jutlandicum* (p. 806)

■ Green, olive, or bronzed, prostrate species on rocks, tiles or base-rich soil **306**

306 ■ Glossy, bronzed, robust species of base-rich, often sandy (305) ground or calcareous rocks; leaves 2–3 mm long *Hypnum lacunosum* var. *lacunosum* (p. 803)

■ Green or brown, prostrate species of stones, tiles, wall tops, etc.; leaves up to 2 mm long *Hypnum cupressiforme* (p. 802)

307 ■ On rocks by lakes, streams or waterfalls. **308**

(302) ■ On peaty or other soil, in marshes, bogs or pools. **315**

308 ■ Plant dark red-brown, purple-brown or blackish-green; (307) primary stem prostrate with long (8–15 cm), little branched, nearly prostrate secondary shoots **309**

■ Plant yellowish-green to golden; secondary shoots either short, erect and nearly simple, or long and freely branched **310**

309 ■ Leaves with strong nerve extending to leaf tip. *Scorpidium revolvens* (p. 723)

(308) ■ Leaves without a nerve *Scorpidium scorpioides* (p. 721)

310 ■ Primary stem prostrate, with short, nearly simple, erect (308) or ascending secondary shoots. **311**

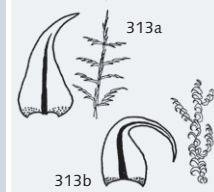
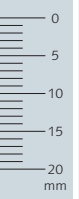
■ Shoots long and freely branched, often regularly pinnate **312**

311 ■ Shoots dark green below and more golden at tip; leaves large, (310) down-turned and crowded; leaf tip acute *Brachythecium plumosum* (p. 751)

■ Shoots dull yellowish-green to brownish; leaves small, tightly curved and not crowded; leaf tip blunt *Hygrohypnum luridum* (p. 731)

312 ■ Red-brown rhizoids present on the stem; leaves equally (310) curved throughout; strong nerve present. **313**

■ Red-brown rhizoids absent from the stem; leaves more strongly curved at shoot tip than elsewhere; nerve absent **314**



313 ■ Leaves on any one shoot all curved in one direction, but not (312) so much that the tip curls round and back towards the leaf base; rhizoids sparse on stem *Cratoneuron filicinum* (p. 701)

■ Leaves uniformly and strongly curved; older stems with abundant, red-brown rhizoids *Palustriella commutata* (p. 698)/*P. falcata* (p. 699)

314 ■ Young shoots very small and crowded, their leaves strongly (312) curled; on calcareous rocks *Ctenidium molluscum* (p. 812)

■ Young shoots not crowded, often elongated, their leaves only lightly curved; mainly on siliceous rocks by waterfalls, etc. *Hycomium armoricum* (p. 813)

315 ■ Leaves very short (<2 mm long) **316**

(307) ■ Leaves longer than 2 mm **318**



316 ■ Branches at shoot tip very slender and crowded, their leaves (315) strongly curled; nerve absent. *Ctenidium molluscum* (p. 812)

■ Branches at shoot tip not very crowded, their leaves only slightly curved; distinct nerve present **317**

317 ■ Sparse, red-brown outgrowths on lower part of (316) stem (hand lens) *Cratoneuron filicinum* (p. 701)

■ Stem entirely without outgrowths below *Drepanocladus aduncus* (small forms) (p. 714)



318 ■ Leaves without a nerve, crowded, noticeably broad, concave (315) and shortly pointed at the tip; dark red-brown, purplish or blackish-green plant with long, prostrate, little-branched shoots *Scorpidium scorpioides* (p. 721)

■ Leaves with a nerve, and finely pointed **319**

319 ■ Leaves strongly pleated *Palustriella commutata* (p. 698)/*P. falcata* (p. 699)

(318) ■ Leaves not pleated **320**

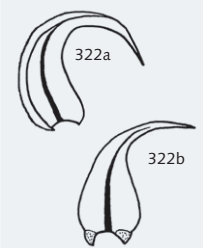


320 ■ Leaves strongly and uniformly curved (almost to form a circle); (319) shoots prostrate, little-branched, dark red *Scorpidium revolvens* (p. 723)

■ Either leaves strongly curved, but plants upright, or shoots prostrate/floating, but most leaves only slightly curved. **321**

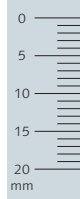
321 ■ Sprawling plants in lowland ditches (*D. aduncus*) or bog pools (320) (*W. fluitans*); only identifiable with a microscope *Drepanocladus aduncus* (p. 714)/*Warnstorfia fluitans* (p. 717)

■ Upright plants in flushes or fens. **322**



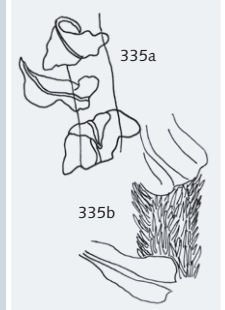
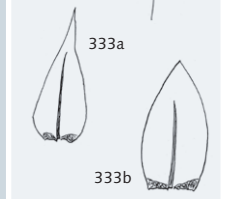
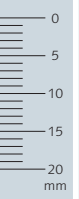
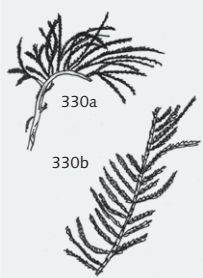
322 ■ Leaves strongly curved (almost to form a circle), relatively (321) short and broad; shoots often mottled green and red, not orange; no prominent inflated, colourless cells at basal angles of leaves *Scorpidium cossonii* (p. 722)

■ Leaves moderately curved (tip pointing more or less at right angle to stem), relatively long and narrow; shoots usually orange or light green; prominent group of inflated, colourless cells at basal angles of leaves *Warnstorfia exannulata* (p. 716)

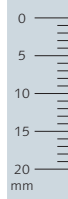


Pleurocarps with leaves not turned to one side, even near the tip of shoots

- 323 ■ Plant aquatic, growing submerged (periodically) in streams, (287) rivers or lakes. 324
 - Plant not aquatic 328
- 324 ■ Shoots triangular in cross-section; leaves long (5 mm), keeled, (323) strictly in 3 ranks *Fontinalis antipyretica* (p. 670)
 - Shoots not triangular in cross-section. 325
- 325 ■ Shoots very long, narrow (<3 mm wide) and string-like; dark (324) green, with appressed, round-backed leaves *Fontinalis squamosa* (p. 671)
 - Shoots not string-like 326
- 326 ■ Leaves with thickened margins easily visible through a 10 hand lens (325) *Cinclidotus fontinaloides* (an acrocarp) (p. 502)
 - Leaves without thickened margins 327
- 327 ■ Tip of shoots flat; leaves wide and bluntly pointed; nerve not (326) quite reaching tip. *Platyhypnidium riparioides* (p. 758)
 - Tip of shoots not flat; leaves narrow and gradually tapering to tip; nerve very thick, reaching leaf tip *Cratoneuron filicinum* (p. 701)/*Hygroamblystegium* spp. (p. 706)
- 328 ■ Very large plants (>12 cm long), habit bushy; stems rigid, (323) erect, red, and branched from the base; leaves 3–5 mm long *Rhytidiadelphus triquetrus* (p. 816)
 - Plants and leaves not so large. 329
- 329 ■ Appressed patches on bark with fruiting stems projecting, and (328) abundant capsules on short seta (less than capsule length) along one side of shoots *Cryphaea heteromalla* (p. 672)
 - Capsules, if present, with seta longer than capsules; not appressed to bark 330
- 330 ■ Secondary shoots somewhat tassel-like or resembling (329) miniature trees, with erect or ascending, almost bare main stem and crowded branches above 331
 - Plants lacking this tree-like or nearly tree-like habit 334
- 331 ■ Stems thick, rigid, and blackish-green or dark brown, (330) unbranched for several centimetres, so that habit is markedly tree-like; in grassy places, on calcareous rocks or woodland floor. 332
 - Stems thin, weak and not dark green, with some branches almost to base, so that habit tassel-like or nearly tree-like; on tree bases or acidic rocks 333



- 332 ■ Stems erect; leaves 2–3 mm long, branches originating from (331) the same level on the main stem, so looking like miniature palm trees; in moist, grassy places *Climacium dendroides* (p. 674)
 - Stems sub-erect or arched; leaves about 1 mm long, branches arising from different places on the main stem; on shaded, calcareous rocks, woodland floor, etc. *Thamnobryum alopecurum* (p. 684)
- 333 ■ Stem leaves finely drawn out at tip; branches appear slender and (331) acutely pointed; capsules curved, inclined *Isothecium myosuroides* (p. 736)
 - Stem leaves only shortly pointed; branches usually appear relatively stout and bluntly pointed; capsules straight, erect *Isothecium alopecuroides* (p. 737)
- 334 ■ Shoots regularly bi- or tripinnate in one plane, hence frond-like (330) or feather-like 335
 - Shoots simple or only once pinnate, or irregularly branched. 337
- 335 ■ Shoots not symmetrically tripinnate; stem without outgrowths, (334) so apparently shiny; branch leaves <1 mm long, much narrower than stem leaves; leaves with prominent nerve *Kindbergia praelonga* (p. 767)
 - Shoots symmetrically tripinnate; stem with abundant outgrowths, so appearing fuzzy and dull; leaves with or without a nerve. 336
- 336 ■ Stems green or almost black, rigid; leaves not glossy, vivid (335) green, yellow-green or orange, whole plant very opaque *Thuidium tamariscinum* (p. 696)
 - Stems red, not rigid; leaves glossy, pale or dull yellowish green, whole plant appearing translucent *Hylocomium splendens* (p. 821)
- 337 ■ Stems red or orange-red; nerve absent 338
 - (334) ■ Stems green or yellowish; nerve present or absent. 342
- 338 ■ Leaves straight, with very short point or rounded at tip, (337) appressed or slightly spreading; branching usually very regularly pinnate 339
 - Leaves curved, with broad base and long, acute tip which is widely spreading or recurved; branching most often irregular (sometimes pinnate) 340
- 339 ■ Uppermost leaves rolled together (even when moist) to (338) form sharp, spearhead shoot tip, lower leaves rather widely spreading; growing in damp places, including lawns *Calliergonella cuspidata* (p. 797)
 - Spearhead shoot tip normally lacking (at least when moist), lower leaves not widely spreading; chiefly heath and moorland *Pleurozium schreberi* (p. 815)



- 340 ■ Leaf tip straight or slightly curved back; stem with abundant, (338) fuzzy outgrowths (hand lens); irregular bushy growth form *Loeskeobryum brevirostre* (p. 820)
- Leaves strongly curved; stem lacking outgrowths; more or less pinnate 341

- 341 ■ Plant robust (shoots >4 mm wide), with strong, rigid, freely (340) branched stems; leaves curved gradually from base to long, fine, hook-like tip; upland woods and mountain slopes *Rhytidiadelphus loreus* (p. 817)
- Plant of medium size (shoots <3 mm wide), with relatively weak, little-branched stems; leaves abruptly bent outwards above short, clasping base, divergent tip straight and scarcely hook-like; grassy places (very common) *Rhytidiadelphus squarrosus* (p. 818)

- 342 ■ Semi-aquatic: in flushes, marshes or on rocks or tree bases (337) by water 343
- Not semi-aquatic; habitat various 351

- 343 ■ Nerve absent 344
- (342) ■ Leaves with nerve 346

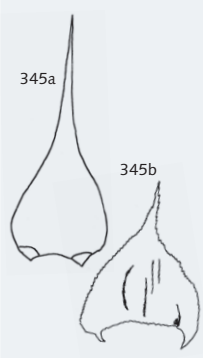
- 344 ■ Uppermost leaves rolled together to form sharp, spearhead (343) shoot tip *Calliergonella cuspidata* (p. 797)
- Uppermost leaves not forming a spearhead 345

- 345 ■ Leaves with long point, much narrower than leaf base; (344) uppermost leaves widely spreading in conspicuously star-like manner; in calcareous flushes. *Campylium stellatum* (p. 709)
- Leaves small (about 1 mm), without narrow upper part; secondary stems with long, slender branches; dark green plant with golden shoot tips; on rocks by waterfalls and upland streams *Hyocomium armoricum* (p. 813)

- 346 ■ Leaves very short (<1.5 mm long); capsules abundant; (343) tiny yellowish-green plant on silty tree bases by rivers *Leskea polycarpa* (p. 689)
- Leaves longer (>1.5 mm long); colour not yellowish-green. 347

- 347 ■ Leaf tip obtuse, rounded or hooded; shoots upright in wetlands 348
- (346) ■ Leaf tip sharply pointed 349

- 348 ■ Leaves overlapping; shoots string-like; rhizoids growing from (347) leaf tip. *Straminergon stramineum* (p. 720)
- Leaves widely spreading; shoots not string-like; no rhizoids on leaf tip. *Calliergon cordifolium* (p. 719)



- 349 ■ Tip of shoots flat; leaves egg-shaped and shortly pointed; (347) plant deep green or brown; older stems often nearly bare of leaves; always by or in running water *Platyhypnidium riparioides* (p. 758)
- Leaves narrower, with rather long, fine point; plant mid-green; older stems not bare of leaves. 350

- 350 ■ Secondary stems with numerous short, nearly erect branches; (349) leaves crowded and not widely spreading; tip of branches light yellowish-green and very glossy *Brachythecium rivulare* (p. 748)
- Habit usually creeping, with irregular or pinnate branching; leaves rather distantly spaced and widely spreading; tip of branches darker green and not very glossy. *Leptodictyum riparium* (p. 707)

- 351 ■ Leaves minute (0.5 mm long), only just distinguishable with (342) the naked eye 352
- Leaves larger (1 mm or over), easily seen with the naked eye 353

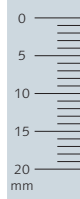
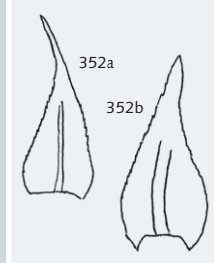
- 352 ■ Leaves >3 times as long as wide, with very long, narrow (351) tip; usually on wood, stone, walls, etc. *Amblystegium serpens* (p. 702)
- Leaves about 2 times as long as wide, with relatively short tip; usually on soil *Rhynchostegiella pumila* (p. 773)

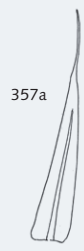
- 353 ■ Leaves bluntly rounded, or abruptly contracted into minute (351) point at tip. 354
- Leaves gradually tapering to acute point. 356

- 354 ■ Leaves opaque, not glossy, much shrivelled and curled when (353) dry; yellow-green plant of calcareous banks or limestone *Anomodon viticulosus* (p. 694)
- Leaves translucent, glossy, little altered when dry; habitats various. 355

- 355 ■ Uppermost leaves rolled together to form sharp, spearhead (354) shoot tip; shoots green or occasionally orange-green; very common in wet lawns, fens, flushes, etc. *Calliergonella cuspidata* (p. 797)
- Spearheads lacking, shoot tip appearing blunt and rounded; branches swollen with concave leaves; usually pale green; very common on dry, grassy banks, woodland floor, etc. *Pseudoscleropodium purum* (p. 753)

- 356 ■ Plant with numerous, fine branches on which the leaves are (353) much smaller and narrower than on the main stems; forming untidy, usually deep green, straggling mats on shaded banks, etc. *Kindbergia praelonga* (p. 767)
- Plant lacking very fine, small-leaved branches, and less intricately branched; leaves nearly equal in size throughout shoot 357



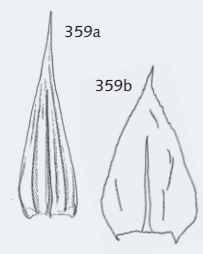


357 ■ Tiny plants with abundant, short branches and very narrow (356) (>4 times as long as wide), gradually tapering, short (≤ 1.5 mm long) leaves with no pleats; common on wall mortar and limestone *Rhynchostegiella tenella* (p. 771)

■ Plants larger, with longer leaves; leaves with or without pleats **358**

358 ■ Leaves without nerve, leaves pointing up from substrate in the (357) same direction to form a crest; plants creeping, usually olive-green *Hypnum resupinatum* (p. 805)

■ Leaves with a nerve, not pointing up from substrate **359**



359 ■ Leaves strongly and obviously pleated (hand lens); narrowly (358) spearhead-shaped, tapering gradually from base to a rather long, fine tip, usually 2–2.5 mm long; plants very glossy **360**

■ Leaves not or scarcely pleated (except *Eurhynchium striatum*, p. 764), often <2 mm long, rather abruptly narrowed above the middle to form fairly short, fine point; dull or glossy **361**

360 ■ Bright green, with silky sheen, creeping on walls, boulders (359) or tree bases; branches curved when dry *Homalothecium sericeum* (p. 738)

■ Yellowish, of loose habit with ascending branches; in calcareous grassland or sand dunes; branches always straight *Homalothecium lutescens* (p. 739)

361 ■ Robust; leafy shoots (stem and stem leaves) 2 mm or more (359) across, leaves 1.5–2.5 mm long and 1 mm broad at base **362**

■ Slender; leafy shoots (stem and stem leaves) 1 mm across, leaves distinctly smaller than above **365**

362 ■ Shoots upright, glossy pale green, with spearhead shoot tip; (361) leaves very concave, with a fine wispy point at the tip *Cirriphyllum piliferum* (p. 756)

■ Plants either irregularly branched or creeping, without spearhead shoot tip **363**

363 ■ Shoots usually with long (>1.5 cm), upright branches, rarely (362) creeping; leaves appressed to stem, making shoots string-like; plants very pale or yellowish-green *Brachythecium albicans* (p. 741)

■ Shoots creeping or with short (<1 cm) branches; shoots not string-like **364**

364 ■ Stems and branches rather rigid, forming big, bushy tufts; (363) leaves evenly and widely spreading when dry; stem leaves heart-shaped to triangular, with strong longitudinal pleats; capsule lid long-beaked *Eurhynchium striatum* (p. 764)

■ Stems creeping, with soft, irregular ascending branches, not forming bushy tufts; leaves less regularly and widely spreading when dry, broadly egg-shaped to spearhead-shaped and not or only faintly pleated; lid of capsule not long-beaked *Brachythecium rutabulum* (p. 746)

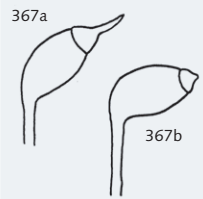


365 ■ Leaves rather widely spaced on stems and branches so that (361) they hardly overlap; common on soil *Oxyrrhynchium hians* (p. 768)

■ Leaves less widely spaced, so that many overlap **367**

366 ■ Shoots with long (>1.5 cm), upright branches; leaves appressed (365) to stem, making shoots string-like; plants very pale or yellowish-green *Brachythecium albicans* (p. 741)

■ Shoots creeping or with short (<1 cm) branches; shoots not string-like **367**



367 ■ Capsule lid long-beaked; seta smooth (not identifiable in the (366) field without capsules). **368**

■ Capsule lid not long-beaked; seta roughened (not identifiable in the field without capsules). **369**

368 ■ Leaves more or less flat; plants mid-green; forming loose, (367) irregularly branched mats *Rhynchostegium confertum* (p. 761)

■ Leaves very concave; plants pale green; forming neat patches of rather tightly packed branches *Rhynchostegium murale* (p. 760)

369 ■ Long, narrow leaves with nerve almost reaching the tip; (367) roughened in upper half; mostly on rocks, especially in the west *Brachythecium populeum* (p. 744)

■ Relatively shorter, wider leaves, with nerve reaching $\frac{3}{4}$ of the way up leaf; seta roughened throughout; on rocks, trees or soil, mostly in the east *Brachythecium velutinum* (p. 745)

