## Descriptions

*Equisetum arvense* L.

“Common Horsetail”. The rhizomes dark brown to black, dull, hairy; bearing tubers (often, these ovoid), or not tuberous. The shoots conspicuously dimorphic: the cone-bearing stems thick, unbranched, brown and non-assimilating, appearing in early spring and withering before the emergence of the sterile, branched, green, persistent ones (or rarely, the fertile stems persist and become green). The brown, non-assimilating fertile stems 10–25 cm high; about 4–6 mm in diameter (erect, smooth, somewhat succulent); with only 4 to 6 relatively distant sheaths; sheaths 6–12 toothed. The main stems of assimilating shoots, 20–80 cm high; 3–5 mm in diameter; erect to decumbent; bright green; slightly rough; bearing whorls of slender branches at the nodes; dying down in autumn. The main stem internodes 6–19 grooved; grooves deep, with prominent ridges between. Central hollow much less than half the diameter of the internode to about half the diameter of the internode (from one third to two thirds its diameter); endodermis comprising a single layer outside the ring of vascular bundles. The main stem sheaths pale; about as broad as long ((1-)3–8(-10) mm long, 1–9 mm wide); 6–19 toothed (as many teeth as grooves, but the teeth often more or less cohering in pairs). The teeth one ribbed (the ribs reaching to their tips); subulate, acute, green with blackish tips. The primary branching symmetrical. The primary branches numerous (about ten or twelve); spreading to drooping; usually simple (sometimes with a hint of secondary branching). The primary branch internodes (3–)4 grooved. The primary branch sheaths 4 toothed (the teeth triangular-lanceolate, acuminate, somewhat spreading, pale). The first branch internodes at least as long as the subtending sheaths, at least on the upper parts of the stem. The primary branch internodes solid. Stomata not sunken. The cones 1–4 cm long; blunt. Spores released in April. **Distribution.** Arctic and north temperate, from Greenland to S. Spain, Crete, central China, Virginia, Alabama and California. Common throughout the British Isles, in fields, hedgebanks, waste land, dune-slacks, etc., ascending to nearly 1000 m. **Classification.** Subgenus Equisetum; Section *Vernalia*.

*Equisetum fluviatile* L.

“Water Horsetail”. *E. limosum* L.; *E. heleocharis* Ehrh. The rhizomes light brown, glabrous, smooth, with black roots; bearing tubers (according to Le Maout & Decaisne), or not tuberous (according to Goebel). The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 50–140 cm high; 2–12 mm in diameter; more or less erect; smooth; bearing whorls of slender branches at the nodes (around the middle), or simple; dying down in autumn. The main stem internodes 10–30 grooved; grooves fine, the ribs between them not prominent. The main stem internodes with a central hollow; central hollow much more than half the diameter of the internode (4/5 or more); endodermis surrounding the individual vascular bundles. The main stem sheaths green; loose to appressed (somewhat loose); 10–30 toothed (as many as the grooves). The teeth not ribbed; subulate, small (about 1 mm), black tipped. The primary branching asymmetrical. The primary branches numerous; ascending; when present, simple (slender, ascending). The primary branch internodes usually 5 -angled. The primary branch sheaths 4–5 toothed (the teeth moderate, subulate, green or blackish). The first branch internodes about as long as or shorter than the subtending sheaths. The primary branch internodes hollow. Stomata not sunken. The cones 1–2 cm long; blunt. Spores released June to July. **Distribution.** Europe, from Iceland and arctic Russia to central Spain, Italy, Macedonia and the Caucasus; temperate Asia; North America, from Labrador and Alaska to Virginia and Oregon. Common throughout the British Isles, in shallow water at edges of ponds and lakes and in ditches, less often in fens and marshes, ascending to almost 1000 m. **Classification.** Subgenus Equisetum; Section *Aestivalia*.

*Equisetum hyemale* L.

“Dutch Rush”, “Scouring Rush”. The rhizomes not tuberous. The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 30–100 cm high; 4–6 mm in diameter; erect; dull green (glaucous); very rough (on the ridges, these with two regular rows of tubercles); simple; persisting through the winter. The main stem internodes somewhat swollen; 10–30 grooved; grooves moderately deep. The main stem internodes with a central hollow; central hollow about half the diameter of the internode to more than half the diameter of the internode (2/3 or more); endodermis comprising two layers, one outside and the other inside the ring of vascular bundles. The main stem sheaths soon whitish, black-banded at top and bottom; about as broad as long (3–9 mm); appressed; 10–30 toothed (as many as the grooves). The teeth caducous (leaving the sheaths with crenulate upper edges). Stomata sunken. The cones 8–15 cm long; apiculate. Spores released July to August. **Distribution.** Europe, from Iceland and northern (not arctic) Russia to central Spain, Corsica, northern Italy, Crete and the Caucasus; northern and central Asia; and western North America south to California and New Mexico. In Britain, from Somerset and Kent to Sutherland, very rare in southern England and Wales, scattered over Ireland. In shady moist places, to about 550 m. **Classification.** Subgenus Hippochaete.

*Equisetum* × *litorale* Kühlew. ex Rupr.

The rhizomes often(?) bearing tubers. The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 50–140 cm high; 2–12 mm in diameter; erect; slightly rough; bearing whorls of slender branches at the nodes; dying down in autumn. The main stem internodes 10–30 grooved; grooves fine, the ribs between them not prominent. The main stem internodes with a central hollow; central hollow much less than half the diameter of the internode to about half the diameter of the internode (1/3 to 1/2); endodermis surrounding the individual vascular bundles. The main stem sheaths green; loose (the upper sheaths with dilated mouths); 10–30 toothed (as many as the grooves). The teeth not ribbed; appressed, black tipped. The primary branching symmetrical to asymmetrical (?). The primary branches numerous; ascending; simple (slender, ascending). The primary branch internodes 5 -angled (with 4 or five subulate, green or blackish teeth). The primary branch sheaths 4–5 toothed (?). The first branch internodes much shorter than the subtending sheaths to at least as long as the subtending sheaths, at least on the upper parts of the stem. The primary branch internodes hollow. Stomata not sunken. The cones 0.5–1 cm long; blunt. Spores abortive. **Comments.** Stems more deeply grooved than in *E. fluviatile*, with twice the number of green bands, and more branches. **Distribution.** Occurring sometimes, and then often abundant, where both parent species are present. **Classification.** Subgenus Equisetum; Section *Aestivalia*; = *E. arvense* × *E. fluviatile*.

*Equisetum* × *moorei* Newm.

*E. occidentale* (Hy) Coste. The rhizomes not tuberous. The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 30–100 cm high; 4–6 mm in diameter; erect; dull green (glaucous); very rough (on the ridges, these with two regular rows of tubercles); simple; dying down in autumn (at least, to near the base). The main stem internodes not swollen; 10–30 grooved; grooves moderately deep. The main stem internodes with a central hollow; central hollow about half the diameter of the internode to more than half the diameter of the internode (about 3/5). The main stem sheaths soon whitish, black-banded at top and bottom; longer than broad; somewhat loose; 10–30 toothed (as many teeth as grooves). The teeth persistent (at least, more so than in *E. hyemale*, dark brown, truncate). Stomata sunken. The cones 8–15 cm long; apiculate. Spores abortive. **Distribution.** Western and central Europe, the detailed distribution uncertain owing to problems of identification. In the British Isles, known from maritime dunes and banks in Wicklow and Wexford, and from one locality in Surrey. **Classification.** Subgenus Hippochaete; = *E. hyemale* x *E. ramosissimum*.

*Equisetum palustre* L.

“Marsh Horsetail”. The rhizomes often(?) bearing tubers. The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 10–60 cm high; 1–3 mm in diameter; erect, or decumbent; slightly rough; bearing whorls of slender branches at the nodes (usually, but often irregularly), or sparingly branched, the branches solitary and similar to the main stem, or simple; dying down in autumn. The main stem internodes not swollen; 4–8 grooved; grooves deep, with prominent ridges between. The main stem internodes with a central hollow; central hollow much much less than half the diameter of the internode (small, scarcely larger than the outer canals); endodermis comprising a single layer outside the ring of vascular bundles. The main stem sheaths green; 4–12 mm; loose; 4–8 toothed. The teeth one ribbed; triangular-subulate, blackish, with narrow, whitish-scarious margins; persistent (?). The primary branching symmetrical to asymmetrical (often irregular). The primary branches few to numerous; ascending to spreading; simple (spreading to sub-erect, often short). The primary branch internodes 4–5 grooved; 4–5 grooved. The primary branch sheaths 4 toothed (these short, appressed, black-tipped). The first branch internodes much shorter than the subtending sheaths. The primary branch internodes hollow. Stomata not sunken. The cones 1–3 cm long; blunt. Spores released May to July. **Distribution.** Europe, from Iceland and northern (not arctic) Russia to central Spain and northern Portugal, Sicily, Greece and the Caucasus, temperate Asia; and North America, from Newfoundland and Alaska to Connecticut and Oregon. Common throughout the British Isles, in bogs, fens, marshes and wet heaths, woods and meadows, ascending to nearly 1000 m. **Classification.** Subgenus Equisetum; Section *Aestivalia*.

*Equisetum pratense* Ehrh.

“Shady Horsetail”. *E. umbrosum* Meyer ex Willd. The rhizomes black, dull, hairy only on the sheaths; not tuberous. The shoots distinguishable as fertile and sterile: both types produced at the same time, but those bearing cones remaining non-green and unbranched until after spore dispersal, and only later becoming green and branching so as to resemble the sterile stems vegetatively. The main stems 20–60 cm high (sterile), or 20–25 cm high (fertile); 1–2 mm in diameter (measurement available only for sterile stems); erect; green; very rough (in sterile stems); bearing whorls of slender branches at the nodes (the sterile stems, sometimes also in the mature fertile stems), or simple (fertile stems, commonly); dying down in autumn. The main stem internodes 8–20 grooved. The main stem internodes with a central hollow (in sterile stems); central hollow about half the diameter of the internode to more than half the diameter of the internode (about half or rather more, according to Clapham *et al*.); endodermis comprising a single layer outside the ring of vascular bundles. The main stem sheaths 3–8 mm long in sterile stems; 8–20 toothed (on sterile stems), or 10–20 toothed (on fertile stems). The teeth of sterile stem sheaths brown with a blackish rib, acute, subulate in sterile; those on sterile stems pale with dark ribs; persistent. The primary branching symmetrical. The primary branches numerous; spreading (usually), or spreading to drooping; simple (and numerous, in both fertile and steriles stems). The primary branch internodes 3(–4) grooved. The primary branch sheaths 3(–4) toothed (the teeth deltoid, acute). The first branch internodes of sterile stems at least as long as the subtending sheaths, at least on the upper parts of the stem (though sometimes shorter on the lower parts of the stem). The primary branch internodes solid. Stomata not sunken. The cones 1.5–4 cm long; blunt. Spores released in April. **Comments.** The identity of Sowerby & Johnson’s illustration of “*E. umbrosum*” needs checking, in view of the erecto-patent branching and blunt-topped shape of the sterile stem depicted. **Distribution.** Europe, from Iceland and arctic Russia to eastern France, Tirol, Rumania and the Caucasus; northern and central Asia, and North America from Nova Scotia and Alaska to New Jersey and Colorado. In the British Isles, in scattered (mainly eastern) localities from Yorkshire and Westmorland to Orkney, and in Ireland in Fernanagh, Donegal and Antrim. Grassy stream banks, etc., ascending to about 1000 m. **Classification.** Subgenus Equisetum; Section *Subvernalia*.

*Equisetum ramosissimum* Desf.

The rhizomes not tuberous. The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 50–75 cm high; greyish green; very rough to slightly rough (with scattered tubercles); bearing whorls of slender branches at the nodes (at least on their lower halves); persisting through the winter. The main stem internodes not swollen; 8–20 grooved; grooves moderately deep. The main stem internodes with a central hollow; central hollow about half the diameter of the internode to more than half the diameter of the internode (1/2 to 2/3); endodermis comprising two layers, one outside and the other inside the ring of vascular bundles. The main stem sheaths green at first, then brown with a black band at the bottom; about 8 mm long. The teeth black, with narrow white margins and a hairlike apex; persistent. The primary branches numerous. The first branch internodes much shorter than the subtending sheaths (about a third its length). The primary branch internodes hollow. Stomata sunken. The cones 0.6–1.2 cm long; apiculate. Spores released May to August. **Comments.** The available descriptions are poor. **Distribution.** Europe from Loire, southern Bavaria and central Russia southwards, and in isolated localities in Brittany, the Netherlands, and northern Germany; Asia, Africa and America. In Britain, first found on a grassy stream bank near Boston (S. Lincolnshire) in 1947. **Classification.** Subgenus Hippochaete.

*Equisetum sylvaticum* L.

“Wood Horsetail”. The rhizomes light brown, smooth and shiny, hairy; bearing tubers, or not tuberous. The shoots distinguishable as fertile and sterile: both types produced at the same time, but those bearing cones remaining non-green and unbranched until after spore dispersal, and only later becoming green and branching so as to resemble the sterile stems vegetatively. The main stems 10–80 cm high (sterile), or 10–40 cm high (fertile); 1–4 mm in diameter; erect; bright green; slightly rough to smooth; bearing whorls of slender branches at the nodes (the branches numerous, fewer and shorter on the fertile stems), or simple (perhaps occasionally, when fertile); dying down in autumn. The main stem internodes not swollen; 10–18 grooved (in sterile stems). The main stem internodes with a central hollow; central hollow about half the diameter of the internode to more than half the diameter of the internode (a half to two thirds); endodermis comprising a single layer outside the ring of vascular bundles. The main stem sheaths green or greenish; 5–10 mm long; ostensibly 3–6 toothed (seemingly having joined teeth, these represented by the 3–6 broad, subacute, brown lobes). The teeth about 3 ribbed; persistent. The primary branching symmetrical. The primary branches numerous (10 to 16 or more per whorl); drooping (towards their ends); delicately secondarily branched (at least proximally, lending the plant its characteristic elegance). The primary branch internodes 3–4 grooved; 3–4 grooved. The primary branch sheaths 3–4 toothed (the teeth long, subulate). The first branch internodes at least as long as the subtending sheaths, at least on the upper parts of the stem. The primary branch internodes solid. Stomata not sunken. The cones 1.5–2.5 cm long; blunt. Spores released April to May. **Distribution.** Europe, from Iceland and Scandinavia to northern Spain, northern Italy, Crete and the Caucasus; temperate Asia; North America from Newfoundland and Alaska to Virginia and Iowa; southern Greenland. Throughout the British Isles except for some midland and southern counties and the Channel Isles; associated with acid soils in damp woods and moors, ascending to about 1000 m. **Classification.** Subgenus Equisetum; Section *Subvernalia*.

*Equisetum telmateia* Ehrh.

“Great Horsetail”. *E. maximum* auct. The rhizomes dark brown, rough; bearing tubers (often, these pear-shaped), or not tuberous. The shoots conspicuously dimorphic: the cone-bearing stems thick, unbranched, brown and non-assimilating, appearing in early spring and withering before the emergence of the sterile, branched, green, persistent ones. The brown, non-assimilating fertile stems 20–40 cm high; with numerous sheaths and relatively short internodes; sheaths 20–30 toothed. The main stems of assimilating shoots, 100–200 cm high; 10–12 mm in diameter; erect; dirty whitish, with no chlorenchyma; bearing whorls of slender branches at the nodes (these numerous, regular); dying down in autumn. The main stem internodes not swollen; 20–40 grooved; grooves fine, the ribs between them not prominent. The main stem internodes with a central hollow; central hollow about half the diameter of the internode to more than half the diameter of the internode (2/3 to 3/4); endodermis comprising a single layer outside the ring of vascular bundles. The main stem sheaths pale, blackish above; about 4 cm long; loose; 20–40 toothed (as many as the grooves). The teeth two ribbed; blackish, subulate; persistent. The primary branching symmetrical. The primary branches numerous; spreading; simple (regular, spreading). The primary branch internodes 4 grooved. The primary branch sheaths 20–30 toothed (the teeth dark). The first branch internodes much shorter than the subtending sheaths. The primary branch internodes solid. Stomata on the sheaths not sunken (the internodes lacking stomata, as well as chlorenchyma). The cones 4–8 cm long; blunt. Spores released in April. **Distribution.** Europe, from Sweden, Denmark and the Black Sea region southwards, Asia Minor and the Caucasus; North Africa; Azores and Madeira; and north-western North America from British Columbia to Ohio. In the British Isles, locally distributed throughout England, Wales and Ireland, absent from north-eastern Scotland; in damp, shady places, ascending to about 400 m. **Classification.** Subgenus Equisetum; Section *Subvernalia*.

*Equisetum* × *trachyodon* A. Br.

“Mackay’s Horsetail”. *E. mackaii* Newman. The rhizomes not tuberous. The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 30–100 cm high; 2–4 mm in diameter; erect to decumbent; greyish green; very rough; sparingly branched, the branches solitary and similar to the main stem, or simple; persisting through the winter. The main stem internodes not swollen; 8–12 grooved; grooves moderately deep. The main stem internodes with a central hollow; central hollow much less than half the diameter of the internode (about 1/3); endodermis comprising two layers, one outside and the other inside the ring of vascular bundles. The main stem sheaths at first green with a black band at the top, but becoming entirely black; 2–4 mm long; appressed. The teeth four ribbed; subulate, usually black; persistent. The primary branches when present, simple. Stomata sunken. The cones only about 0.5 cm long (often deformed and partly abortive); apiculate. Spores abortive. **Distribution.** Iceland, Norway, Upper Rhineland; south-west Greenland; northern temperate North America. Largely confined in the British Isles to Scotland (Aberdeen and Kincardine by the Dee, and Perth), and Ireland (widespread there, but absent from the centre and most of the south-east); on shady banks of lakes and streams. **Classification.** Subgenus Hippochaete; = *E. hyemale* × *E. variegatum*.

*Equisetum variegatum* Schleich. ex Web. & Mohr

“Variegated Horsetail”. *E. wilsonii* Newman. The rhizomes not tuberous. The shoots all green and alike vegetatively, the sterile and cone-bearing shoots emerging at the same time. The main stems 15–60 cm high; very slender, 1–3 mm in diameter; decumbent (commonly), or erect to decumbent; green; slightly rough (the ridges with two regular rows of minute tubercles); sparingly branched, the branches solitary and similar to the main stem, or simple; persisting through the winter. The main stem internodes not swollen; 4–10 grooved; grooves moderately deep. The main stem internodes with a central hollow; central hollow much less than half the diameter of the internode (about 1/3); endodermis comprising two layers, one outside and the other inside the ring of vascular bundles. The main stem sheaths green, black banded at the top; about 2–4 mm long; rather loose; 4–10 toothed (as many teeth as grooves). The teeth four ribbed; scarious, except for a blackish centre, triangular- or ovate-lanceolate, at first subulate; persistent (but the subulate tip falling). The primary branches if present, simple. Stomata sunken. The cones 0.5–0.7 cm long; apiculate. Spores released July to August. **Distribution.** Arctic and north temperate regions of Europe, Asia and North America, extending from Greenland to the Pyrenees, northern Italy, Thrace, Caucasus, Mongolia, Connecticut abd Oregon. Widespread in the British Isles, on dunes, river banks, wet ground on mountains, etc., ascending to about 500 m in Kerry (var. *wilsonii* in Kerry only, usually in shallow water). **Classification.** Subgenus Hippochaete.