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Notes on *Hibbertia* (Dilleniaceae) 7. *H. hermanniifolia* group (subgen. *Hemistemma*) from mainly temperate eastern Australia

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Abstract

A taxonomic re-evaluation of the *H. hermanniifolia* group confirmed that it should be segregated from *Hibbertia* §*Tomentosae* Benth (1863). The following taxa are recognised (newly described ones are in bold): *H. acaulothrix* Toelken, *H. hermanniifolia* DC. subsp. *hermanniifolia* and subsp. *recondita* Toelken, *H. hexandra* C.T.White, *H. planifolia* Toelken, *H. reticulata* Toelken, *H. spathulata* N.A.Wakef. subsp. *spathulata* and subsp. *pleioclada* Toelken. Descriptions, a key to the species and subspecies as well as illustrations are provided. The vestiture and its developments are reviewed.

Keywords: Dilleniaceae, *Hibbertia*, nomenclature, revision, taxonomy, eastern Australia.

Introduction

Benth (1863) included in his taxon *Hibbertia* §*Tomentosae* species of the *H. melhanioides* and *H. tomentosa* groups (Toelken 2010) as well as the *H. hermanniifolia* group, which is here revised. All three together with other groups are now included in *Hibbertia* subgen. *Hemistemma* (Thouars) Horn.

Hibbertia hermanniifolia was the first species of this. It was described by Candolle (1817) based on a collection by G. Caley from Dovedale near Sydney, but Benth and subsequent botanists could not locate this second Dovedale, so that it was not recollected for 100 years. The second collection of it was only made in 1913 when E. Cheel and J.L. Boorman rediscovered it at what is now Bents Basin along the lower Nepean River (cf. Notes under *H. hermanniifolia*). The species occurs here only in one very restricted area and this is still the only locality from where typical *H. hermanniifolia* has been recorded.

Approximately thirty years later C.T. White collected in southern Queensland and described *H. hexandra* in 1942. He considered it to come “between *H. hermanniifolia* and *H. velutina* R.Br.” (White 1942, p. 201), the latter is here considered to be only distantly related to the complex as it is part of *Hibbertia* §*Tomentosae*, a taxon published by Benth (1863) without rank (cf. Toelken 2010, p.1). The first collection from Victoria of another species different from *H. hermanniifolia* was described by Wakefield (1957) as *H. spathulata* N.A.Wakef. As more collections from Victoria followed the difference between these two species became less clear, but Willis (1973) distinguished *H. hermanniifolia* by its stalked fascicled hairs and stalked flowers. Since then more collections

have become available from a number of populations with usually disjunct localities of the characteristic ‘Inselberg’ distribution so often found in *hibbertias* along the Great Divide. The present treatment attempted to evaluate and classify these divergent and disjunct populations, as many of them are now represented by several collections to provide a wider range of their local natural variation. However, this does not apply to three recent collections from the Northern Tableland of New South Wales which are here included as subspecies of *H. hermanniifolia* and *H. spathulata*. They are well out of hitherto known distribution ranges of the two species and require more field work.

Characteristics of the vestiture (cf. vestiture below) again proved a useful tool as in other groups of *Hibbertia* (Toelken 1998, 2000, 2010). Benth (1863) largely followed Candolle (1824) when he placed *H. hermanniifolia* into his §*Tomentosae*, but Toelken (2010) noted that it is distinguished by normal fascicled hairs subtended on the upper leaf surface by base cells, while species of the §*Tomentosae*, consisting of the *H. tomentosa* and *H. melhanioides* groups, have rosette-like fascicled hairs or scales. Horn (2005, 2009) had already established this separation in his molecular analyses of the genus and family.

Characters

Leaves. The margins at the base of the leaf lamina continue into ridges or wings on either side of the persistent leaf bases on the branches. The leaves therefore seem sessile, but, similar to the more or less terete petioles in other parts of the subgen. *Hemistemma* (Thouars) Horn. They are also often variously elongated, so that the petiole is usually ill defined although approximate



measurements for this section of the leaf are provided in the descriptions. Species of the *H. hermanniifolia* group do not develop a marked ridge or wing from the base of the central vein on the undersurface of the leaves, which characteristically continues on the leaf base and the branches of species of the *H. tomentosa* and *H. melhanioides* groups (Toelken 2010).

No young seedlings have been recorded for this group, but juvenile plants about 10 cm tall, e.g. *G.L.Stebbins A-63*, NSW224829, without the basal leaves still had a few leaves which had two shallow subterminal teeth/lobes each with an obvious vein-end from a lateral vein more or less at the apex (Fig. 3I, 4B). Adult leaves including those of coppicing branches of *H. acaulothrix* (e.g. *S.Clarke s.n.*) are not lobed or toothed as has been recorded for the *H. tomentosa* and *H. melhanioides* groups (Toelken 2010). However, the leaves of *H. reticulata*, and rarely also in *H. hexandra*, exhibit short veinlets from the sinuate supermarginal veins to the leaf margins (Fig. 4H), but in contrast to those from juvenile leaves no obvious vein-ends were observed. These veinlets are also not continuations from the lateral veins to the leaf margin (unlike in juvenile leaves above), but seem to develop at irregular intervals, sometimes even several times, from the supermarginal between any two connections with lateral veins. No such veinlets were observed in any of the other species of this group even when the often dense tomentum was removed.

Vestiture. All species have predominantly fascicled hairs and in *H. reticulata* these are overtopped by hooked simple hairs on proximal margins of the leaf lamina. These hooked hairs are different to the occasional simple hairs on the upper leaf surface of, for instance *H. acaulothrix* (Fig. 1) which usually have a similar habit (including base cells, cf. below) to those of the surrounding fascicled hairs, which have arms varying in number (1–3) and size sometimes even on the same hair. Leaves of coppicing branches of the same species (*S.Clarke s.n.*) have mainly such simple hairs on the adaxial leaf surface, but even here they seem to merge into few multiangulate fascicled hairs of similar size and habit and are therefore grouped together.

These multiangulate fascicled hairs are, however, never found to become rosette-like as in the very similar species of the *H. melhanioides* and *H. tomentosa* groups, nor could the latter species be shown to have any multiangulate hairs, even in juvenile stages, although this would have been the obvious derivation of the rosette-like fascicled hairs (Toelken 2010).

The hairs on the upper leaf surface of adult as well as juvenile plants, as much as they are known, are often sparse and usually with very few arms. The leaves of seedlings of typical *H. hermanniifolia* (*G.L.Stebbins A-63*, NSW224829) examined had already lost the lowest about fifteen leaves, but still retained a few with shallow subterminal lobes or rounded teeth. These leaves had already a few hairs with short stalks on the abaxial

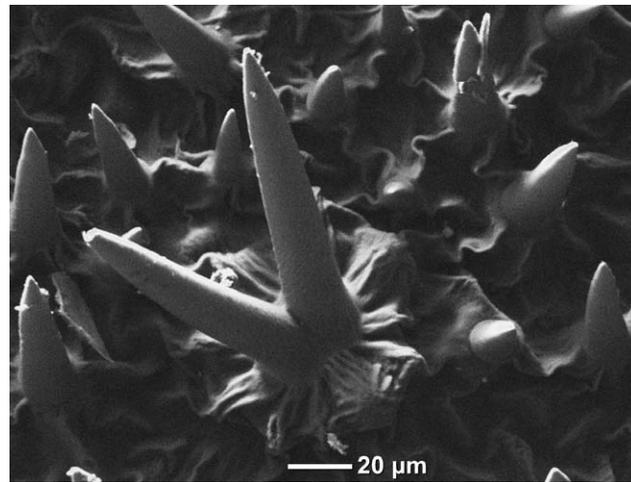


Fig. 1. *H. acaulothrix*. Adaxial leaf surface covered with erect fascicled hairs with 1–3 arms and subtended by a collar of ridged base cells. — *J.D.Briggs 2080*. — Leaf mounted on specimen holder and scanned uncoated using a JEOL Neoscope JCM-5000 Table Top SEM (Nikon, Tokyo) under low vacuum; accelerating voltage 15kV.

surface, but the cover of sessile hairs below them was still more sparse than in adult leaves as also reported for the *H. melhanioides* and *H. tomentosa* groups (Toelken 2010).

On the adaxial surface of mature leaves at least one row of epidermal cells form a collar around the base of each hair. The walls of these cells become thickened and often ridged (cf. Fig. 1). They stand out because they are often lighter than other green cells, and are similar to the **base cells** in the *H. aspera* group (Toelken 1998). Often they become very pronounced particularly when that leaf is very exposed and the hairs have worn off, so that eventually some leaves especially of *H. hexandra* are completely covered with such thickened cells. However, the base cells of leaves of *H. planifolia* and *H. spathulata* are usually bulging similar to ‘goose-bumps’ on human skin, but do not develop visibly thickened walls under the persistent dense hairs. They are even less well developed in *H. reticulata*.

Normally the base cells, which were only observed on the upper leaf surface, are only slightly raised above the surrounding epidermis and form a bulging or beady collar around each hair. On the undersurface of the leaves the stalked hairs, although not unique to this group (cf. *H. alopecotis*, Toelken 2010), are very well developed in *H. hermanniifolia*. The stalk is made up of cells similar to those of epidermis, which seem to have formed a protrusion, as the basal tubercle of the fascicled hair is found distally but partly hidden by a layer of epidermis-like cells. The cells of the stalks develop thick walls similar to the base cells and become filled with an amorphous brown substance, which is presumed to be tannins. This development of the stalk from the epidermis is further supported by the occasional presence of sessile fascicled hairs at the base or on the base of the stalk (Fig. 2) in the typical subspecies of *H. hermanniifolia*. The development of the stalks has,

however, not been studied as no seedlings with very immature leaves could be obtained.

Flowers. The terminal flowers are subtended by a bract that is always found immediately below the calyx as in the §*Tomentosae* but unlike the varying positions in the §*Vestitae*. The internode below the bract here referred to as peduncle (propodium; Conn 1995) is more or less elongated. In *H. hermanniifolia* subsp. *hermanniifolia* the internodes on the branches are usually elongate, so that one can more easily examine the flower buds, which are usually immediately overtopped by continued vegetative growth from the axil of the first leaf at the base of the peduncle. After at least two leaves another flower develops terminally and sympodial growth continues in a similar pattern to that described for *H. superans* (Toelken 2000, Fig. 11). As the branch thickens, the base of the slender peduncle is often pushed aside, so that it is usually not in a strictly leaf-opposed position, as it is commonly found in other *Hibbertia* species. In some dried specimens flowers may even seem axillary, but younger buds examined showed more clearly a terminal origin of the flowers.

The position of the flower is not quite so obvious in most specimens of *H. hermanniifolia* subsp. *recondita*, *H. aculothrix*, *H. planifolia* and *H. spathulata* partly because of lateral displacement, but mainly as a result of abbreviated internodes between the clustered leaves on distal branches, so that it becomes impossible to determine the position of the flowers.

In *H. hexandra*, and to lesser degree also in *H. reticulata*, flowers are also borne on elongated branches, but here the flowers are found terminal on fascicled lateral branches toward the apex of the main branches. Usually there are few such branches scattered along the upper reaches of larger branches. However, on actively growing branches the flowers occur in distal groups of these fascicled branches, at first on short lateral branches with few leaves. Higher up these leaves decrease in number and size acropetally to two caducous leaflets (up to 4 mm long) at the base of the peduncle in the axil of the uppermost leaves. These axillary flowers in such continuous inflorescences are born at successive nodes unlike the terminal flowers, which develop at intervals of several nodes/leaves, as also recorded for the §*Tomentosae* (cf. Toelken 2010, Fig. 12A).

Stamens. Five more or less clear bundles of stamens are arranged around the ovaries in most flowers. These bundles seem to agree with the stamen trunks, which divide up to provide vascular traces to the individual stamens (Wilson 1965, Tucker & Bernhardt 2000), as there are usually the same number of stamens in each bundle. Sometimes, particularly in flowers with more than 15 stamens, the dorsal two bundles (in relation to the bract) are more clustered, so that these bundles are less easily distinguished. However, the few stamens of *H. hexandra* are also not always clearly grouped (Fig. 4E).

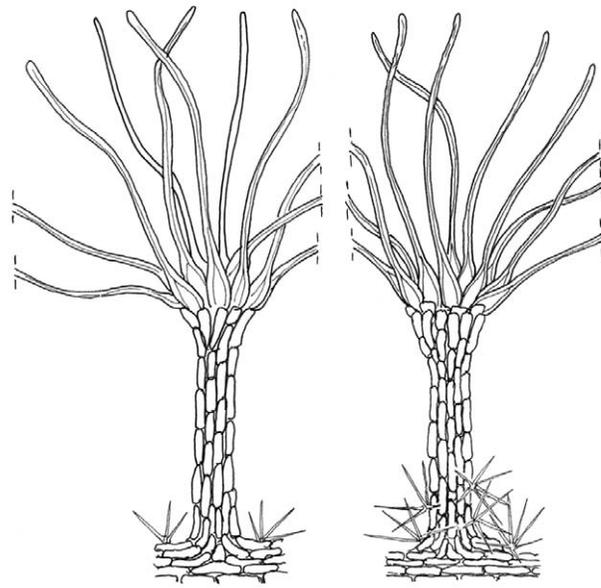


Fig. 2. *H. hermanniifolia* subsp. *hermanniifolia*. Stalked fascicled hairs with sessile fascicled hairs at or sometimes on the base of the stalk $\times 30$. — I.R. Telford 7225.

The stamens are variable in size and some of them are reduced to staminodes with more or less reduced, indehiscent anthers or anthers lacking (Fig. 3D, 4D). The number of staminodes varies from one plant to another. There are often more staminodes, or all of them occur in the lateral bundles. The fertile stamens are also variable in length and especially the central one (rarely few) of the dorsal bundle is usually considerably longer than others. The filament of the central stamen, as well as the anthers of the other stamens of that bundle are usually leaning over the ovaries, so that the large anther is usually placed between the bases of the two erect styles. Other anthers of different sizes are normally tightly arranged around this to form a broadening column downwards. The rotate flower with a central anther column is unusual in *Hibbertia* and resembles those of *Solanum* flowers, except that two styles on either side of the anthers are at first erect, but become strongly recurved, so that the stigmas are directed dorsally and well away from the anthers. The filaments are usually slightly longer in *H. elongata* and *H. spathulata*, and as a result the anthers in dried material are rarely close together. A similar arrangement, though not as tightly grouped, is also found in *H. hexandra*. Here, however, the styles remain more or less erect, as in some tropical species of the *H. melhanioides* group, where the anthers are also often unequally long (e.g. *H. bicarpellata*, Toelken 2010), but are not forming a central column. A similar spacial arrangement of the anthers and styles as in the *H. hermanniifolia* complex is also often observed in the *H. stricta* complex (Toelken 2010b) except here all the stamens are in one dorsal cluster. This spatial arrangement seems to represent a distinct feature of the pollinating syndrome.

Ovary. In all species of the *H. hermanniifolia* group the ovaries are densely hirsute with erect-spreading fascicled hairs. Similar to the species of the *H. melhanioides* group (Toelken 2010a) the style bases (Fig. 4F, 4J), particularly of *H. hexandra* and *H. reticulata*, are often to various degrees hairy. Other specimens of both the species vary to glabrous.

Seeds. The more or less lobed cup-shaped apex of the arils varies only slightly in length, similar to those in the *H. melhanioides* and *H. tomentosa* groups.

Taxonomy

Historically *Hibbertia hermanniifolia* was placed by Candolle (1817, 1824) into a group of species distinguished by the stamens being arranged around the densely hairy ovaries. Bentham (1863) largely agreed and named the group *Hibbertia* §*Tomentosae*. In that group Toelken (2010a) segregated the tropical species of the *H. melhanioides* and *H. tomentosa* groups from the *H. hermanniifolia* group mainly on the basis rosette-like hairs to scales as opposed to fascicled hairs, respectively.

H. hermanniifolia group

Shrubs with terete branches covered with raised leaf bases (not ridged or winged). *Vestiture* of multiangulate fascicled hairs with their base often surrounded by base cells with thickened lateral walls, or at first only radial walls thickened. *Leaves* cuneately linear-triangular to obovate, with lamina gradually constricted into indistinct petiole, truncate to cuspidate with scarcely recurved apex, sometimes emarginate, flat and with slightly revolute margins, lateral and intramarginal veins incompletely or not visible (except for mainly young

leaves of *H. reticulata*); *juvenile leaves* broader, with a pair of rounded subterminal teeth/lobes but not repeated in coppicing leaves, with subterminal and terminal vein-ends. *Flowers* terminal on more or less reduced short shoots, hence sometimes appearing axillary, ± stalked, with narrowly ovoid to ellipsoidal buds; *bracts* linear to linear-spathulate. *Calyx* with lobes subequal to dissimilar, acute to cuspidate, ± ridged distally, with multiangulate fascicled hairs outside and inside. *Petals* entire to scarcely bilobed. *Stamens* 6–25 (–48), in groups around the ovaries, with varying numbers of staminodes; *anthers* linear-obloid, 1–3 longer ones. *Pistils* 2; *ovaries* each with 2 (–6) basal/ parietal ovules, densely fascicled-tomentose; styles erect on either side of stamens, with style base ± hairy.

Notes. This distinctive group is restricted to temperate areas (except *H. reticulata*) along mainly the eastern escarpment of the Great Divide in Queensland, New South Wales and Victoria, where the present taxa seem to represent local relics judging by their often very disjunct restricted distribution. Widely separated populations of, for instance, the subspecies of *H. hermanniifolia* and *H. spathulata* indicate that some of these species once were more widespread.

Affinities. Bentham (1863) placed *H. hermanniifolia* as the first species into the *Hibbertia* §*Tomentosae* next to the *H. §Vestitae* and *H. §Ochrolasiae* and included them in his sect. *Euhibbertia* (=sect. *Hibbertia*), because the stamens in their flowers are arranged around the ovaries. Based on molecular evidence all of these three groups are now separated from the species of *H.* subgen. *Hibbertia* and placed in the *H.* subgen. *Hemistemma* (Horn 2005, 2009). Furthermore Horn (2009) demonstrated that

Key to the species and subspecies based largely on floral characters

1. Lower surface of leaves without stalked fascicled hairs
 2. Peduncle > 5 mm long
 3. Stamens 32–48; upper leaf surface with distinct rugose-reticulate veins; northern Qld *H. reticulata*
 - 3: Stamens 6 (–12); upper leaf surface with only a distinct mainly central vein; Qld, NSW *H. hexandra*
 - 2: Peduncle ≤ 5 mm long
 4. Undersurface of leaves not visible between revolute margins and central vein, which is ± obscured by dense vestiture; shrublets decumbent to prostrate; NSW *H. planifolia*
 - 4: Undersurface of leaves well exposed between revolute margins and obvious central vein; shrubs erect to spreading
 5. Bracts 7.8–10.4 mm long; NSW *H. acaulothrix*
 - 5: Bracts 3.4–5.4 mm long
 6. Leaves with scarcely recurved margins; upper leaf surface puberulous to tuberculate or glabrescent; Qld, NSW *H. hexandra*
 - 6: Leaves with obviously revolute margins; upper leaf surface tomentose, rarely pubescent
 7. Hairs on upper leaf surface with up to 8–10 (–14) arms; NSW *H. spathulata* subsp. *pleioclada*
 - 7: Hairs on upper leaf surface with 2–6 (–8) arms
 8. Undersurface of leaves with some shortly stalked hairs; hairs on upper surface of leaves with 2 or 3 (–5) arms; NSW, Vic. *H. hermanniifolia* subsp. *recondita*
 - 8: Undersurface of leaves with sessile hairs; hairs on upper surface of leaves with 6–8 (–14) arms; Vic. *H. spathulata* subsp. *spathulata*
 - 1: Lower surface of leaves with some stalked fascicled hairs
 9. Stalk of fascicled hairs 0.35–0.7 mm long; peduncle (9.4–) 10–15 (–17.7) mm long; stamens and staminodes 18–28; NSW *H. hermanniifolia* subsp. *hermanniifolia*
 - 9: Stalk of fascicled hairs 0.1–0.3 mm long; peduncle (2–) 3–7 (–9) mm long; stamens and staminodes up to 15; NSW, Vic. *H. hermanniifolia* subsp. *recondita*

the *H. hermanniifolia* group formed a separate clade and one of three sister clades is the *H. aspera* group. Toelken (2010a) divided the *H. §Tomentosae* into the *H. melhanioides* and *H. tomentosa* groups and here distinguishes the *H. hermanniifolia* group mainly on the basis of their rosette-like hairs or scales as compared to multiangulate fascicled hairs respectively.

The *H. hermanniifolia* and *H. aspera* groups, which had previously been widely separated, because of the different arrangement of the stamens, now demonstrate one of several cases in *Hibbertia* where Horn (2009) could show a switch from the original stamens around the ovaries to stamens in one group to one side of the ovaries in another. Morphologically this affinity is supported because, in contrast to the other two sister clades, both groups have flat leaves with a scarcely developed central vein and develop similar base cells (cf. vestiture) around the tubercles of the fascicled hairs on the adaxial leaf surfaces. While most of the species of the *H. melhanioides* and *H. tomentosa* groups have toothed/lobed leaves of juvenile and regenerating shoots (Toelken 2010a), the *H. hermanniifolia* group were here found to develop toothed leaves only on seedlings and all leaves in the *H. aspera* group are entire (Toelken 1998).

The *H. §Ochrolasiae* from Western Australia form according to Horn (2009) part of a sister clade to the

H. melhanioides and *H. tomentosa* groups, while the *H. §Vestitae* from temperate eastern Australia are part of one of the other two clades separate from the *H. hermanniifolia* and *H. aspera* clades (cf. above). Both the *H. §Ochrolasiae* and *H. §Vestitae* have more strongly revolute leaves and a more well developed central vein.

Species of the *H. hermanniifolia* group are here alphabetically arranged in order to avoid renumbering them once the whole genus has been revised.

***Hibbertia acaulothrix* Toelken, sp. nov.**

A H. hermanniifolia floribus plus minusve sessilibus pilisque faciculatis sessilibus; a H. spathulata pilis simplicibus foliorum paginis supernis bracteisque longioribus calice differt.

Typus: New South Wales, 10 km N Bemboka, 16.x.1986, J.D.Briggs 2080 (holo.: NSW; iso.: MEL; CANB – n.v.).

Hibbertia hermanniifolia auct. non DC.: G.J.Harden & J.Everett in G.J.Harden, Fl. New South Wales 1: 300 (1990), pro parte.

Shrubs up to 1.1 m tall, with several stems, erect; branches bluntly ridged to scarcely flanged from the leaf base, tomentose or pubescent. *Vestiture* ± persistent, dense multiangulate fascicled hairs sometimes overtopped by larger broad-based ones on whole plant; *on branches* dense, with erect to spreading multiangulate fascicled hairs (6–9 often unequal arms) overtopped by

Key to species and subspecies based on vegetative characters

As the revolute margins and central vein often bear different hairs they are here, for convenience, excluded in the use of ‘undersurface of leaves’, which are therefore not synonymous with the abaxial leaf surface (cf. Toelken 1998, 2000). References to the central vein always apply to the abaxial leaf surface unless specified, because here it is usually clearly visible.

- 1. Upper leaf surface with ± rugose-reticulate veins, with hooked simple hairs towards the proximal margins overtopping fascicled hairs; Qld *H. reticulata*
- 1: Upper leaf surface without veins or with incomplete vein network, without hooked hairs overtopping fascicled hairs
 - 2. Stalked fascicled hairs present on branches and veins of abaxial surface of leaves *H. hermanniifolia*
 - 3. Stalk of fascicled hairs 0.35–0.7 mm long; peduncle (9.4–) 10–15 (–17.7) mm long; NSW *H. hermanniifolia* subsp. *hermanniifolia*
 - 3: Stalk of fascicled hairs 0.1–0.3 mm long; peduncle (2–) 3–7 (–9) mm long; NSW, Vic *H. hermanniifolia* subsp. *recondita*
 - 2: Stalked fascicled hairs absent on branches and leaves
 - 4. Upper leaf surface sparsely hairy, becoming tuberculate or glabrescent; arms of hairs scarcely longer than basal tubercle; leaf lamina (4.6–) 6–18 (–22.8) mm broad; Qld, NSW *H. hexandra*
 - 4: Upper leaf surface tomentose to hirsute; arms of hairs at least twice as long as basal tubercle; leaf lamina 1–5.4 (–8.3) mm broad
 - 5. Upper leaf surface hirsute with arms of larger flaccid hairs 2–4 times longer than those on shorter hairs (particularly on flanks of cuneate base), fascicled hairs with 2 or 3 (–5 on margins) arms, not persistent; NSW *H. acaulothrix*
 - 5: Upper leaf surface velvety to tomentose with arms of larger erect-spreading hairs scarcely longer than those of shorter ones, fascicled hairs with (3) 4–6 (–12 on margins) arms, persistent
 - 6. Central vein ± obscured by dense vestiture; undersurface of leaves not visible between revolute margins and central vein, shrublets decumbent to prostrate; NSW *H. planifolia*
 - 6: Central vein obvious; undersurface of leaves visible between revolute margins and central vein; shrublets erect to spreading *H. spathulata*
 - 7. Hairs on upper leaf surface with up to 8–10 (–14) arms; NSW *H. spathulata* subsp. *pleioclada*
 - 7: Hairs on upper leaf surface 2–6 (–8) arms
 - 8. Undersurface of leaves with some shortly stalked hairs; hairs on upper surface of leaves with 2 or 3 (–5) arms; NSW, Vic. *H. hermanniifolia* subsp. *recondita*
 - 8: Undersurface of leaves with sessile hairs; hairs on upper surface of leaves with 6–8 (–14) arms; Vic. *H. spathulata* subsp. *spathulata*

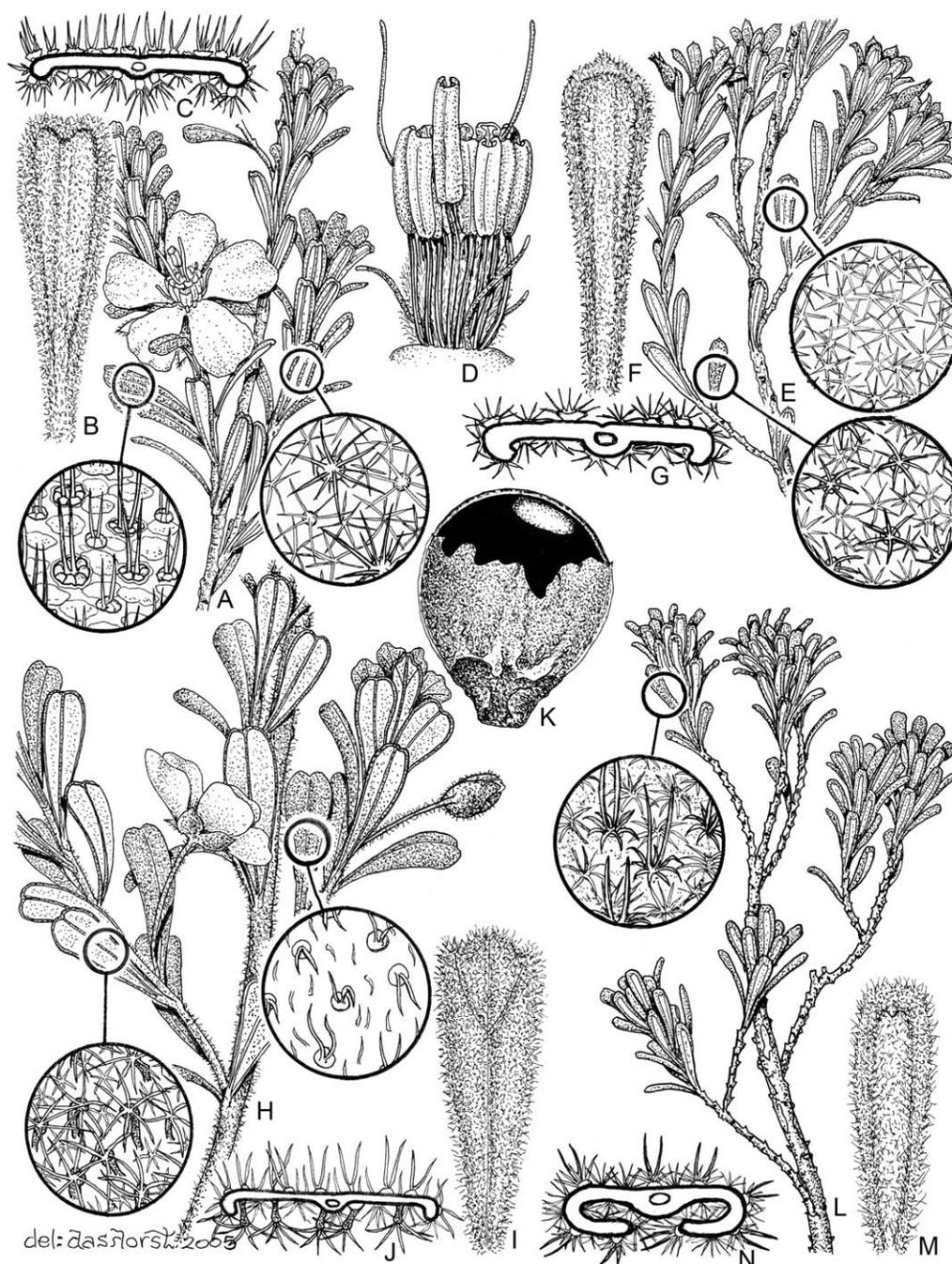


Fig. 3. A–D *H. acaulothrix*: A flowering branch $\times 1$; B leaf from below $\times 3$; C transverse section through mid-leaf $\times 9$; D flower with calyx and corolla removed to show erect position of stigmas, 1 larger stamen and several staminodes $\times 10$. E–G *H. spathulata* subsp. *spathulata*: E branch $\times 1$; F leaf from below $\times 4$; G transverse section through mid-leaf $\times 10$. H–K *H. hermanniifolia* subsp. *hermanniifolia*: H flowering branch $\times 1$; I juvenile leaf from above $\times 4$; J transverse section through mid-leaf $\times 8$; K seed $\times 10$. L–N *H. planifolia*: L branch $\times 1$; M leaf from below $\times 4$; N transverse section through mid-leaf $\times 9$. — A–D J.D.Briggs 2080; E–G N.G.Walsh 2209; H, J, K I.R.Telford 7225, I G.L.Stebbins A-63; L–N R.Coveney NSW 127188.

or with scattered larger, often almost stalked broad-based ones (11–16 usually unequal arms); *on leaves above* moderately dense, spreading to antrorse, appearing sessile (basal tubercle surrounded by base cells) subequal multiangulate fascicled hairs (1–3 usually unequal arms or up to 5 on margin and often increasing 2–4 times the length towards the flanks) wearing off sooner or later; *on leaves below* scattered larger erect

to spreading multiangulate broad-based fascicled hairs (7–14 unequal to subequal, antrorse to radial arms) over dense fine narrow-based multiangulate fascicled hairs (5–10 subequal arms, but not always distinguishable); *on bracts above* dense, with erect hairs (1–3 often unequal arms), below dense, with erect multiangulate fascicled hairs (6–9 subequal arms) or rarely with some broad-based ones (8–11 subequal arms) mainly on the central

vein; *on outer calyx lobes* outside dense, with mainly cactiform broad-based fascicled hairs or some erect multiangulate narrower-based fascicled hairs towards the margins and the apex, inside \pm dense antrorse narrow-based fascicled hairs on upper third; *on inner calyx lobes* outside \pm dense band of cactiform fascicled hairs along the centre becoming smaller laterally and with some fascicled cilia on the broad membranous margin, inside glabrous. *Leaves* without axillary tufts of hairs; *petiole* 0–0.3 mm long, indistinct; *lamina* cuneately oblong-ob lanceolate, (4.6–) 6–15 (–22.3) \times (1.6–) 2.5–4.5 (–5.4) mm, usually truncate-emarginate rarely rounded and with scarcely recurved vein-end, gradually constricted into petiole, flat, entire, above distinctly grooved along the central vein and puberulous or sometimes pubescent, becoming tuberculate, below with central vein broader and often raised above revolute margins or rarely with some lateral veins visible on upper half, velutinous, slightly discolourous; juvenile leaves (coppicing) larger but similar to normal leaves, entire, with finer and larger hairs. *Flowers* single, terminal, sessile or almost so, often on lateral shoots, with flower bud ellipsoidal; *peduncle* \pm absent; *bracts* linear-ob lanceolate to linear-spathulate, 7.8–10.4 \times 1.9–2.4 mm, usually longer than outer calyx, pointed, ridged, below pubescent to tomentose or velutinous, above tomentose. *Calyx* with lobes slightly unequal but forming a range; *outer calyx lobes* (3/2) linear-lanceolate to -ob lanceolate, (5.4–) 6–6.8 (–7.2) \times 2.5–2.8 mm, scarcely longer than inner ones, pointed to acute, ridged, outside stubble-like to velutinous along margins, inside puberulous to pubescent on the upper third and the margins; *inner calyx lobes* (2/3) oblong-ovate, (4.2–) 4.5–5.5 (–6.3) \times 3.1–3.8 (–4.1) mm, acute to cuspidate, scarcely ridged, stubble-like to pubescent on a central band and with fascicled cilia on broad membranous margin, inside glabrous. *Petals* obovate, (7.4–) 7.8–9.5 (–10.2) \times (4.3–) 5.0–7.0 (–8.8) mm long, scarcely bilobed. *Stamens* 9–13 (plus some staminodes), subequal except for 1 (–3) longer ones, in \pm 5 bundles around the ovaries; filaments narrow throughout, 1.3–1.8 mm long, slightly connate basally; *anthers* narrowly obloid, rarely obloid-ovoid, 1.1–1.3 mm long, 1 (–3) longer ones (1.8–1.9 mm long) in the centre, abruptly constricted above and below. *Pistils* 2; *ovaries* obovoid, each with 2 (–4) ovules above one another, hirsute, style attached to dorsal apex of ovary then \pm erect such that stigmas are lateral to the upper part of the longer \pm incurved anther(s). *Fruiting peduncle* not elongating. *Seeds* not seen. *Flowering*: usually October–April. **Fig. 1, 3A–D.**

Distribution and ecology. Recorded associated with sedimentary rocks from very different woodlands, such as with *Eucalyptus sieberi* L.A.S.Johnson or *E. multicaulis* Blakeley or associated with *Allocasuarina littoralis* (Salisb.) L.A.S.Johnson, *Corymbia gummifera* (Gaertn.) K.D.Hill & L.A.S.Johnson and *Leptospermum trinervium* (Sm.) Joy Thoms.; found in few widely separated localities in New South Wales (CT, CC, SC).

Conservation status. In Wadbilliga National Park “several thousand plants scattered over at least 3 ha.” were recorded by J.D.Briggs 2080.

Diagnostic features. The vestiture of simple or scarcely branched fascicled hairs on the upper leaf surface is similar to that of *H. hermanniifolia*, but *H. acaulothrix* is distinguished by the absence of stalked fascicled hairs and flowers on elongated peduncles. Similarly the latter is distinguished from *H. spathulata* by the presence of simple hairs on the upper leaf surface, and bracts are longer than the calyx.

Variation. Although the species is at present known only from a few well separated localities, the different populations show little variation. Leaves of young fast-growing branches have usually predominantly simple hairs on the adaxial leaf surface and these and at least the larger hairs of the abaxial surface are more or less antrorse. Since a similar trend was found in both *H. hermanniifolia* and *H. spathulata* the absence of stalked fascicled hairs in this species is significant.

Etymology. The epithet “acaulo-thrix”, Greek, “stalkless-hair” (noun in apposition) refers to the sessile hairs of this species in comparison to those of the very similar *H. hermanniifolia*.

Specimens examined

NEW SOUTH WALES: *S. Clarke s.n.*, Water Board land off Long Nose Point Road, 27.iii.2001 (WOLL); *M.D.Crisp* 2235 & *I.R.Telford*, 3.3 km E Mt Coricudgy, 27.x.1976 (CANB); *P.Gilmour* WO33, Brogo River near Yankees Creek, Wadbilliga National Park, 1.iv.1983 (CANB); *D.J.McGillivray* 1605, between Kekeelbon Mts and Mt Coricudgy, 13.ii.1966 (NSW); *D.Tilley* WOLL 2113, Wattle Ridge, Hilltop, iii.82 (WOLL); *T. & S.Whaite* 3275, Kekeelbon Mts, 1.ix.1969 (NSW).

Hibbertia hermanniifolia DC.

Regn. Veg. Syst. Nat. 1: 431 (1817), as “*hermanniaefolia*”; Prodr. 1: 75 (1824), as “*hermanniaefolia*”; Benth., Fl. Austral. 1: 30 (1863), as “*hermanniaefolia*”; F.Muell., Syst. Cens. 1: 2 (1882), as “*hermannifolia*”; C.Moore, Census Pl. New South Wales 1 (1884), as “*hermannifolia*”; C.Moore & Betche, Handb. Fl. New South Wales 10 (1893), as “*hermannifolia*”; W.A.Dixon, Pl. New South Wales 29 (1906), as “*hermannifolia*”; N.C.W.Beadle et al., Vasc. Pl. Sydney edn 1: 194 (1963); J.H.Willis, Handb. Pl. Victoria 2: 386 (1973); G.J.Harden & J.Everett in G.J.Harden, Fl. New South Wales 1: 300 (1990); Toelken in N.G.Walsh & Entwisle, Fl. Victoria 3: 305 (1996). — **Type citation:** “in montibus Novae Hollandiae. Caley. (v. s. sp. in h. [dried specimen seen in herb.] Lambert)”. **Type:** “m Lambert” (holo.: G-DC). — see Notes below.

Shrubs 0.8–1.5 (–3) m tall, with several stems, spreading; branches bluntly ridged to flanged from the leaf base, hispid to pubescent. *Vestiture* \pm persistent, usually dense multiangulate fascicled hairs over whole plant but overtopped by few to many stalked ones mainly on branches, leaves below and outside of outer calyx lobes; *on branches* dense, with erect to spreading multiangulate narrow-based fascicled hairs (7–10 often

unequal arms) of different sizes overtopped by more or less spreading stalked broad-based ones (8–16 (–25) usually unequal arms) often near nodes; on *leaves above* sometimes wearing off but retaining basal tubercle and ring of base cells, moderately dense, with few to many erect simple to erect or spreading, often antrorse multiangulate narrow-based fascicled hairs (2, 3 often unequal arms, rarely up to 5 arms on the Northern Tableland, New South Wales) of different sizes, becoming larger (up to 12 arms) towards the flanks of the recurved margins; on *leaves below* dense, with fine spreading multiangulate narrow-based fascicled hairs of different sizes (7–10 subequal arms) overtopped by few to many stalked broad-based ones (11–16 (–23) usually unequal arms) mainly restricted to veins and the revolute margins; on *bracts above* moderately dense, with erect multiangulate narrow-based fascicled hairs (3–5 subequal arms), below like leaves dense, with spreading multiangulate narrow-based fascicled hairs of different sizes overtopped by few larger stalked broad-based fascicled hairs; on *outer calyx lobes* outside \pm dense, with spreading, often short-branched multiangulate, often broad-based fascicled hairs of different sizes overtopped by \pm stalked usually broad-based fascicled hairs scattered over the surface but becoming shorter towards the margins, inside with \pm dense antrorse narrow-based multiangulate fascicled hairs on often more than the upper half; on *inner calyx lobes* outside \pm dense, with spreading but short-branched multiangulate, often broad-based fascicled hairs of different sizes overtopped by scattered larger broad-based ones mainly along the centre and with narrow-based fascicled cilia on the membranous margins, inside glabrous except for a few antrorse fascicled hairs towards the apex. *Leaves* without axillary tufts of hairs; *petiole* 0.2–1.4 mm long, indistinct; *lamina* obovate to oblanceolate, 3.3–30.2 \times 1.8–10.2 mm, usually \pm truncate and with short recurved apex, usually entire, flat to \pm folded lengthwise or grooved along the central vein and pubescent to sparsely velutinous, below with narrow central vein rarely raised above revolute margins and rarely with usually incomplete lateral veins visible towards the apex, and hirsute to velutinous, discolourous; juvenile leaves obtriangular, with three subequal terminal teeth, flat, covered at least at first with fine sessile fascicled hairs, each with few arms on the upper surface and with more on the undersurface. *Flowers* single, terminal or often not leaf-opposed but beside petiole, with ovoid to ellipsoidal buds; *peduncle* thread-like but firm, (3–) 4–12 (–17.7) mm long, terete; *bracts* spatulate to linear-oblanceolate, 3.3–5.5 \times 0.8–2.9 mm, longer than half the outer calyx, leaf-like with revolute margins and central ridge, sparsely velutinous above and \pm hirsute below. *Calyx* with lobes slightly unequal but forming a range; *outer calyx lobes* (3/2) linear-lanceolate to lanceolate, 5.1–7.4 \times 1.8–3.1 mm, slightly longer than inner ones, ridged, outside hirsute rarely velutinous, inside pubescent with few antrorse fascicled hairs on

upper half; *inner calyx lobes* (2/3) ovate, 5.1–6.4 \times 3.6–4.2 mm, acute to obtuse, without ridge, tomentose to almost stubble-like towards the margins and with fascicled cilia along the membranous margins, inside glabrous to puberulous towards the apex. *Petals* oblong-oblanceolate, rarely obovate, 6.8–9.4 \times 4.7–6.8 mm, scarcely bilobed. *Stamens* 9–24 (plus few staminodes) unequal, in 5 bundles around the ovary; filaments filiform, 1.1–1.5 mm long, scarcely basally connate; anthers narrowly obloid, 1.2–1.5 mm long, at least central one longer (1.8–2.1 mm), abruptly constricted above and below, straight. *Pistils* 2; *ovaries* obovoid, each with 2–4 ovules in pairs above one another, hirsute, with style attached to dorsal apex then more or less erect positioning stigmas laterally to the upper part of the longer anther. *Fruiting peduncle* slightly elongated, \pm recurved. *Seeds* obovoid to almost spherical, 2.5–2.9 \times 2.9–3.25 mm, shiny-black; aril with fleshy base expanding into \pm 3 or 4 lobed cup-like membrane clasping the lower half of seed.

Diagnostic features. Pedunculate flowers and the uniquely stalked fascicled hairs with their commonly brown stalks, particularly on the undersurface of leaves, are distinctive of this species. Some of the latter hairs were always present, although they were found to grade into normal fascicled hairs with broad and thin tubercles. The discolourous leaves of this species are usually accentuated by the sparse tomentum of simple and fascicled hairs (with few arms) on the upper leaf surface, which is distinctive of the two subspecies.

The truncate leaves with a similar fascicled tomentum of vegetative material of some *Asterolasia* species (Rutaceae) have at times been confused with specimens of *Hibbertia hermannifolia*.

Variation. The plants from the type locality, Bents Basin on the Nepean River, have particularly large leaves and hairs. They become smaller southwards in southern New South Wales and in Victorian plants often appear similar in size to those of *H. spathulata*. Throughout the distribution of the species the stalk of stalked hairs is more or less intensely brown-coloured, while the short base of sessile hairs is without colour. The same applies to less obviously stalked rosette-like fascicled hairs in *H. alopecota* from the Northern Territory and Duretto and Ladiges (1997) also report “often heavily pigmented” stalks of species of *Boronia*.

Similarly in the northern specimens the flowers are usually overtopped by axillary vegetative growth so that they appear to be axillary, because they are commonly pushed sideways. These flowers are rarely clearly leaf-opposed, nor do they show rudiments of axillary short shoots as it is observed in the tropical species. The specimen (*G.L. Stebbins A-63*, NSW224829) is the only one that has a number of terminal flowers but then the peduncles are typically longer than 9 mm.

The number of stamens and staminodes of a flower were found to vary from one population to another.

Notes. In the protologue Candolle (1817) cites the type as “in montibus Novae Hollandiae” and being a Caley specimen in Herb. Lambert, but none of this detail is found on the holotype specimen. A sheet (BM 834625) of this species contains four branches, one marked “in the Mountains – Caley” and a second “Dove Dale Oct 30-1807” in a different later handwriting (Bentham?). There is no indication whether they belong to the same collection or two different ones and which specimen then belongs to which collection, except that all four specimens are so similar that it seems likely that they are from the same plant of the only population this, the typical subspecies is known from. It could also not be established whether or not the Caley specimen/s in the British Museum are duplicates, i.e. possible isotypes particularly as Vallance et al. (2001) stated “Caley visited and revisited the place over the years.”

The R. Brown specimen in Kew Herbarium was noted to have been received in 1880 (after flora treatment of Bentham, 1863) and is accompanied by a collector’s label but without a number added subsequently by J.J. Bennett. This was found typical of that batch judging by other specimens. It is also annotated “Dove Dale Oct 30-1807” and thus unlikely to be collected by Brown. Vallance et al. (2001) suggested he and G. Caley could only have visited Dovedale on 23.x.1803, but no such specimen could be located.

A note concerning the exact locality of this Dovedale, which Bentham was unable to resolve, was found in the cover of the species in the National Herbarium of New South Wales (NSW):

“The type of this species was collected by Caley at ‘Dovedale’ (cf. Benth. [1863]) or, as cited by DC., ‘in montibus Novae-Hollandiae’. This Dovedale (see label on specimen of leaf from Nat. Herb. Vict. Mel.) is at Bent’s Basin, Nepean River. There was also another early property named ‘Dovedale’ on the Bellinger River (see Balliere’s N.S.W. Gazetteer & Road Guide compiled by R.P. Whilworth 1866) & and this must have lead Moore & Betche [1893 and Dixon 1906] to cite ‘Clarence River District’ in the Fl. N.S.W. Caley’s collections were from the Central Coast & too early for a N. Coast area. N.C.F. [Neridah C. Ford] 6/1957”.

The species consists of many, often disjunct populations which are here grouped into two subspecies. The subsp. *hermanniifolia* is, however, restricted to a small area at Bents Basin.

Key to subspecies

1. Stalk of fascicled hairs 0.35–0.7 mm long; peduncle (9.4–) 10–15 (–17.7) mm long; combined stamens and staminodes 18–28; NSW subsp. *hermanniifolia*
- 1: Stalk of fascicled hairs 0.1–0.3 mm long; peduncle (2–) 3–7 (–9) mm long; combined stamens and staminodes up to 15; NSW, Vic. subsp. *recondita*

***Hibbertia hermanniifolia* subsp. *hermanniifolia*.**

Leaves broadly obovate, (5.6–) 7–18 (–30.2) × (2.2–) 30–75 (–10.2) mm; stalk of fascicled hairs 0.35–0.7 mm

long. *Flowers* usually overtopped by axillary vegetative growth displacing the peduncle to a lateral position; *peduncles* (9.4–) 10–15 (–17.7) mm long; *bracts* oblanceolate-spathulate, 1.9–2.9 mm broad. *Stamens and staminodes* 18–28. *Flowering*: September–February. **Fig. 2, 3H–K.**

Distribution and ecology. Grows on sandy soils or rocky slopes associated with sandstone cliffs in sclerophyll eucalypt forest of mainly *Corymbia eximia* (Schauer) K.D.Hill & L.A.S.Johnson and *Eucalyptus pilularis* Sm. in New South Wales (CC).

Conservation status. Locally common in conserved area.

Variation. Judging by a number of specimens collected at this restricted population it would seem that this subspecies shows little variation. Even juvenile plants are remarkably similar to adult plants (see description).

Specimens examined

NEW SOUTH WALES (all from Bents Basin): *D. Benson et al.* NSW 167541, 20.ii.1984 (NSW); *R. Brown [G. Caley] s.n.*, Dove Dale, 30.x.1807 (BM, K); *E. Cheel & J.L. Boorman* NSW 33652, 10.ix.1913 (BM, BRI, CANB, K, MEL, NSW); *J. Pulley* 897 & *I.R. Telford*, 29.ix.1971 (CANB); *G.L. Stebbins A-63*, 20.xi.1974 (CANB, NSW); *I.R. Telford* 7225, 27.x.1978 (CANB).

***Hibbertia hermanniifolia* subsp. *recondita* Toelken, subsp. nov.**

A subspecies typica pedunculis brevibus usque ad 9 mm longis, pilis brevibus folisque parvis differt.

Typus: Victoria, Mt Elizabeth 2, *R.D. Hoogland* 11911, 26.xi.1970 (holo.: AD98040099; iso.: BRI, MEL, NSW; A, B, BM, CANB, E, G, HBG, K, L, NE, OKLA, PERTH, UC – n.v.).

Hibbertia hermanniifolia auctt. non DC.: Willis, Handb. Pl. Victoria 2: 386 (1973), pro parte; G.J. Harden & J. Everett in G.J. Harden, Fl. New South Wales 1: 300 (1990), pro parte; Toelken in N.G. Walsh & Entwisle, Fl. Victoria 3: 305 (1996), pro parte.

Leaves oblanceolate to obovate, (3.3–) 4–8.5 (–13.5) × (1.8–) 2.5–4 (–5.6) mm; stalk of fascicled hairs 0.1–0.3 mm long. *Flowers* not overtopped by axillary vegetative growth, or if displaced by some growth then peduncle leaf-opposed; *peduncles* (2–) 3–7 (–9) mm long; *bracts* linear-oblanceolate, 0.9–1.4 mm broad. *Stamens and staminodes* up to 15. *Flowering*: August–February.

Distribution and ecology. Grows on dry slopes or on skeletal soils in rock outcrops, often on granite, in shrub land to sclerophyll forest in southern New South Wales (NT, SC) and north-eastern Victoria (EHL, EG).

Conservation status. Locally common on Mt Poole, New South Wales (*J.D. Briggs & D.E. Albrecht* 1957A) and Mt Elizabeth 2, Victoria (*F.E. Davies* 640).

Variation. Specimens from widely separated localities on the Northern Tablelands are remarkably similar to the southern populations of this subspecies. Even the number of stamens, the most critical character that separates

the two subspecies, fall into a similar range, although only few flowers from the northern populations have been available for examination. While one specimen (*L.M.Copeland 3446*) has a vestiture remarkably similar to the southern populations (even with base cells being visible around each hairs on the upper leaf surface), *P.Gilmour 8373* has very few stalked hairs on the leaves and these stalks are shorter than normal for this subspecies, and hairs on the upper leaf surface have up to five arms on the margins. Since the two specimens were collected relatively close to one another the two were combined until more material becomes available to evaluate the variation.

As the latter specimen has only few, shortly stalked hairs it might easily be confused with *H. spatulata* subsp. *pleioclada*, also from the Northern Tableland, but that subspecies can be easily distinguished by fascicled hairs with 5–10 arms on the upper leaf surface.

Most specimens of this subspecies can be recognised by their smaller leaves, but in the extreme large range there is an obvious overlap with those of typical *H. hermannifolia*. One unusual specimen from between Mt Wellington and Castleburn (*Chesterfield MEL530993*) has, however, very large leaves (extreme measurements of 21.7 × 9.8 mm), but the hairs are much smaller (arms of stalked fascicled hair being 0.1–0.2 mm long), so that this specimen is here accepted as a form, possibly coppicing and still without flowers, of subsp. *recondita*, although this variant falls well outside the known range. The vestiture of this specimen also does not fit any species of *Asterolasia* (Rutaceae), which are at times confused with vegetative material of this species of *Hibbertia*.

Etymology. The epithet “recondita”, Latin, “hidden, not easily seen” refers to the terminal flower buds, which are usually covered up by, or enclosed in the leaves around them because of the short peduncles.

Selection of specimens examined (36 seen)

NEW SOUTH WALES: *J.D.Briggs & D.E.Albrecht 1957A*, Mt Poole, Yumbulla State Forest, 16.vii.1986 (CANB, NSW); *L.M.Copeland 3446 & P.Lupica*, near Steepdrop Falls, ca 40 km ENE Walcha, 24.x.2002 (AD); *L.M.Copeland 3864*, *I.R.Telford & J.Duncan*, 100 m NNW Moona Falls, ca 30 km E Walcha, 30.xi.2004 (AD, CANB, NE, NSW); *P.Gilmour 8373*, ca 5 km NNE Limbri, 24.ii.2003 (AD); *K.Mills NSW 224830*, Mt Dunagh, Tantawangalo State Forest, 30.xi.1987 (NSW); *R.Outhred NSW 224833*, Yankees Gap, Wadbilliga Park, 1.iv.1983 (NSW).

VICTORIA: *D.E.Albrecht 296*, Camp Oven Gap track, W Timbarra, 18.iii.1984 (CANB, MEL); *A.C.Beauglehole 37113*, Mt Elizabeth 2, N side, 28.ii.1971 (AD, MEL, NSW); *37144*, Collins Road, 5.3 miles from Omeo Highway, 1.iii.1971 (MEL, NSW, CANB); *F.E.Davies 640*, Mt Elizabeth, 12.xi.1988 (AD, CBG, HO, MEL, NSW); *E.A.Chesterfield MEL 530993*, on Dargo Road between Mt Wellington & Castleburn, 11.iii.1978 (MEL); *J.R.Turner 18*, Mt Steve, 25.ix.1984, (MEL); *J.H.Willis MEL502085*, Mt Elizabeth summit, 16.ix.1968 (MEL, NSW).

Hibbertia hexandra C.T.White

Proc. Roy. Soc. Queensland 53: 201 (1942); N.C.W.Beadle, Student. Fl. N.E. New South Wales 3: 250, fig. 117C (1976); Stanley in Stanley & E.M.Ross, Fl. S.E. Queensl. 1: 188 (1983); G.J.Harden & J.Everett in G.J.Harden, Fl. New South Wales 1: 300 (1990); Jessup in Bostock & E.E.Holland, Census Queensl. Fl. 64 (2007). — **Typus:** Queensland, Lamington National Park, *C.T.White 11187*, 22.xi.1934 (holo.: BRI).

Shrubs to small trees recorded up to 5 m, but usually not more than 3 m tall, erect; branches bluntly ridged, tomentose. *Vestiture* ± persistent, with erect to spreading, rarely reflexed multiangulate fascicled hairs on all parts of the plant; *on branches* dense, with erect to spreading smaller multiangulate fascicled hairs (8–15 often unequal arms) overtopped by scattered larger ones (11–22 often unequal arms); *on leaves above* sparse, with scattered larger and smaller multiangulate fascicled hairs (with broad base and 2–4 short subequal and often only with antrorse arms, usually wearing off but with tubercle remaining or rarely only tubercles developing) with slightly larger ones towards and on the flanks of the revolute margins; *on leaves below* dense, with subequal erect multiangulate fascicled hairs (7–12 subequal arms) overtopped by few distinctly larger ones (15–18 subequal arms) mainly associated with the veins; *on bracts* above and below dense, with subequal erect multiangulate fascicled hairs overtopped by very few larger ones on the central vein; *on outer calyx lobes* outside dense, with subequal spreading multiangulate fascicled hairs overtopped by more or less larger ones often with many arms, inside densely covered with subequal multiangulate fascicled hairs (but more or less antrorse) on the upper two-third to half; *on inner calyx lobes* outside like outer calyx but with fewer larger hairs, inside with few antrorse multiangulate hairs towards the apex. *Leaves* without axillary tufts of hairs; *petiole* (0–) 0.4–2.0 (–6.6) mm long, often indistinct; *lamina* elliptic- to oblanceolate, (8.2–) 15–50 (–75.6) × (4.6–) 6–18 (–22.8) mm, rounded to slightly emarginate, rarely obtuse, gradually tapering into petiole, flat with slightly recurved margins, entire rarely slightly sinuate towards the apex and associated with veins to the margins, above slightly grooved along the central vein and puberulous often becoming tuberculate to glabrous, below with more or less raised veins showing the central vein connected to lateral ones at 70–85° and continued onto sinuate inframarginal ones, tomentose to hirsute along the major veins, distinctly discolourous; juveniles leaves (*L.J.Webb & J.G.Tracey BRI 37332*) oblanceolate, with 1, rarely 2, rounded teeth on either side below the rounded apex and continued for up to 30 leaves, occasionally repeated on fast growing branches, flat with hardly recurved margins, above with scattered fascicled hairs (2, 3 subequal arms), scarcely tuberculate at first, but soon tubercles form and arms wear off, below with few scattered hairs along the veins, each with 3–5 subequal arms, becoming densely hairy (tomentose) on the 17th to 20th leaves. *Flowers* single, terminal on short

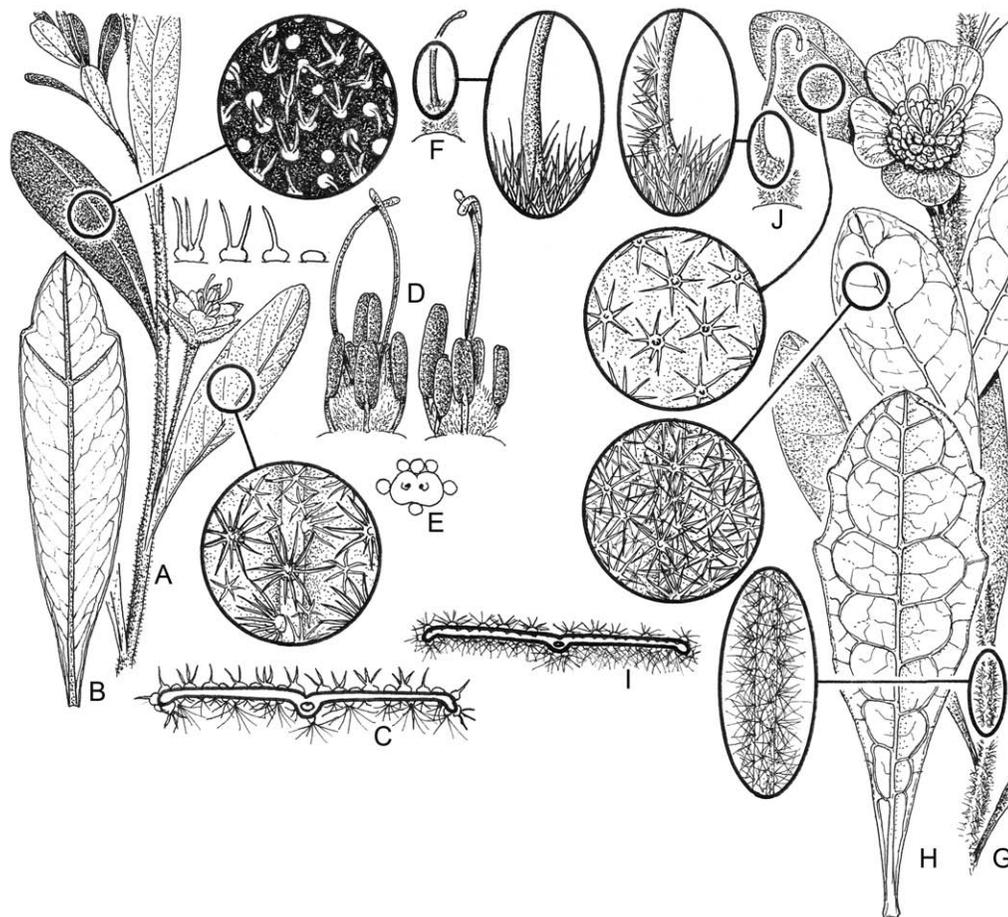


Fig. 4. A–F *H. hexandra*: A flowering branch $\times 1$; B juvenile leaf from below $\times 1$; C transverse section through mid-leaf $\times 5$; D flower with calyx and corolla removed in frontal and lateral view $\times 9$; E diagram of stamens around ovaries; F, style base $\times 8$; G–J *H. reticulata*: G flowering branch $\times 1$; H juvenile leaf from below $\times 1$; I transverse section through mid-leaf $\times 3$; J hairy style base $\times 8$. — A, C–F I.R. Telford 1170; B I.R. Telford 3303; G–J M.B. Thomas 296.

shoots along branches but distally progressively reduced to “axillary” with ultimately two caducous leaflets up to 4 mm long in axil of subtending leaf, with buds narrowly ovoid to ellipsoidal; *peduncle* stiff, 3.1–7.0 (–16.8) mm long, terete to slightly ridged below the flowers; *bracts* strap-like to linear-oblongate, linear-spathulate, 3.4–4.8 \times 0.4–1.2 mm, ca half to two-thirds as long as outer calyx lobes, acute to pointed, erect and \pm appressed, tomentose. *Calyx* with lobes unequal; *outer calyx lobes* (3), lanceolate to oblong-lanceolate, 6.2–7.0 (–7.7) \times (1.7–) 1.9–2.2 mm, usually distinctly longer than inner ones, acute, usually distinctly ridged along the whole length, outside tomentose interspersed with larger hairs, inside tomentose to pubescent on upper two-third to half; *inner calyx lobes* (2) oblong-ovate, 5.4–5.9 (–6.1) \times 2.6–3.1 mm, acute, with faint ridges, outside tomentose and membranous margins with some fascicled cilia, inside tomentose to puberulous towards the apices. *Petals* oblanceolate to oblong-oblanceolate, 5.2–8.4 mm long, usually entire. *Stamens* 6 (–12) (without staminodes), unequal, with dorsal one longer, arranged in groups around pistils; *filaments* strap-like, 1.1–1.4 mm long, scarcely connate basally; *anthers* narrowly obloid, 1.6–1.8 (–2.1) mm long, abruptly

constricted above and below, straight. *Pistils* 2; *ovaries* broadly obovoid to almost spherical, with 2 basal to parietal ovules, hirsute, with style attached to the apex then spreading straight out- and backwards with stigmas near the petals. *Fruiting peduncle* scarcely elongating, slightly recurved. *Seeds* obloid, 3.2–3.35 \times 2.1–2.2, dark brown; aril with fleshy attachment expanding into a cup-like, \pm lobed membrane covering lower third to one side of the seed. *Flowering*: Flowers have been recorded for all months of the year. **Fig. 4A–F.**

Distribution and ecology. Grows usually on shallow soil on volcanic rocks in heath or forest margins but also sometimes in adjoining rainforest vegetation in Queensland (Dd, Mo, Wb) and northern New South Wales (NC).

Conservation status. Recorded from and conserved in a number of parks in Queensland and New South Wales.

Diagnostic features. The species is distinguished from others in this group mainly by its usual six stamens, but as this number is occasionally variable, its vestiture of the leaves, and in particular on the upper surface of the leaf, is different, especially from *H. hermannifolia* and *H. spathulata* subsp. *pleioclada*.

Variation. All parts of plants of this species are extremely variable, but the difference between leaves on fast growing shoots as opposed to senescent flowering ones as found in most hibbertias, is here particularly pronounced. Leaves of the former also usually have distinct petioles, while in the latter they are often ill-defined. The leaves of plants from Mt Greville (*P.I.Forster 4698*) and Mt Maroon (e.g. *S.J.Everist 7172*) are usually narrower and have often obviously larger hairs on the flanks of the recurved margins, sometimes larger numbers of stamens and, most interestingly, hairy style bases of varying degrees. However, no two of these characters allow at present a consistent delineation of an infraspecific taxon.

Unusual for this species is its outer and inner calyx lobes are often very similar in shape, but they are described separately, because the inner two are usually slightly smaller than the outer three. The number of stamens, commonly six in each flower, was occasionally found to vary to eight or even twelve (e.g. *S.J.Everist 7172*), placing it into the same range as in, for instance, *H. spathulata* subsp. *pleioclada*, but this taxon has a different vestiture, especially on the upper surface of the leaves. The tropical species, such as *H. velutina*, to which White (1942) compared *H. hexandra*, have much higher numbers of hairs as well as the different rosette-like fascicled hair type.

Selection of specimens examined (28 examined)

QUEENSLAND: *E.J.Carroll 1170* & *I.R.Telford*, Koongalala Point, Coomera Gorge, 27.v.1967 (CANB); *S.L.Everist 7172*, Logan River E of Mt Maroon, 2.iv.1962 (BRI, CANB); *M.Fagg 616*, Binna Burra, Coomera Falls track, 12.v.1970 (AD, CANB); *P.I.Forster 4698*, Palm Grove Gorge Mt Greville, 21.viii.1988 (BRI, NSW); *E.J.Smith 9*, Mt Greville Gorge, 20.iv.1938 (BRI); *G.L.Stebbins A-81*, SE Binna Burra Lodge, 7.i.1975 (CANB); *R.F.Thorne 20394* & *S.T.Blake*, Roberts Plateau, Binna Burra, 5.iv.1959 (BRI, CANB); *C.T.White 7281*, Mt Greville, 9.vi.1963 (BRI).

NEW SOUTH WALES: *R.D.Hoogland 11807*, Whian Whian State Forest, 16.x.1970 (BRI, CANB); *L.A.S.Johnson* & *E.F.Constable NSW 86478*, Whian Whian State Forest, 10.vi.1957 (NSW); *I.R.Telford 3303*, Nightcap Range, 2 km N Peach Mtn, 29.ix.1973 (CANB); *C.T.White 12840*, Whian Whian State Forest, 2.vi.1924 (BRI, NSW); *M.G.White NSW 86479*, Kippara State Forest, 20.iv.1957 (NSW).

Hibbertia planifolia Toelken, *sp. nov.*

A *H. spathulata* et *H. acaulothrix habitu decumbente, foliis ut videtur planis vena centrale invisibile differt.*

Typus: New South Wales, Yerranderrie, *J.L.Boorman s.n.*, vii.1915 (holo.: NSW 101917; iso.: CANB – n.v.).

Prostrate shrublet ca 0.3 m high, ± decumbent, much branched, with leaves clustered terminally; branches terete with distinctly raised leaf base but these are not drawn into flanges, tomentose. *Vestiture* persistent, dense, with subequal (in size not number of arms) erect-spreading multiangulate usually narrow-based fascicled hairs on most parts of the plants; *on branches* with few slightly larger multiangulate, rarely broad-based fascicled hairs (9–14 usually unequal arms) mainly near

leaf bases with/over a dense cover of smaller ones (7–10 unequal or subequal arms); *on leaves above* dense, with erect to antrorse subequal (becoming longer and with more arms towards the margins) multiangulate narrow-based fascicled hairs (5–10 subequal to unequal some longer arms); *on leaves below* very dense, with slightly larger spreading multiangulate often broad-based fascicled hairs (8–12 subequal arms) mainly on the central vein over or rarely with a very dense cover of smaller narrow-based ones (5–8 subequal arms, but usually not well discernable); *on bracts* above and below dense, with erect-spreading but often somewhat antrorse narrow-based (except for a few larger ones on the margins) multiangulate fascicled hairs (7–12 usually subequal arms), subequal to slightly longer along the margins; *on outer calyx lobes* outside very dense, with erect to spreading narrow-based multiangulate fascicled hairs (6–10 subequal arms becoming longer and often unequal along the margins), overtopped by few spreading broad-based ones, mainly along the central ridge, inside moderately dense antrorse narrow-based fascicled hairs on the upper third; *on inner calyx lobes* outside dense, with small spreading to reflexed narrow-based multiangulate fascicled hairs (with short arms except along the faint central ridge) along a central band and becoming gradually smaller towards the broad lateral membranous margins, ± topped with fascicled cilia, inside glabrous, or rarely with few fine antrorse hairs towards the apex. *Leaves* without axillary tufts of hairs; *petiole* 0–0.3 mm long, indistinct; *lamina* linear-obtriangular, rarely linear, (3.3–) 3.5–4.8 (–6.3) × 1.0–1.3 mm, truncate, rarely obtuse when young, becoming ± recurved-spreading when older, cuneate from apex to petiole, flat, above scarcely grooved along the central vein and tomentose, below central vein recessed between recurved margins being densely tomentose and scarcely visible, discolourous; juveniles leaves not seen. *Flowers* single, sessile in terminal clusters of leaves, with ovoid to ellipsoidal buds; *peduncle* ± absent; *bracts* linear to club-shaped, 5.4–5.6 × 0.9–1.05 mm, almost as long as outer calyx, usually obtuse, semicircular in section, tomentose above and below. *Calyx* with lobes scarcely unequal and forming a range; *outer calyx lobes* (3/2) lanceolate to narrowly ovate, 5.3–5.6 × 2.3–2.9 mm, slightly longer than inner ones, pointed, ridged and with ± recurved margins, outside tomentose to hirsute along ridge and margins, inside pubescent on upper half to third; *inner calyx lobes* (2/3) ovate, 3.8–4.2 × 3.3–3.6 mm, obtuse to cuspidate, rarely almost rounded, with faint ridges, outside pubescent to puberulous, rarely stubble-like along the centre and short, fine, often fascicled, cilia on a broad membranous margin, inside usually glabrous. *Petals* obovate, 5.3–6.3 mm long, slightly bilobed. *Stamens* 8–11 (plus up to 10 staminodes), subequal except one, in groups around the ovary; *filaments* filiform, 1.0–1.15 mm long, scarcely fused basally; *anthers* narrowly oblong-ovoid, 0.9–1.25 mm long, longer one 1.85–2.0

mm long, abruptly constricted above and below. *Pistils* 2; *ovaries* obovoid, each with 2 basal ovules, tomentose, with style attached to the centre and then erect on either side of the central cluster of anthers and with constricted stigmas well above even the longer anthers. *Fruiting peduncle* ± absent. *Seeds* not seen. *Flowering*: July–September. **Fig. 3L–N.**

Distribution and ecology. Grows in rocky places on sandstone with scrub vegetation in south-eastern Central Tableland of New South Wales (CT).

Conservation status. It is only known from two collections and the species has not been collected for forty years.

Diagnostic features. The species is distinguished from the very similar *H. spathulata* by its decumbent to prostrate growth, flat leaves with the central vein ± recessed between the revolute margins and an apex that is only slightly recurved, the almost linear bract, and the greater number of stamens and staminodes (18–22 as apposed to up to 15 in the latter species). A narrow-leaved form of *H. spathulata* (R.D.Hoogland 11922), though superficially similar, is also easily distinguished from *H. planifolia* by the very prominent central vein and more or less folded leaves.

A similar difference in the number of the stamens exists between *H. planifolia* and *H. acaulothrix*, which appears to be a more robust form of the former, because its central vein is underdeveloped but well visible, as is the undersurface of the leaf between the vein and the revolute margins. *Hibbertia acaulothrix* has also fewer arms (1–4 versus 5–14 in *H. planifolia*) on hairs on the upper leaf surface as well as hairs with distinctly longer arms on the flanks.

Variation. Young leaves are erect and similar to those of *H. acaulothrix*, but become recurved-spreading as they get older quite unlike that species.

Etymology. In contrast to all members of the *H. hermanniifolia* complex the central vein of this species seems hardly raised and scarcely distinguishable between the recurved margins, but partly also because of a dense cover of hairs. They appear “flat-leaved”, which is referred to in the Latin epithet “plani-folia”.

Specimens examined

NEW SOUTH WALES: R.Coveney NSW127188, Mt Colong, 16.ix.1967 (NSW).

H. reticulata Toelken, *sp. nov.*

A H. hermanniifolia et H. hexandra 32–48 staminibus pilisque fasciculatis adpressis superantibus pilis simplicibus in paginis adaxialis foliorum; H. melhanioides nervatura foliorum reticulata, calicis et ovarii pilis fasciculatis differt.

Typus: Queensland, Cook district, Tozer Gap, B.J.Conn 3787 & A.N.L.Doust, 5.vi.1993 (holo.: AD; iso.: BRI, NSW – n.v.).

Hibbertia sp. (Mt Tozer L.J.Brass 19024) S.T.Reynolds in R.J.F.Henderson, Queensland Pl. 65 (1997).

Shrubs up to 2 m tall, with erect to spreading branches; branches ± woody, bluntly angular from the centre of the leaf base, tomentose. *Vestiture* persistent, with spreading to reflexed multiangulate, mainly narrow-based fascicled hairs on the whole plant, rarely interspersed with hooked simple hairs; *on branches* densely covered with spreading multiangulate fascicled hairs (5–8 subequal arms), rarely interspersed with few slightly larger ones but not overtopping; *on leaves above* with scattered, often subequal ± appressed multiangulate ± broad-based fascicled hairs (4–6 (–8) subequal to unequal ± reflexed short arms) of more or less the same size, overtopped on young leaves by scattered hooked simple hairs mainly on the proximal flanks; *on leaves below* very densely covered with subequal fine spreading multiangulate fascicled hairs (6–12 subequal often reflexed arms), ± felty with individual hairs rarely visible, overtopped by few or no larger ones; *on bracts* below very densely covered with subequal fine spreading fascicled hairs and less densely above; *on outer calyx lobes* outside very densely or densely covered with subequal fine spreading fascicled hairs, often with unequally long arms, overtopped by scattered hooked simple hairs, inside more or less densely covered with subequal fine antrorse-spreading multiangulate fascicled hairs on the upper half to two-thirds; *on inner calyx lobes* outside more or less densely covered with subequal fine spreading multiangulate fascicled hairs, inside glabrous. *Leaves* without axillary tuft of hairs; *petiole* (0.8–) 2–5 (–6.3) mm long, often indistinct; *lamina* obovate-oblong, obovate rarely oblanceolate, (5.4–) 15–50 (–81.5) × (6–) 10–20 (–30.6) mm, rounded to truncate with mucronate vein-end, gradually to ± abruptly constricted into petiole, entire to sinuate, ± flat with slightly recurved margins, above more or less grooved along much of the network of veins (usually more than 8 lateral veins) and fascicled-puberulous with deciduous hooked simple hairs along the flanks, below more or less raised but partly visible network of veins and tomentose with uniform hairs, distinctly discolourous; juvenile leaves not seen but adult leaves exhibit vein-ends rarely with shallow serrations mainly distally on the margins. *Flowers* single, “axillary” rarely on visible fascicled short shoots, towards the end of branches, with ellipsoidal buds; *peduncle* stiff, 10.8–24.6 mm long, slightly compressed and ridged; *bracts* narrowly oblong to oblong-spathulate, 3.3–6.2 × 0.6–1.2 mm, ca half to two-third of outer calyx lobes, acute to pointed, erect or erecto to spreading, tomentose. *Calyx* lobes unequal; *outer calyx lobes* (3), lanceolate, 10.8–12.4 × 4.8–6.4 mm, distinctly longer than inner ones, pointed rarely acute, scarcely to more or less ridged, outside fascicled-tomentose with few overtopping hooked simple hairs, inside pubescent on upper half to two-third; *inner calyx lobes* (2) obovate, 9.3–10.6 × 6.3–7.5 mm, blunt to rounded; without ridges, outside tomentose and fascicled-ciliate at the apex, inside glabrous. *Petals* obovate, 8.7–11.4 mm long, shallowly bilobed. *Stamens*

32–48 (without staminodes), unequal with 1–4 longer ones, in 2 or 3 groups around the ovaries; *filaments* strap-like, 1.8–3.9 mm long, scarcely connate basally; *anthers* narrowly obloid, (1.4–) 2.0–2.2 mm, or 2.9–3.55 mm long, more or less straight, abruptly constricted above and more gradually below. *Pistils* 2; *ovary* broadly obovoid, with 4–6 parietal ovules, densely tomentose also on the style base, with style attached laterally then curved out- and upward and again inward to place the constricted stigma above the apex of the anthers. *Fruiting peduncle* scarcely elongating, recurved. *Seeds* obovoid and scarcely laterally compressed, 2.5–2.6 × 2–2.2 mm, black; aril with fleshy attachment expanding into a cup-like, lobed membrane covering two-third of the seed. *Flowering*: June–September. **Fig. 4G–J.**

Distribution and ecology. Usually associated with ironstone (rarely granite) in open forest to woodland, known mainly from the Iron Range, northern Queensland (Co).

Conservation status. Conserved in the Iron Range National Park, where it was recorded as common (*L.J.Brass 19350*) in 1948.

Diagnostic features. *Hibbertia reticulata* has similar broad leaves to *H. hermanniifolia* and *H. hexandra*, but is distinguished by its reticulate venation on the upper and lower surface as well as hooked simple hairs along the margin, particularly of young leaves. The hairs may appear to be rosette-like fascicled hairs as typical of the §*Tomentosae*, because the bases of the reflexed arms are sometimes bulging excessively. It also resembles *H. melhanioides* but differs by the extensively reticulate venation and hooked simple hairs of mainly young leaves, and essentially by the whole plant being covered with multiangulate fascicled hairs, as compared to rosette-like fascicled hairs in *H. melhanioides* (cf. Toelken 2010a).

Variation. The two or three first leaves of lateral branches are commonly very much smaller (less than half the size) of normal leaves, and therefore rapidly growing branches (e.g. *H.E.Volck AFO 3263*) with long internodes and very large leaves have a very different appearance to senescent branches with smaller leaves of more or less the same size and short internodes (e.g. *B.J.Conn 3787* & *A.N.L.Doust* from the same locality, Mt Tozer).

Although usually 6–10 lateral veins are visible, there may be up to 16 on particularly large and well-developed leaves. The shape and size of the bracts also vary considerably.

Etymology. The almost complete “reticulate” venation particularly visible on the adaxial surface, especially of young leaves, is referred to in the Latin epithet “reticulata”.

Selection of specimens examined (21 seen)

QUEENSLAND: *L.J.Brass 19024*, northern slopes of Mt Tozer, 3.vi.1948 (BRI, CANB); *L.J.Brass 19350*, Tozer Range

northern end, 29.vi.1948 (BRI); *B.G.Briggs 7331*, 4 km NW Mt Tozer, 21.viii.1983 (NSW); *C.H.Gittens 1074*, Mt Tozer, viii.1965 (NSW); *C.H.Gittens 1086*, Kennedy Road, viii.1968 (NSW); *B.Hyland 7549*, Mt Carter, 15.ix.1974 (QRS); *A.Irvine 258*, Puff de Looney Ridge, 3.vii.1972 (CANB); *A.C.Robinson BRI 194178*, Tozer Gap, 31.x.1974 (BRI); *M.B.Thomas 296*, Tozer Gap, 9.vii.1988 (BRI); *H.E.Volk AFO 2409*; near Mt Tozer, ix.1962 (QRS); *H.E.Volk 3263*, Mt Tozer, viii.1966 (QRS); *L.J.Webb & J.G.Tracey 13487*, northern Mt Tozer, 26.xi.1977 (QRS).

Hibbertia spathulata N.A.Wakef.

Victorian Naturalist 73: 166 (1957); J.H.Willis, Handb. Pl. Victoria 2: 386 (1973); Toelken in N.G.Walsh & Entwisle, Fl. Victoria 3: 304 (1996). — **Typus:** Victoria, Butchers Ridge, Snowy River, *N.A.Wakefield 4832*, 10.ix.1955 (holo.: MEL1010267; iso.: CANB, K, NSW).

Shrubs 0.5–0.8 (–1.5) m tall, with several stems, erect to spreading; branches terete to scarcely flanged from the leaf base, tomentose. *Vestiture:* persistent, dense, with larger with/over smaller erect multiangulate, mainly narrow-based fascicled hairs on most parts of the plant; *on branches* dense, with few larger with thinner erect-spreading narrow-based fascicled hairs (7–12 unequal to subequal arms); *on leaves above* dense with subequal erect to rarely antrorse multiangulate narrow-based fascicled hairs (3–8 (–14) subequal arms), with base cells usually not developed; *on leaves below* very dense, with erect smaller subequal multiangulate, mainly narrow-based fascicled hairs but ± overtopped by, or with few interspersed broad-based ones (7–11 subequal or rarely with the odd longer arms, but often not fully visible because of denseness of hairs) mainly on the central vein and recurved margins; *on bracts* above and below dense, with subequal erect to spreading multiangulate narrow-based fascicled hairs with slightly longer arms along the margin and the central ridge; *on outer calyx lobes* outside very dense, with ± broad-based spreading but short-branched multiangulate fascicled hairs except for a few spreading ones along on the central ridge and the margins, inside with antrorse fascicled hairs on upper half to third; *on inner calyx lobes* outside dense, with ± broad-based cactiform fascicled hairs except for a few spreading ones along the central ridge and with fascicled to simple cilia on the membranous margin, inside glabrous. *Leaves* without axillary tufts of hairs; *petiole* 0–0.5 mm long, indistinct; *lamina* often broadly but also narrowly obtriangular to spatulate, 3.8–22.3 × (1.2–) 1.5–4 (–8.3) mm, truncate with scarcely recurved apex, entire, flat, rarely ± folded lengthwise, above ± grooved along the central vein and tomentose, below with bold central vein usually raised above the recurved margins and tomentose, vaguely discolourous; juvenile leaves not seen. *Flowers* single, terminal, sessile or subsessile, with ovoid to ellipsoidal buds; *peduncle* 0.6–4.4 mm long, terete; *bracts* linear-oblancoate, (4.5–) 5.0–5.4 × 0.9–1.3 mm, bluntly acute, leaf-like with slightly recurved margins, as long as or just shorter than outer calyx lobes, ridged, tomentose. *Calyx* with lobes scarcely unequal; *outer calyx lobes*

(3) lanceolate, 5.2–5.9 × 2.7–3.0 mm, scarcely larger than inner ones, acute, outside ridged or keeled and tomentose, inside pubescent to tomentose on often more than the upper half; *inner calyx lobes* (2) ovate, 5.0–5.3 × 3.1–4.0 mm, obtuse to cuspidate, without ridge, outside finely tomentose to almost stubble-like and with fascicled cilia on membranous margin, inside glabrous. *Petals* oblong-oblancoate, 5.8–7.8 × 3.5–5.5 mm, scarcely bilobed. *Stamens* 5–12 (plus 2–8 staminodes), unequal, in 5 bundles around the ovaries; filament filamentous, 0.8–1.1 mm long, scarcely connate basally; anthers narrowly obloid, 0.9–1.3 mm long, or 1–3 longer ones (1.6–1.8 mm long) in centre surrounded by shorter ones, abruptly constricted above and below, straight. *Pistils* 2; *ovaries* obovoid, each with 2 (–4) ovules (usually 2 basal ones or rarely in pairs above one another), tomentose, with style attached to dorsal apex then erect to position stigmas laterally to upper part of longer anther/s. *Fruiting peduncle* scarcely elongating, recurved. *Seeds* not seen.

Diagnostic features. A similar tomentum of dense fascicled hairs (rarely with a few broad-based ones) on the upper and lower leaf surfaces, and the absence of stalked fascicled hairs on the leaves and branches, as well as the usually sessile flowers, distinguish this species from *H. hermanniifolia*. Altogether the leaves as well as the hairs are much thinner in this species, and are similar to those of *H. acaulothrix*. The latter has commonly elongated leaves, and the fascicled hairs on the upper leaf surface have only 1–3 arms, while the arms of the larger hairs, mainly on the flanks or at least on the lower cuneate base, are 2–4 times longer than those of the smaller hairs next to them. Bracts are also longer than the sepals and large obovate petals are also distinctive for *H. acaulothrix*.

Key to subspecies

1. Shrubs with many wiry-woody branchlets (often twiggy); hairs on upper leaf surface with up to (3–) 5 or 6 (–8) arms subsp. *spathulata*
- 1: Shrubs with rigid-woody branches, hairs on upper leaf surface with up to 8–10 (–14) arms ... subsp. *pleioclada*

Hibbertia spathulata subsp. *spathulata*.

Shrub much branched, often twiggy, usually with wiry branches. *Leaves* (3.8–) 4.5–8.5 (–13.6) × (1.2–) 1.5–4 (–5.4) mm, on upper surface with subequal hairs each with (3–) 5 or 6 (–8) arms. *Outer calyx lobes* outside mainly densely covered with cactiform fascicled hairs or with very short arms and usually broad-based; all these overtopped by larger coarse hairs. *Flowering*: September–December. **Fig. 3E–G.**

Distribution and ecology. Recorded from rocky slopes in open heath, woodland or sclerophyll forest in the catchment of the Snowy River, Victoria (EG).

Conservation status. Notes on herbarium specimens give no indication of the size of recorded populations. It was last collected in 1988.

Variation. Since only a few records of this species are available, not much is known about its variation. One collection (*R.D.Hoogland 11922*) has slender elongate leaves, but unlike those of *H. acaulothrix*, they are only up to 3 mm broad. The peduncles of some of the flowers of this collection are up to 5 mm long.

The difference between the closely resembling *H. spathulata* and *H. hermanniifolia* subsp. *recondita*, which also occur close to one another, is not merely based on the absence or presence of stalked fascicled hairs but also on a similar dense fascicled tomentum of both leaf surfaces of *H. spathulata*, whereas *H. hermanniifolia* subsp. *recondita* has fewer hairs with few arms adaxially.

Specimens examined

VICTORIA: *A.C.Beauglehole 37356*, Museum Spur, 11.iii.1973 (CANB, MEL); *S.J.Forbes 171*, SE Campbells Knob, 12 ix.1979 (MEL ×2); *R.D.Hoogland 11922*, ca 5 miles [8 km] ESE Suggan Buggan, 29.xii.1970 (MEL, NSW); *N.G.Walsh 2209* & *K.C.Norris*, Museum Spur, 15.xi.1988 (CANB, MEL).

Hibbertia spathulata subsp. *pleioclada* Toelken, subsp. nov.

A subspecies typica et a H. hermanniifolia subsp. recondita foliis majoribus et ramis pluribus pilorum in paginis superis differt.

Typus: New South Wales, Mt Jondol, 25 km SE Tenterfield, *J.T.Hunter 3197*, 1.vi.1995 (holo.: AD; iso.: NE, NSW – n.v.).

Shrub moderately branched, with rigid-woody branches. *Leaves* (5.8–) 7.0–18.0 (–22.3) × (2.4–) 3.5–5.0 (–8.3) mm, on upper surface with subequal hairs each with 8–10 (–14) arms. *Outer calyx lobes* outside mainly densely covered with subequal fascicled hairs with fine arms and usually small-based, except for larger fine overtopping hairs. *Flowering*: June.

Distribution and ecology. Grows on sandy soil on west aspect of granite outcrop in dry heath vegetation in northern New South Wales (NT).

Conservation status. Recorded as locally common in Forestlands State Forest (*J.T.Hunter 3197*), but only collected once in 1995.

Variation. The only two branches of this subspecies examined indicate a much more robust plant than typical *H. spathulata*, not only because of the woody stems, but also since the leaves on the main branch are up to 22.3 mm long, while in the typical subspecies they are rarely up to 13.6 mm long. There are, however, a few leaves on the type specimen of this subspecies that show some overlap with the size of leaves of the typical plants, so that only subspecific status is applied until more specimens will reveal a fuller range of variation of this taxon.

The many arms of the fascicled hairs of the upper leaf surface distinguish this subspecies from specimens of *H. hermanniifolia* subsp. *recondita*, which is mainly

recognised by its short-stalked fascicled hairs on the lower surface of their leaves. Both of them occur on the Northern Tableland. The dense hairs and the larger number of arms of these hairs are approaching those on the undersurface and the rest of the plant and are possibly closer to those of seedlings of these plants (cf. seedlings in Toelken 2010a).

Etymology. The epithet “pleio-clada”, Latinised Greek, “more (than usual)-branched” refers to the larger number of arms of the fascicled hairs on upper leaf surface.

Specimen examined.

Known only from the type collection.

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