

AUSTRALIAN BIOLOGICAL RESOURCES STUDY



FLOODPLAIN FLORA

A flora of the coastal floodplains
of the Northern Territory, Australia

I. D. Cowie, P. S. Short & M. Osterkamp Madsen

Parks & Wildlife Commission of the Northern Territory



FLORA OF AUSTRALIA SUPPLEMENTARY SERIES NUMBER 10

Extract:

Key to Families of Macroalgae and Vascular Plants

II. FLORA OF THE FLOODPLAINS

KEY TO FAMILIES OF MACROALGAE AND VASCULAR PLANTS

- 1 Foliage completely submerged **Group 1**
- 1: Foliage floating at water surface or emergent or plants terrestrial..... 2
 - 2 Plants free-floating; roots trailing in water (1:) **Group 2**
 - 2: Plants aquatic or terrestrial; rooted in substrate..... 3
- 3 True floating leaves present (submerged or emergent leaves may also be present) (2:)..... **Group 3**
- 3: True floating leaves absent; stems and foliage partly or completely emergent (submerged leaves may also be present) or plants terrestrial..... 4
 - 4 Vines; trailing, twining or climbing by tendrils (3:) **Group 4**
 - 4: Herbs, shrubs or trees..... 5
- 5 Herbs (stems not woody), usually less than 1.5 m tall (4:)..... **Group 5**
- 5: Shrubs or trees (stems woody), usually more than 1.5 m tall **Group 6**

Group 1

Aquatics with foliage and stems entirely submerged (flowers may be emergent); plants either rooted in substrate or free-floating. (Note: sterile submerged individuals belonging to the genera *Ammannia*, *Aponogeton*, *Elatine*, *Hygrophila*, *Limnophila*, *Microcarpaea*, *Pogostemon*, *Rotala* and *Triglochin* key out to leads 3 and 11 of this group. Fertile parts present on foliage-bearing emergent stems are necessary for further identification.)

- 1 Plants bearing oogonia or antheridia **Characeae** (macroalgae) (p. 41)
- 1: Plants lacking oogonia or antheridia..... 2
 - 2 Plants with sporangia in the basal part of the leaf; leaves basal, linear (1:) **Isoetaceae** (p. 43)
 - 2: Sporangia absent; plants reproducing by flowers and seeds; leaves cauline (spaced along a stem) or basal, variously shaped..... 3
- 3 Leaves all basal (2:) **Hydrocharitaceae** (p. 193)
- 3: Leaves mostly cauline..... 4
 - 4 Leaves alternate or irregularly arranged (3:) 5
 - 4: Leaves opposite or whorled 9
- 5 Leaves finely divided (4) **Haloragaceae** (p. 102)
- 5: Leaves entire or serrate, filiform to oblong..... 6
 - 6 Flowers arranged in heads or spikes (5:) 7
 - 6: Flowers solitary or few in the axils 8
- 7 Flowers in small more or less globular heads to 10 mm diam. (6)..... **Eriocaulaceae** (p. 223)
- 7: Flowers in spikes..... **Potamogetonaceae** (p. 204)
- 8 Foliage clustered at nodes; petiole sheathing at base; female flowers sessile (6:) **Najadaceae** (p. 206)
- 8: Foliage mostly well-spaced; petiole not sheathing at base; female flowers borne on long slender peduncles..... **Hydrocharitaceae** (p. 193)
- 9 Leaves bearing traps, either bladder-like or of a folded leaf blade; plants free-floating (4:)..... 10
- 9: Leaves lacking traps; plants usually rooted in substrate..... 11
 - 10 Flowers yellow or blue; leaves bearing bladder-like traps (9) **Lentibulariaceae** (p. 167)
 - 10: Flowers white; leaves with folded blades, forming traps..... **Droseraceae** (*Aldrovanda*) (p. 83)

- 11 Leaves entire or serrate, linear to ovate (9:)..... 12
- 11: Leaves deeply divided..... 13
- 12 Leaves whorled; petiole not sheathing at base; sheath not auriculate (11).....
.....**Hydrocharitaceae** (*Hydrilla*) (p. 196)
- 12: Leaves in pseudowhorls; petiole sheathing at base; sheath auriculate**Najadaceae** (p. 206)
- 13 Flowers and fruits sessile, borne underwater; plants free-floating or loosely attached (no true roots)
(11:)..... **Ceratophyllaceae** (p. 61)
- 13: Flowers pedunculate, emergent (held above water surface) at anthesis; rooted in substrate.....
..... **Cabombaceae** (p. 61)

Group 2

Free-floating aquatic plants; foliage at surface of water or emergent.

- 1 Leaves or fronds clearly emergent (held above water surface) 2
- 1: Leaves or fronds floating at surface of water 4
- 2 Foliage borne along a stem (1)..... **Salviniaceae** (p. 48)
- 2: Foliage basal (plants rosetted); rosettes sometimes joined by stolons 3
- 3 Leaves with well-developed petioles (often spongy and swollen) 3–75 cm long (2:)
.....**Pontederiaceae** (*Eichhornia*) (p. 330)
- 3: Leaves sessile or on short petioles to 2 cm long **Araceae** (*Pistia*) (p. 215)
- 4 Leaves (fronds) 8–35 mm long (1:)..... **Salviniaceae** (p. 48)
- 4: Leaves (fronds) less than 9 mm long..... 5
- 5 Fronds minute, in 2 alternate rows along a slender rhizome; upper surface papillate (4:).....
..... **Azollaceae** (p. 49)
- 5: Fronds minute or more than 1 mm long, cohering in groups of 2–several, glabrous throughout.....
..... **Lemnaceae** (p. 216)

Group 3

Aquatic plants with floating leaves at surface of water; plants rooted in substrate.

- 1 Leaves (fronds) with 4 leaflets **Marsileaceae** (p. 45)
- 1: Leaves simple..... 2
- 2 Leaves linear to narrowly elliptic (1:)..... 3
- 2: Leaves ovate to orbicular, sagittate (arrowhead-shaped) or horseshoe-shaped 7
- 3 Leaves peltate (with petiole attached centrally to the undersurface) (2) **Cabombaceae** (p. 61)
- 3: Leaves with petiole attached to base of blade..... 4
- 4 Leaves cauline (arranged along an elongated stem); leaf sheath well-developed (3:) 5
- 4: Leaves largely basal; leaf sheath poorly developed..... 6
- 5 Flowers unisexual, subtended by 2 scarious bracts (palea and lemma); perianth absent or reduced to
scales (4)..... **Poaceae** (*Hygrochloa*) (p. 295)
- 5: Flowers bisexual; perianth of 4 minute tepals **Potamogetonaceae** (p. 204)
- 6 Leaves 1–6 cm wide, linear to narrowly elliptic; margins often undulate (4:).....
..... **Aponogetonaceae** (p. 200)
- 6: Leaves 0.1–0.4 cm wide, linear..... **Juncaginaceae** (p. 203)
- 7 Leaves peltate (with petiole attached centrally to the undersurface) (2:) **Nelumbonaceae** (p. 53)
- 7: Leaves with petiole attached to base of blade, or at the apex of a deep sinus 8

Key to families

- 8 Leaf blade less than 1 cm long; base attenuate to rounded (7:):..... 9
- 8: Leaf blade usually much greater than 1 cm long; base cordate or with a deep sinus 10
- 9 Leaves opposite; perianth 5-merous (8) **Scrophulariaceae** (*Peplidium*) (p. 162)
- 9: Leaves alternate; perianth 4-merous **Haloragaceae** (p. 102)
- 10 Inflorescence a pyramidal panicle; leaves with scalariform (ladder-like) secondary venation (8:):.....
..... **Alismataceae** (p. 192)
- 10: Inflorescence not as above; secondary venation reticulate or obscure 11
- 11 Flowers arising singly from the base of the plant (10:):..... **Nymphaeaceae** (p. 54)
- 11: Flowers arising in pairs along an elongated stem or in clusters from just below a leaf (*i.e.* from the junction of the petiole and stem) **Menyanthaceae** (p. 130)

Group 4

Vines, either emergent aquatics or terrestrial; trailing, twining or climbing by tendrils.

- 1 Tendrils present 2
- 1: Tendrils absent; plants trailing or twining 4
- 2 Tendrils borne in inflorescences; leaves biternate (1) **Sapindaceae** (p. 119)
- 2: Tendrils at nodes of stem or leaf-opposed; leaves simple or 3-foliolate, lobed or dentate 3
- 3 Leaves 3-foliolate, glabrous to finely hairy (2:):..... **Vitaceae** (p. 118)
- 3: Leaves simple or lobed, hispid to scabrid **Cucurbitaceae** (p. 83)
- 4 Leaves 3-foliolate (1:):..... **Fabaceae** (p. 91)
- 4: Leaves simple 5
- 5 Leaves opposite; stems more or less woody (4:):..... **Verbenaceae** (*Clerodendrum*) (p. 143)
- 5: Leaves alternate; stems herbaceous or woody 6
- 6 Clear latex present; stamens connate into a tubular staminal column (gynostegium) inserted at base of corolla tube; fruit a follicle (5:):..... †**Asclepiadaceae**
- 6: Clear latex absent (milky latex sometimes present); stamens either inserted on corolla tube (epipetalous) or free and inserted on an inferior ovary (epigynous); fruit a capsule or berry 7
- 7 Flowers all unisexual; stems woody (6:):..... **Euphorbiaceae** (*Phyllanthus*) (p. 117)
- 7: Flowers bisexual; stems herbaceous 8
- 8 Stems trailing; some roots modified to form white spongy spindle-shaped floats when in water; ovary inferior; seeds numerous (7:):..... **Onagraceae** (p. 109)
- 8: Stems twining; float roots absent; ovary superior; seeds 6 or fewer **Convolvulaceae** (p. 124)

† One species, *Cynanchum carnosum* (R.Br.) Schltr., occurs at the rear of mangrove communities, in other coastal habitats and occasionally at springs. It is a slender twining vine with clear latex and opposite, narrowly elliptic to broadly elliptic leaves. This species is not treated further in this book.

Group 5

Herbs (stems not woody), usually less than 1.5 m tall.

- 1 Plants not reproducing by seeds, but by spores (ferns and fern allies) 2
- 1: Plants reproducing by seeds (flowering plants) 5
- 2 Plants tufted and grass-like, with sporangia in the basal part of the leaf (1) **Isoetaceae** (p. 43)
- 2: Plants not grass-like, with sporangia borne on the undersurface of fronds or borne in sporocarps on pedicels arising from a slender rhizome (true ferns) 3

- 3 Sporangia borne in sporocarps on pedicels arising from a slender rhizome (2:):..... **Marsileaceae** (p. 45)
- 3: Sporangia borne on the undersurface of pinnate fronds 4
- 4 Fronds 1–3-pinnate; leaflets filiform to irregularly lobed (3:):..... **Parkeriaceae** (p. 50)
- 4: Fronds 1-pinnate; leaflets regularly serrate **Thelypteridaceae** (p. 50)
- 5 Leaves with parallel venation (except Araceae), usually basal; petiole sheathing at base; flowers with perianth segments (sepals and petals) usually in whorls of 3 (2 in Philydraceae, often apparently absent in Poaceae, Cyperaceae, Araceae and Typhaceae); coloured petals or petal-like segments present or absent (monocots) (1:):..... 6
- 5: Leaves usually with reticulate venation, cauline (spread along a stem); petiole usually not sheathing at base; flowers with perianth segments usually in whorls of 4 or 5; coloured petals or petal-like segments mostly present (dicots):..... 16
- 6 Flowers lacking coloured petals or perianth segments; flowers unisexual or bisexual (5)..... 7
- 6: Flowers with coloured (white, yellow, blue or purple) petals or perianth segments; flowers bisexual 11
- 7 Flowers closely packed in a dense spike (spadix), with a convolute spathe arising from the base (6) **Araceae** (p. 214)
- 7: Spathe sometimes present, but inflorescence not as above and often branched 8
- 8 Flowers bisexual or unisexual, each enclosed by imbricate bracts or scales, arranged in heads or spikelets; perianth absent or of 1–8 scales or bristles, usually concealed within bracts (7:):..... 9
- 8: Flowers always unisexual, imbricate bracts or scales absent; perianth present or of bristles 10
- 9 Ligule usually absent; margins of leaf-sheath often connate; each flower subtended by a single bract (glume); awns absent (8):..... **Cyperaceae** (p. 239)
- 9: Ligule present (at junction of leaf sheath and blade); margins of leaf-sheath free or overlapping; each flower (floret) subtended by a pair of opposing bracts (palea and lemma); awns often present..... **Poaceae** (p. 278)
- 10 Inflorescence a large open terminal panicle; male and female flowers on separate plants (8:):..... **Hanguanaceae** (p. 336)
- 10: Inflorescence crowded, spike-like; male and female flowers on the same plant..... **Typhaceae** (p. 326)
- 11 Leaves cauline (6:):..... **Commelinaceae** (p. 220)
- 11: Leaves all or mostly basal 12
- 12 Inflorescence an umbel or 1-flowered scape; corolla white to pink (11:):..... 13
- 12: Inflorescence a head, spike-like, racemose or a panicle of spikes; corolla yellow, blue or purple 14
- 13 Style 1, gynoecium inferior (12):..... **Liliaceae** (p. 334)
- 13: Styles several, gynoecium superior..... **Limnocharitaceae** (p. 190)
- 14 Perianth segments 4 (12:):..... **Philydraceae** (p. 328)
- 14: Perianth segments 6, rarely 5 15
- 15 Inflorescence a globular to cylindrical head or dense spike; flowers in the axils of spirally arranged imbricate bracts (14:):..... **Xyridaceae** (p. 219)
- 15: Inflorescence few- to many-flowered, spike-like or racemose, sometimes contracted; imbricate bracts absent..... **Pontederiaceae** (p. 330)
- 16 Leaves strongly dimorphic; submerged leaves deeply divided with filiform lobes; emergent leaves entire or serrate (5:):..... 17
- 16: Leaves all similar; submerged leaves absent or linear to ovate, not deeply divided or plants terrestrial 18
- 17 Perianth 5-merous; fruit a capsule; leaves opposite or whorled (16):..... **Scrophulariaceae** (p. 154)
- 17: Perianth 4-merous; fruit a schizocarp of 2 or 4 mericarps; leaves alternate, irregular, or whorled **Haloragaceae** (p. 102)
- 18 Leaves compound (16:):..... 19
- 18: Leaves simple 22

Key to families

- 19 Leaves with 3 leaflets or with 5 digitately arranged leaflets (18) **Fabaceae** (p. 91)
- 19: Leaves with more than 3 leaflets, the leaflets pinnately or bipinnately arranged..... 20
- 20 Leaves bipinnate (19:):.....**Mimosaceae** (p. 85)
- 20: Leaves pinnate 21
- 21 Flowers zygomorphic (bilaterally symmetrical); leaflets usually in 8–50 pairs (20:) **Fabaceae** (p. 91)
- 21: Flowers actinomorphic (radially symmetrical); leaflets in 2–5 pairs **Caesalpiniaceae** (p. 89)
- 22 Leaves opposite or whorled (18:):..... 23
- 22: Leaves alternate 36
- 23 Flowers lacking true perianth; plants with milky latex (22) **Euphorbiaceae** (*Euphorbia*) (p. 115)
- 23: Flowers with perianth; milky latex absent..... 24
- 24 Ovary inferior or semi-inferior (23:):..... 25
- 24: Ovary superior 26
- 25 Flowers numerous, in a compact head; anthers fused to one another (24)..... **Asteraceae** (p. 180)
- 25: Flowers few, axillary; anthers free from each other but attached to corolla tube..... **Rubiaceae** (p. 176)
- 26 Petals or perianth segments joined at base (24:) 27
- 26: Petals or perianth segments free 32
- 27 Ovary divided into 4 separate segments; style gynobasic (26) **Lamiaceae** (p. 153)
- 27: Ovary entire or lobed; style terminal 28
- 28 Flowers more or less actinomorphic (radially symmetrical) (27:):..... 29
- 28: Flowers zygomorphic (bilaterally symmetrical)..... 30
- 29 Stamens 2 (28) **Acanthaceae** (*Nelsonia*) (p. 165)
- 29: Stamens 4..... **Verbenaceae** (p. 142)
- 30 Calyx 2-lobed (28:):..... **Verbenaceae** (*Phyla*) (p. 143)
- 30: Calyx 4- or 5-lobed 31
- 31 Calyx 4- or 5-lobed; capsule loculicidal, often dehiscing explosively; seeds often attached to hooked processes (retinacula) arising from the septum (30:) **Acanthaceae** (p. 163)
- 31: Calyx 5-lobed; capsule septicidal, septifragal or loculicidal, dehiscing normally; seed-bearing hooks absent..... **Scrophulariaceae** (p. 154)
- 32 Flowers arranged in a short, dense axillary spike (26:):..... **Amaranthaceae** (*Alternanthera*) (p. 64)
- 32: Flowers axillary, solitary, in fascicles or cymes 33
- 33 Stamens inserted below ovary (32:):..... 34
- 33: Stamens inserted on perianth tube or adnate to it 35
- 34 Perianth segments 6 or more (33) **Elatinaceae** (p. 70)
- 34: Perianth segments 5 or less..... **Molluginaceae** (p. 65)
- 35 Leaves opposite, unequal in size (33:):..... **Aizoaceae** (p. 63)
- 35: Leaves opposite, equal in size **Lythraceae** (p. 105)
- 36 Leaves at base with a membranous sheath encircling stem (22:) **Polygonaceae** (p. 67)
- 36: Leaves petiolate or sessile; base not sheathing 37
- 37 Ovary superior (36:):..... 38
- 37: Ovary inferior, or semi-inferior 45
- 38 Petals or perianth segments free (37) 39
- 38: Petals or perianth segments joined at base..... 43
- 39 Flowers all unisexual (38)..... **Euphorbiaceae** (*Phyllanthus*) (p. 117)
- 39: Flowers at least some bisexual 40
- 40 Perianth segments 4, scarious; stamens 2 (39:):..... **Amaranthaceae** (*Omegandra*) (p. 65)
- 40: Perianth segments 10 or more; corolla membranous; stamens 5 or more..... 41

- 41 Stamens free, or arising from margin of a small disc (40:) **Tiliaceae** (p. 71)
- 41: Stamens united at the base into a cup or forming a conspicuous staminal tube 42
- 42 Stamens numerous; staminal tube long, closely encircling style; stigmas 5 or 10; leaves often lobed; epicalyx present or absent (41:) **Malvaceae** (p. 75)
- 42: Stamens 5, 10 or 15, united in an open tube, not closely encircling style; stigmas 1 or 5; leaves not lobed; epicalyx absent **Sterculiaceae** (p. 72)
- 43 Fruit of 4, 1-seeded mericarps; stamens 4 or if 5 then inflorescence a terminal, scorpid cyme (flowers on the upper side of the stem, inflorescence coiled when young) (38:) **Boraginaceae** (p. 139)
- 43: Fruit a berry or dehiscent capsule; stamens 5 44
- 44 Fruit a berry; style 1, stigmas 1 or 2, or stigma sessile (43:) **Solanaceae** (p. 123)
- 44: Fruit a dehiscent capsule; styles 2, free **Convolvulaceae** (*Cressa*) (p. 125)
- 45 Perianth segments more than 6 (37:) 46
- 45: Perianth segments 6 or fewer 49
- 46 Petals free (45:) 47
- 46: Petals joined at base 48
- 47 Fruit a schizocarp splitting into 2 or 4, 1-seeded mericarps (46) **Haloragaceae** (p. 102)
- 47: Fruit capsule-like, indehiscent or irregularly dehiscent; seeds numerous **Onagraceae** (p. 109)
- 48 Flowers zygomorphic (bilaterally symmetrical); style with an indusium (46:) **Goodeniaceae** (p. 172)
- 48: Flowers actinomorphic (radially symmetrical); style lacking an indusium **Sphenocleaceae** (p. 171)
- 49 Flowers in a compact head; corolla a lobed tube; anthers fused to one another (45:) **Asteraceae** (p. 180)
- 49: Flowers in simple axillary umbels; corolla free; anthers free **Apiaceae** (p. 120)

Group 6

Shrubs or trees (stems woody), usually more than 1.5 m tall.

- 1 Leaves compound 2
- 1: Leaves simple 4
- 2 Leaves pinnate; flowers zygomorphic (bilaterally symmetrical) (1) **Fabaceae** (p. 91)
- 2: Leaves bipinnate; flowers actinomorphic (radially symmetrical) 3
- 3 Petals 5 (2:) **Caesalpinaceae** (p. 89)
- 3: Petals 4 **Mimosaceae** (p. 85)
- 4 Leaves (including petiole) more than 30 cm long, linear or palmately lobed (palms & *Pandanus*) (1:) 5
- 4: Leaves less than 30 cm long 6
- 5 Leaves sessile, linear (4) **Pandanaceae** (p. 213)
- 5: Leaves petiolate, palmately lobed **Arecaceae** (p. 210)
- 6 Leaves opposite (4:) **Verbenaceae** (p. 142)
- 6: Leaves alternate 7
- 7 Flowers of one sex; milky latex present or absent (6:) **Euphorbiaceae** (p. 114)
- 7: Flowers bisexual; milky latex absent 8
- 8 Leaf blades longitudinally veined; translucent oil glands present (7:) **Myrtaceae** (p. 112)
- 8: Leaf blades pinnately veined; translucent oil glands absent 9
- 9 Ovary inferior or semi-inferior (8:) **Lecythidaceae** (p. 80)
- 9: Ovary superior 10
- 10 Stamens 5, 10 or 15, free or joined at base in an open cup; stigmas 1 or 5 (9:) **Sterculiaceae** (p. 72)
- 10: Stamens numerous, joined in a long tube closely encircling style; stigmas 5 **Malvaceae** (p. 75)