

**Flora Briofítica Ibérica - *Grimmia* key (Muñoz *et al.*, 2015),  
translated from Spanish by R D Porley)**

- 1. Hyaline hairpoint ciliate.....***G. horrida***
- 1. Hyaline hairpoint smooth or toothed, or leaves without hairpoint.....2
- 2. Basal marginal cells of lamina oblate.....***G. laevigata***
- 2. Basal marginal cells isodiametric or rectangular.....3
- 3. Leaves broadly oval, very concave; plants in water courses.....***G. mollis***
- 3. Leaves linear, lanceolate, oval or obovate, slightly concave; not in water.....4
- 4. Laminal cells with scattered papillae, papilla large.....***G. elatior***
- 4. Laminal cells smooth or with very small indistinct papillae, occasionally pseudopapillose.....5
- 5. Capsule asymmetric, ventricose at base.....6
- 5. Capsule symmetric at base, or specimens sterile.....8
- 6. Leaves spatulate or obovate; calyptra cucullate.....***G. crinita***
- 6. Leaves lanceolate, oval-lanceolate or oblong; calyptra mitrate.....7
- 7. Capsule gymnostomus; mature perichaetial leaves similar to vegetative leaves although larger.....***G. anodon***
- 7. Capsule with well-developed peristome, very rarely rudimentary but always above the mouth of the urn; mature perichaetial leaves hyaline with chlorophyllus zone at apex and area adjacent to nerve, well-differentiated from vegetative leaves, but can be overlooked.....***G. crinitoleucophaea***
- 8. Basal marginal cells all with equally thin walls.....9
- 8. Basal marginal cells with more heavily thickened transverse walls than longitudinal walls.....14
- 9. Leaf margins plane throughout.....10
- 9. Leaf margins recurved, sometimes less on one side or in part.....12
- 10. Capsule immersed; seta shorter than the capsule; walls of exothecial cells thickened (> 3 µm).....***G. triformis***
- 10. Capsule emergent or exerted; seta longer than the capsule; walls of exothecial cells thin (< 3 µm).....11
- 11. Seta curved; hairpoint spirally twisted or very flexuose.....***G. arenaria***

11. Seta erect; hairpoint straight or slightly flexuose.....**G. donniana**
12. Leaves curled when dry; hairpoint of perichaetial leaves up to 1 mm.....**G. incurva**
12. Leaves straight or slightly flexuose, but not curled when dry; hairpoint of perichaetial leaves up to 0.3 mm, leaves occasionally without hairpoint.....13
13. Plants dark green to almost black; leaves in upper part formed almost exclusively of nerve, brittle.....**G. incurva**
13. Plants olive green, brownish, reddish, or brownish-black, at high altitudes or in very exposed situations; leaves in upper part with nerve and lamina well-defined, not brittle.....**G. elongata**
14. Leaves strongly crisped when dry.....**G. torquata**
14. Leaves straight or flexuose when dry.....15
15. Propagules on leaf apices.....16
15. Propagules sessile on laminal cells on dorsal side of leaves, or on filaments originating from nerve in leaf axils, or propagules absent.....17
16. Propagules green, yellowish-green, yellowish or pale orange; nerve lacking dorsal ridges; stem with central strand.....**G. anomala**
16. Propagules orange or red; nerve generally with dorsal ridges, stem lacking central strand.....**G. hartmanii**
17. Leaves always without hairpoint.....18
17. Leaves, including perichaetial leaves, with hyaline or yellowish hairpoint of variable length.....20
18. Leaf margins plane.....**G. unicolor**
18. Leaf margins recurved at least on one side, or in part.....19
19. Leaf apex acuminate; nerve with ridges or angular on dorsal side, sometimes convex (especially in west of Peninsula).....**G. ramondii**
19. Leaf apex obtuse (although narrow); nerve without superficial projections on dorsal side.....**G. atrata**
20. Nerve in transverse section scarcely differentiated from lamina, dorsal surface of leaves smooth.....21
20. Nerve in transverse section clearly differentiated from lamina, leaves keeled with prominent nerve dorsally.....23
21. Basal paracostal cells elongate-rectangular (4 - 8:1), walls nodulose; mature perichaetial leaves chlorophyllose, similar to vegetative leaves; seta longer than capsule.....**G. ovalis**

21. Basal paracostal cells isodiametric or short-rectangular (1.5 - 3.5:1), walls straight; mature perichaetial leaves hyaline with chlorophyllus zone at apex and area adjacent to nerve, clearly differentiated from vegetative leaves, but can be overlooked; seta shorter than capsule.....22
22. Seta straight; capsule symmetric at base; plants growing on limestone.....**G. tergestina**
22. Seta curved or sigmoid; capsule ventricose; plants normally growing on acid or neutral rocks.....**G. crinitoleucophaea**
23. Nerve in TS with dorsal ridges variable in depth and number of cells, winged or irregularly triangular, flattened or angulate on dorsal surface.....24
23. Nerve in TS semi-circular on dorsal surface, in upper part regularly angular.....27
24. Nerve in TS toward leaf base with two layers of guide cells; lamina almost wholly 2-4-stratose; leaf cells protuberant or irregularly projecting on both surfaces, also scattered papillae, occasionally surfaces of lamina smooth.....**G. elatior**
24. Nerve in TS toward leaf base with one layer of guide cells; lamina unistratose or partially bistratose, especially towards the leaf margins; laminal cells without protuberances or papillae....25
25. Nerve in TS 2 guide cells wide on ventral surface; stem with central strand.....**G. muehlenbeckii**
25. Nerve in TS 2-6 guide cells wide on ventral surface; stem without central strand.....26
26. Leaves without hyaline hairpoint, at the most apex with a few yellowish cells; propagules lacking.....**G. ramondii**
26. Leaves with hyaline hairpoint; orange to reddish propagules on leaf apices (sometimes they are all detached; check out substratum).....**G. hartmanii**
27. Leaf margins plane.....28
27. Leaf margins recurved, less on one side or partially.....32
28. Leaf cells protuberant (bulging) on both surfaces [note: sterile specimens cannot always be confidently identified].....29
28. Leaf cells not protuberant or protuberances only on one surface.....31
29. Leaves with very marked longitudinal plicae each side of nerve, in TS usually with very small lumens and thickened walls, giving appearance of secondary nerves; laminal cells in upper half with small papillae.....**G. caespiticia**
29. Leaves without plicae, or with less marked plicae and in TS lacking differentiated cells; laminal cells in upper half smooth.....30
30. Dioicous; urn fusiform; capsule brownish, the same colour as the peristome, without stomata in the neck region; exothecial cells with heavily thickened walls (> 3µm).....**G. alpestris**

30. Cladautoicous or gonioautoicous; urn ovoid; capsule straw-coloured, the colour clearly different from the peristome, with stomata in the neck region; exothelial cells thin walled (< 3 µm).....**G. reflexidens**
31. Leaves when moist patent or spreading, not sigmoid when viewed laterally; capsule straw-coloured, the colour clearly different to peristome, with stomata in neck region.....**G. reflexidens**
31. Leaves when moist with basal part appressed, upper part spreading with apex curved toward stem, sigmoid when viewed laterally; capsule brownish, with peristome the same colour, without stomata in neck region.....**G. montana**
32. Nerve in TS reniform, 2-6 guide cells on ventral surface.....33
32. Nerve in TS semi-circular, 2 guide cells on ventral surface.....37
33. Stems ascending and plants dioicous.....34
33. Stems erect and plants cladautoicous or stem ascending and plants gonioautoicous.....36
34. Basal paracostal cells elongate-rectangular (5-15:1).....**G. ramondii**
34. Basal paracostal cells short-rectangular (1.5-6:1).....35
35. Nerve in TS reniform, with dorsal nerve contour regularly convex; leaves spreading to squarrose when moist, margin plane towards apex (leaves lacking folds and flatten easily in preparation); stem with central strand.....**G. lisae**
35. Nerve in TS semi-circular, irregularly furrowed or with ribs, with dorsal nerve surface irregular; leaves patent or somewhat secund when moist, strongly keeled towards apex (leaves always remain folded longitudinally along nerve in preparation); stem without central strand.....**G. hartmanii**
36. Gonioautoicous, perigonia axillary at base of perigonal bracts; seta curved; capsule furrowed; hairpoint of upper leaves patent or spreading, with many sharp teeth.....**G. decipiens**
36. Cladautoicous, perigonia terminal; capsule smooth; hairpoint erect, scarcely toothed.....**G. longirostris**
37. Leaves lingulate or elliptical; when hairpoint lacking differentiated from forms with hairpoint, having apex more or less cucullate.....38
37. Leaves oval or lanceolate, when hairpoint lacking not differentiated from forms with hairpoint.....40
38. Seta up to 1 mm long, erect; capsule immersed.....**G. capillata**
38. Seta more than 1.5 mm long, curved; capsule exerted.....39
39. Gonioautoicous, perigonia axillary at base of perigonal bracts; calyptra mitrate.....**G. pulvinata**
39. Cladautoicous; perigonia terminal; calyptra cucullate.....**G. orbicularis**

40. Leaves when dry clearly disposed in spiral rows around stem; flagelliform shoots cymbiform, strongly keel-shaped without a hyaline point.....**G. funalis**
40. Leaves when dry not in spiral rows around stem; flagelliform shoots lacking.....41
41. Lamina bistratose in upper  $\frac{2}{3}$ , 2-3(4)-stratose at margins, propagules lacking.....**G. reflexidens**
41. Lamina unistratose or partially bistratose in upper  $\frac{2}{3}$ , rarely almost uniformly bistratose, margins bistratose in apex; propagules formed on laminal cells, liberation causing breakdown of leaves.....42
42. Nerve in TS towards base of leaf with 2 layers of guide cells, 1-3 lower ones smaller than the ventral surface cells; basal paracostal cells smooth or slightly nodulose; basal marginal cells elongate-rectangular (2-5:1).....**G. trichophylla**
42. Nerve in TS towards base with single layer of guide cells; basal paracostal cells usually clearly nodulose; basal marginal cells isodiametric or short-rectangular (1-3:1).....43
43. Guide cells toward leaf base elliptical in TS, with its axes forming a 'V'; basal paracostal cells elongate-rectangular (3-7:1), the walls thickened and with small lumens forming a yellowish zone contrasting with the colour of the rest of the leaf base, a pattern that is only slightly discernible inside shoots at low magnification (4-10x).....**G. meridionalis**
43. Guide cells towards leaf base circular in TS; basal paracostal cells rectangular (2-5:1), the walls not thickened, not forming small cell lumens, not contrasting in colour with rest of leaf base, a pattern that is easily discernible inside shoots at low magnification (4-10x).....**G. dissimulata**

END

#### Reference

**Muñoz, J., Cezón, K., Hespanhol, H. & Quandt, D. 2015.** *Grimmia*. In: Flora briofítica Ibérica, Volumen II, Universidad e Murcia & Sociedad Española de Briología, pp. 210-261.

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