



## Notes on *Hibbertia* subgen. *Hemistemma* (Dilleniaceae) – 13. The eastern Australian *H. acicularis* and *H. perhamata* groups

H.R. Toelken

State Herbarium of South Australia, Botanic Gardens and State Herbarium, Hackney Road, Adelaide, South Australia 5000

Email: hellmut.toelken@sa.gov.au

**Abstract:** This taxonomic revision of the *Hibbertia acicularis* (with *H. acicularis* and *H. rufa* subgroups) and *H. perhamata* groups (with *H. perhamata* and *H. arguta* subgroups) are based on morphological examinations of mainly dried specimens. Species of both groups are primarily delimited by occurring in eastern Australia and having a non-chlorophyll-containing leaf awn. Although many species of the *H. rufa* subgroup also have this awn and/or a terminal tuft of straight simple hairs, they are readily recognised by  $\pm$  connate erect filaments of usually four to six stamens per flower. They are also prostrate to decumbent plants with simple hairs similar to species of the *H. acicularis* subgroup, while species of the *H. perhamata* subgroup have woody erect branches and radially spreading fascicled hairs at least on the outer surface of the calyx lobes. Apart from floral characteristics, combinations of different types of hairs, especially on the calyx lobes and to a lesser degree on branches and leaves, were frequently used to distinguish species. However, the variation within individual species, their distribution and their specific habitats are at present insufficiently known, because species are generally represented by too few collections. Only limited field work was possible because species of the groups are distributed widely, from southern South Australia to northern Queensland, all along the changing environments of the Great Dividing Range, especially its eastern and western foothills. The present treatment is intended to serve as a baseline for molecular assessments of the many localised populations in distinct microhabitats, which demand closer examination.

The following 36 taxa are recognised (the 28 newly described ones in bold), fully described and included in a key: *H. acicularis* (Labill.) F.Muell., ***H. aiodonta*** Toelken, ***H. arenaria*** Toelken, ***H. arguta*** Toelken, ***H. aristibracteata*** Toelken, ***H. aristisepala*** Toelken, ***H. armata*** Toelken, ***H. carnarvonensis*** Toelken, ***H. conferta*** Toelken, ***H. crassinervis*** Toelken, ***H. epeduncularis*** Toelken, *H. exutiacies* N.A.Wakef., ***H. filifolia*** Toelken, ***H. incrassata*** Toelken, ***H. leiocarpa*** Toelken, ***H. lignescens*** Toelken, ***H. minima*** Toelken, ***H. minyantha*** Toelken, ***H. nematophylla*** Toelken, ***H. nudicalycina*** Toelken, ***H. octandra*** Toelken, *H. obtusibracteata* Toelken, ***H. parvifolia*** Toelken, ***H. perhamata*** Toelken, *H. pilifera* Toelken, ***H. prorufa*** Toelken, *H. pustulata* Toelken, ***H. pustulifolia*** Toelken & R.T.Miller, ***H. rasilis*** Toelken, ***H. rigens*** Toelken, *H. rufa* N.A.Wakef., ***H. succuneata*** Toelken, *H. surcularis* Toelken, ***H. taeniophylla*** Toelken, ***H. tuberculipilosa*** Toelken, *H. woronorana* Toelken.

**Keywords:** Dilleniaceae, *Hibbertia*, nomenclature, revision, taxonomy, new species, eastern Australia

### Introduction

*Pleurandra acicularis* Labill. was described by Labillardiere (1806) and referred to under this name by Candolle (1817, 1824), Sprengel (1825) and Mueller (1853), but it was later transferred to *Hibbertia* by Mueller (1862). In the meantime, Turczaninow (1855) had described *Pleurandra triandra* Turcz. based on a Gunn collection from “prope Sidney in Tasmania”, but it was regarded by subsequent authors as a form of *H. acicularis* (Labill.) F.Muell. The very broad concept of *H. acicularis*, including all specimens with awned leaf

apices as adopted by Mueller (1862, 1880, 1882, 1889) and Bentham (1863), was retained for a hundred years, although both the above authors mentioned different forms from areas extending from South Australia (S.A.) to near Brisbane. Mueller (1880) included even a specimen from Western Australia (W.A.; Thomas River, 1862, *G. Maxwell s.n.*), while Hamilton (1887) drew attention to one from Beaudesert in Queensland (Qld). Black (1912) also retained the one-species concept when he published *H. acicularis* var. *sessiliflora* J.M.Black, which Wakefield (1955) described as the first separate species, *H. exutiacies* N.A.Wakef., from south-eastern

Australia. In the same paper Wakefield also published *H. rufa* N.A.Wakef., a species here included in the *H. rufa* subgroup where the awned leaf apex is well developed in several species only. As, however, the flowers with distinctly connate filaments of 4–6 erect stamens, unite species of this subgroup and in addition agree with additional characters, e.g. the glabrous inside surface of the calyx, the presence of only simple hairs and mainly decumbent habit of the *H. acicularis* subgroup, it is recognised as a distinct subgroup (cf. taxonomy).

Throughout the first 150 years, the acuminate leaf apex with a distinctive firm terminal awn of the *H. acicularis* group in eastern Australia (from S.A. to Queensland) has been its distinguishing feature, and, although it is still treated here as the major diagnostic feature even in many species of the *H. rufa* subgroup, it differs from similar ericoid-leaved species in the *H. sericea* (R.Br. ex DC.) Benth. and *H. stricta* (DC.) R.Br. ex F.Muell. groups (*sensu* Toelken & Miller 2012) in eastern Australia by the awn being without chlorophyll. Even on herbarium material the awn has, in contrast to species of the above two groups, a different colour to the main leaf lamina. On young leaves they are usually topped by a transparent point, which is either caducous or becomes brown with dead tissue on mature leaves. Other diagnostic features are, for instance, usually fewer than ten stamens per flower, in comparison to often twenty or more found in many species of the *H. stricta* and *H. sericea* groups. Furthermore, the inner surfaces of the calyx lobes are usually glabrous, while they are commonly  $\pm$  hairy in the latter two groups. Unlike the straight simple hairs that occur on the outer surface of the calyx, which are diagnostic of species of the *H. sericea* group, erect hooked simple hairs in the *H. acicularis* group and overtopping radially spreading fascicled hairs are usually found in the *H. perhamata* group, but straight simple hairs have been recorded from a few species in the *H. rufa* subgroup (e.g. *H. pilifera* Toelken).

Species of the eastern Australian *H. acicularis* group differ from those of the West Australian groups with awned leaves by the following:

1. The stamens are to one side of 2 carpels, as opposed to around and in gaps of 5 carpels, which separates it from the *Hibbertia exasperata-pungens* group (including the new *H. advena* Hammer). The recently described *H. ferox* Jackes also has stamens around the carpels and is most closely related to *H. drummondii* and *H. glabriuscula* from Western Australia, according to molecular data (Hammer *et al.* 2022).
2. The stamens are  $\pm$  erect, as opposed to the “hand-of-banana” stamens that are curved over and obscure the carpels, as is seen in most species of *H.* subg. *Hemistemma* in Western Australia, including *H. acerosa* and related species. *Hibbertia arguta*, *H. aristisepala* and *H. crassinervis*, which are here described from eastern Australia under present criteria should, pending molecular assessment,

possibly be included in this Western Australian group, because of their floral resemblance.

In the *H. rufa* subgroup, not all species exhibit the defining leaf awn of the *H. acicularis* group, but it is nevertheless clearly defined by 4–6 stamens with  $\pm$  connate filaments. These unusual taxa are mainly included in this paper because some species (e.g. *H. obtusibracteata*), have the characteristic awned leaves similar to the *H. acicularis* group. Other species have terminal tufts of straight simple hairs on the leaves, or (*H. obtusibracteata*) bear a transparent terminal awn with a number of finer, straight simple hairs around it, indicating a likely origin of the caducous transparent terminal point of the awn. Although at present only incomplete evidence can be provided to reduce the *H. rufa* group to a subgroup, it is done partly for clarity of the treatment.

An interesting character that the *H. acicularis* group shares with the other ericoid-leaved species of the *H. sericea* and *H. stricta* groups is the excentric style, the recurved base of which is  $\pm$  fused to the apex of the ovary, so that the free styles are attached to the outer apex or side of the ovaries. This feature is usually well-visible in species of the *H. acicularis* group because the ovaries, or only the ‘crest’ (as this connate style base is called here) are commonly glabrous to glabrescent and clearly visible, while in the *H. perhamata* group it is usually obscured by the commonly dense tomentum of the ovaries and crest as in the *H. sericea* and *H. stricta* groups.

This revision of species of the *H. acicularis* and *H. perhamata* groups from eastern Australian treats 36 species and provides tools for their identification. It is hoped that this will stimulate interest and more discerning collecting of a wider range of variation of the individual taxa as well as their habitats and distribution.

## Characters

**Habit.** An important characteristic of species of the *H. acicularis* group is their commonly decumbent or trailing growth, in contrast to the predominantly erect habit common in the *H. perhamata* group (similar to the *H. sericea* and *H. stricta* groups), as can usually be observed on herbarium specimen by their wiry-woody as opposed to rigid-woody branches, respectively. These wiry branches remain usually distinctly ridged for a long time even if they often become somewhat woody by secondary growth on very mature plants, while rigid-woody branches usually soon become  $\pm$  terete. There are however, provisionally a few species with woody erect branches included, pending molecular assessment, e.g. *H. lignescens* and *H. taeniophylla*.

**Hairs.** As in other groups of *Hibbertia*, such as the *H. tomentosa* R.Br. ex DC. Group (Toelken 2010), hairs are an important character to distinguish species and to provide some indication of groups of species. Therefore,

they are described in detail. There are principally three types of hairs in the *H. acicularis* group, and they are less varied than those of the *H. stricta* and *H. sericea* groups and structurally less complex than in, for instance, the *H. tomentosa* group.

**1. Straight simple hairs** are usually  $\pm$  antrorsely appressed or spreading. When they are very dense, as, for instance, on ovaries, it is often difficult to distinguish between straight simple or bifid hairs, and for that reason the latter hairs are in such situations included in straight simple hairs (although when strictly assessed they are fascicled). In the *H. acicularis* group, straight simple hairs are usually found as intrapetiolar tufts or on ovaries, while they rarely occur on branches and leaves, where their usual combination with a range of radially spreading fascicled hairs indicates that they may represent very much reduced forms of the latter as they have similar basal tubercles.

Straight simple hairs often also subtend the transparent terminal point of the leaf awn where, although finer than the awn, they are of similar length and transparent texture, particularly in the *H. rufa* subgroup, indicating that the awn may have developed from such hairs.

**2. Hooked simple hairs**, commonly found on the outer surface of the calyx of species of both the *H. acicularis* and *H. perhamata* groups. They are generally not quite erect but are  $\pm$  recurved from the base, in contrast to the usually antrorsely spreading straight simple hairs. Even very reduced hooked hairs on, for instance, lateral sides of inner calyx lobes, still show signs of the terminal hook. Hooked simple hairs are always distinct from straight simple hairs and have not been found to intergrade. Occasionally hooked simple hairs occur very sporadically on the margins of leaves and bracts.

**3. Radially spreading fascicled hairs** is here used as the preferred term for multiangulate fascicled hairs (Hewson 1988). They are rare in the *H. perhamata* group and occur most commonly on the calyx, but are easily overlooked there because they are usually overtopped by erect hooked simple hairs. On the same plant, radially spreading fascicled hairs may also occur on branches and leaves, though not always, as for instance, in *H. perhamata*. They are, however, often very much reduced (especially on leaves), so that they have mostly only two or three arms and could easily be confused with bifid hairs, but they can be usually identified by the presence of adjoining hairs with more arms, particularly on the leaf margins. Radially spreading fascicled hairs usually have distinct tuberculate bases. Plants with radially spreading fascicled hairs are similar to species of the *H. stricta* group, but are placed into the *H. perhamata* group here, due to having pronounced leaf awns and commonly fewer radially spreading fascicled hairs.

**Leaves.** All species of the *H. acicularis* and *H. perhamata* groups have ericoid leaves with strongly revolute margins usually abutting the central vein. Characteristic of them are the terminal awns formed mainly by an extension of the central vein, as also frequently observed in species of the *H. sericea* and *H. stricta* groups and many Western Australian species, but unlike those the awns are not green, but transparent when young, and in the *H. perhamata* group become usually dark brown with age. This awn is usually very long and distinctly pungent, but in some species (e.g. *H. exutiacies*) the transparent apex of the awn breaks off and only a shorter brown tip remains on adult cauline leaves. The transparent point is considered here to be derived from terminal hairs, as it is often surrounded by hairs of similar length, but the awn is much stouter than the hairs.

Another common feature of mature leaves of the *H. acicularis* and *H. perhamata* groups is the usually tightly revolute margins that abut the central vein, so that on dried herbarium material the undersurface of the leaf between them is only visible in exceptional cases. On young or fresh material, the leaf margins are sometimes less abutting. The radially spreading fascicled hairs of the enclosed undersurface are often reduced, sometimes to tubercles, or are absent. However, on the margins of both the central vein and the abutting revolute margins, rows of teeth-like projections are often observed, which also represent much-reduced radially fascicled hairs, as have been described for other ericoid-leaved *Hibbertia* species, e.g. *H. dispar* (Toelken 2013, fig. 1).

The leaf bases on branches are distinctly stepped into the recessed abaxial base of the petiole in most species of the *H. acicularis* group, and especially the *H. perhamata* group, and also recorded from Western Australia, while they are  $\pm$  confluent on specimens in the other species groups of eastern Australia.

In many species, the base of the leaf lamina is  $\pm$  abruptly constricted onto the petiole, but a truncate base, as used in descriptions, should already be visible on maturing leaves, as senescent leaves often develop this characteristic subsequently by excessive development of the revolute margins at the base.

Although leaves in the *H. acicularis* group are generally glabrous, the upper surface is often  $\pm$  pustulate with regularly bulging epidermal cells (particularly prominent in, e.g. *H. pustulifolia*). This condition must, however, be distinguished from a granulate or verrucose surface due to often irregularly arranged, multi-cellular hair tubercles (in, e.g. *H. rigens*), with the respective hairs no longer developing and/or wearing off early. Such tubercles are often particularly well-developed on the flanks of the revolute margins of leaves (e.g. in *H. aristibracteolata*).

**Flowers.** The size of flowers varies considerably and is conveniently determined by the length of the

persistent calyx lobes. However, as the calyx of all species is accrescent, measurements must strictly be associated with a similar stage or age of the flower to be comparable. Whenever possible, only flowers at anthesis were measured, which was determined by the presence of the caducous petals.

Flower buds of species of the *H. acicularis* group tend to be ellipsoidal, in contrast to the more often ovoid buds of members of the *H. sericea* and *H. stricta* groups.

**Bracts and flower stalk.** The first flowers are commonly terminal on major branches and vary from sessile or subsessile to distinctly stalked. The branch below the terminal flower has usually widely-spaced leaves (e.g. *H. rigens*), but the flower is often overtopped by a second flower from the axil of the first leaf below it. The first flower becomes leaf-opposed, and must not be confused with axillary flowers, which are rare in this genus. The second flower, and especially all subsequent ones, as well as all axillary flowers lower down on branches, usually develop terminal on a short-shoot with  $\pm$  fascicled short leaf-like additional bracts and with, at the base, usually two, often caducous scales ('prophylls', *sensu* Briggs & Johnson 1979) as on vegetative shoots.

The first scale-like leaf commonly subtending the flower is the **primary bract**, which is characteristically without revolute margins and is flat or sometimes with a raised central vein. If the flower is stalked, the primary bract commonly subtends the calyx, but in some species (particularly in the *H. rufa* subgroup) it is born shortly to well below the flower. In sessile flowers of, for instance, *H. crassinervis*, it is possible to find a range of scale-like to leaf-like but fascicled **additional bracts** below the primary bract. The additional bracts usually gradually change in size and shape, best shown in the progressively more clearly developed revolute margins downwards, so that one cannot always distinguish the bracts from leaves. In order to retain consistency in the use of the two types of bracts the uppermost, usually a flat one is called the **primary bract** and, although the second one might have a similar shape and size to first one, all the remaining fascicled ones below, the **additional bracts**, of which there are usually several, particularly on a short-shoot. Although the lowest ones of these fascicled additional bracts are eventually leaf-like, they are usually distinctly shorter than the commonly widely-spaced cauline leaves. As they are modified leaves below the flower, they could be considered to be hypsophylls, although they are not as obviously different as described for some species in the *H. sericea* group (Toelken 2000). Nevertheless, they also agree with the definition for hypsophylls provided by Jackson (1965): "a bract of the inflorescence, a reduced or modified leaf towards the upper end of a shoot". For consistency all of these 'leaves' on the short-shoot, except the two basal prophylls, are here referred to as **additional bracts**, because they are often bract-like in the *H. acicularis*, *H. perhamata*, *H. stricta* and most of the species of the *H. sericea* group. Although

the primary bract might not always be morphologically distinguishable, it differs from the additional bracts by the absence of new growth flushes from its axil, while new growth commonly occurs from successive axils of the additional bracts.

Different types of branches with fascicled leaves and/or bracts associated with flowers have been recorded for different species in the *H. acicularis* and *H. perhamata* groups. Main branches with well-spaced leaves in some and with fascicled leaves without any indication of representing a new growth flush are normal in, for instance, *H. crassinervis*. In the case of the similar *H. arguta*, these fascicled leaves differ from cauline leaves by a coat of radially spreading fascicled hairs. Such densely clustered "leaves" below sessile flowers are much-reduced in size in *H. aristibracteata* below terminal and axillary flowering short-shoots.

While most new growth flushes in the *H. acicularis* group develop normal branches with spaced leaves, short-shoots as mentioned above are mainly axillary and commonly start immediately below an existing terminal flower at the first leaf/bract below the primary bract. They sometimes seem to develop a compound inflorescence by producing successive flowering short-shoots downwards in a prolonged good season in some species (e.g. *H. crassinervis*), but at times there are a few spaced leaves below the additional bracts, so that this is not a part-inflorescence, but a growth flush with its own terminal flower. This feature is, however, more common in the *H. stricta* group and especially in the *H. sericea* group. Sometimes the short-shoots are very reduced, as in *H. obtusibracteata*, where the primary bract is also found sporadically above the similar additional bracts all at the base of the flowering stalk, as discussed above.

As the type of bracts of many species can often not be clearly distinguished by their shape alone nor defined by their position on the stalk (partly because the stalk may be variously elongated between the bracts), the stalk cannot be compared to a peduncle (stalk between shoot and primary bract) or a pedicel (stalk between primary bract and flower). The situation is so confusingly variable, with the primary bract not always subtending the flower (cf. *H. obtusibracteata*), that, for consistency, the whole stalk from the point of branching, including the basal additional bracts to the base of the flower, is here simply called the **flower stalk**, or just the **stalk below fruit**.

Compound inflorescences on main branches consisting of a terminal flower and below it one or few additional flowers, each on a short-shoot with a set of fascicled additional bracts at the base, occasionally occur in the *H. acicularis* and *H. perhamata* groups, while there are often many additional flowers in some species of the *H. stricta* and *H. sericea* groups. The additional flowers when stalked often overtop the terminal one (as in *H. rigens* and *H. woronorana*), while they form a sessile cluster below and around the terminal flower in, for instance, *H. crassinervis*.

**Calyx.** The calyx is for convenience divided into two outer calyx lobes and three inner ones, largely based on the presence of one or two lateral glabrous marginal membranes on the inner lobes, which the outer two lack. Although the outer calyx lobes are usually narrower than at least the two innermost, the outermost inner lobe is often of intermediate shape and size. Hairs on the inner surface are usually absent, particularly on the two innermost lobes in the *H. acicularis* group, but in the *H. perhamata* group at least a few hairs are observed, which resemble those of the *H. stricta* group. These species commonly also bear a layer of small radially-spreading fascicled hairs beneath the hooked simple hairs generally found on the outer surface of calyx lobes on species of the *H. acicularis* and *H. perhamata* groups. *Hibbertia pilifera* and *H. crassinervis* present another unusual feature within their respective subgroup, as they bear only straight simple hairs on the outer surface of the calyx, usually a characteristic of flowers of species of the *H. sericea* group.

**Stamens.** Another feature of the *H. acicularis* group is the low number of stamens (usually <10 per flower), but a few species of the *H. perhamata* group, such as *H. crassinervis*, have 16 stamens. Anther length and shape, as recorded in the descriptions, are based on dried herbarium material, and at times are used as supportive characters to distinguish species. However, anthers of outer stamens are often shorter, even compared to the occasionally occurring staminodes, while the central anthers are often slightly longer. A description of the full range known is provided in the species descriptions.

Similarly, the length of filaments is variable, particularly as they often become slightly longer with age. Filaments that are distinctly connate basally distinguish some species, and seem to be associated with specific pollination syndromes, particularly in the *H. rufa* subgroup.

**Pistils.** Styles in the *H. acicularis*, *H. perhamata*, *H. stricta* and *H. sericea* groups are attached to the upper outer side (i.e., opposite the placenta) of the obovoid, usually slightly laterally compressed ovaries. Along the top of the ovary runs a  $\pm$  distinguishable ridge, here referred to as the crest, which represents the connate base of the excentric styles across the apex of the ovaries. The crest is often visible in many species with glabrous ovaries while in others a glabrous crest is noticeable against the  $\pm$  hairy ovary. Styles are rarely vertical (attached to the apex then pointing straight upwards), more commonly horizontal (joined to the upper side of the ovaries and then extend horizontally before straightening up). These horizontally and vertically attached styles, which eventually overtop the anthers, are commonly more robust, while shorter, always vertically attached ones, which present the stigmas at the level of the anthers, are thread-like. In the *H. arguta* subgroup the anthers are “hand-of-banana” curved over the short styles, so that the whole flower is adapted to a similar pollination syndrome as other groups of *Hibbertia*, such as *H. incrassata* (Toelken 1998, figs

2A, B). However, these vertically attached styles, which are  $\pm$  joined to the apex of the ovaries, often appear horizontally attached in fruit because the enlarging seeds on the opposite side of the placenta cause their displacement. The type of attachment referred to in the descriptions is therefore based on observations on flowers.

In the *H. acicularis* group the number of ovules per ovary is generally low, while in a number of species two or even one basal ovule has been recorded.

**Fruits.** The stalks below the fruits usually elongate and become nodding or recurved in the fruiting stage of different species. However, in the absence of fruit these characteristics of the stalk of specific species can also be observed on flowering specimens, because the stalks of previous years are usually retained. It was therefore often recorded in descriptions without seeing actual fruits.

**Seeds.** The seeds are commonly obovoid to almost spherical and are usually  $\pm$  laterally compressed. However, the seeds of some species are  $\pm$  obliquely oblong-obovoid to almost reniform with the attachment point shifted to one side, which is attributed to species with one or two basal or almost basal ovules. A wide enough range of seeds has not been examined to confirm this, as too few specimens in fruit were available. The attachment of the aril of these more oblong seeds is more or less shifted to one end of the seed. A wider range of fruiting specimens would be desirable in order to use seed characters more critically in the delimitation of species.

## Taxonomy

The *Hibbertia acicularis* and *H. perhamata* groups of eastern Australia (Table 1), as referred to here, are for convenience arbitrarily delimited by the terminal awn on leaves, as is conventionally accepted. This often pungent awn is however more specifically defined as having a leaf apex consisting of dead tissue without chlorophyll and often terminated by an often deciduous awn and/or a tuft of hairs (as often found in the *H. rufa* subgroup). Two informal groups are recognised within the *H. acicularis* group: the *H. acicularis* and *H. rufa* subgroups, both of which are possibly natural groups. The *H. perhamata* group is also split into two subgroups: the *H. perhamata* subgroup represents an accumulation of heterogeneous species with  $\pm$  pungent awned leaves; in the *H. arguta* subgroup, the incurved stamens of flowers resemble those of some Western Australian species. In the absence of molecular data or a detailed study on the development of such awns, a decision on whether any of the groups of species within this treatment should be excluded or rather be recognised as independent groups of regional distribution, as presented here, can at present not be fully evaluated based on morphological data only.

**Table 1.** List of taxa and informal groups within *Hibbertia acicularis* and *H. perhamata* groups.

<b>1. <i>Hibbertia acicularis</i> group</b>	
<b>1.1. <i>H. acicularis</i> subgroup</b>	<b>1.2. <i>H. rufa</i> subgroup</b>
1. <i>H. acicularis</i> (Labill.) F.Muell.	20. <i>H. minima</i> Toelken
2. <i>H. aiodontia</i> Toelken	21. <i>H. obtusibracteata</i> Toelken
3. <i>H. arenaria</i> Toelken	22. <i>H. pilifera</i> Toelken
4. <i>H. aristibracteata</i> Toelken	23. <i>H. pustulata</i> Toelken
5. <i>H. armata</i> Toelken	24. <i>H. rufa</i> N.A.Wakef.
6. <i>H. conferta</i> Toelken	25. <i>H. succuneata</i> Toelken
7. <i>H. epeduncularis</i> Toelken	26. <i>H. surcularis</i> Toelken
8. <i>H. exutiacies</i> N.A.Wakef.	27. <i>H. tuberculipilosa</i> Toelken
9. <i>H. filifolia</i> Toelken	
10. <i>H. leiocarpa</i> Toelken	
11. <i>H. lignescens</i> Toelken	
12. <i>H. minysantha</i> Toelken	
13. <i>H. nematophylla</i> Toelken	
14. <i>H. nudicalycina</i> Toelken	
15. <i>H. parvifolia</i> Toelken	
16. <i>H. prorufa</i> Toelken	
17. <i>H. rasilis</i> Toelken	
18. <i>H. rigens</i> Toelken	
19. <i>H. woronorana</i> Toelken	
<b>2. <i>H. perhamata</i> group</b>	
<b>2.1. <i>H. perhamata</i> subgroup</b>	<b>2.2. <i>H. arguta</i> subgroup</b>
28. <i>H. carnarvonensis</i> Toelken	34. <i>H. arguta</i> Toelken
29. <i>H. incrassata</i> Toelken	35. <i>H. aristisepala</i> Toelken
30. <i>H. octandra</i> Toelken	36. <i>H. crassinervis</i> Toelken
31. <i>H. perhamata</i> Toelken	
32. <i>H. pustulifolia</i> Toelken & R.T.Miller	
33. <i>H. taeniophylla</i> Toelken	

The groups and subgroups can be distinguished as follows (see Table 1 for a listing of species):

**1.** The *H. acicularis* group is distinguished from the *H. perhamata* group by the absence of hairs on the inside surface of the calyx, only simple hairs occur on the commonly decumbent plants with rarely woody branches.

**1.1.** The *H. acicularis* subgroup is characterised by commonly more than 6 stamens per flower and each stamen with filaments scarcely connate basally. The terminal leaf awn is topped by a short transparent point, which is visible on young leaves and usually wears off soon. This point varies in size but is broader than hairs; this can often be seen, e.g. in *H. exutiacies*, where it is usually subtended by one or few, well-distinguished finer straight simple hairs, but which are often of similar length.

**1.2.** Species in the *H. rufa* subgroup are characterised by a common pollination syndrome, with  $\pm$  connate filaments of usually only (3) 4 or 5 (6) stiffly erect stamens. Although species of the *H. rufa* subgroup are primarily characterised by their pollination syndrome, they also share the unusual characteristic of the primary bract not subtending the calyx; even in species with sessile to subsessile flowers it does not clasp the calyx, as is commonly observed in species of the *H. acicularis* subgroup. Since this characteristic bract is below the flower and therefore thought to be independent of its pollination, it seems to indicate a natural grouping of species in spite of other differences.

**2.** Species of the *H. perhamata* group are characterised, in addition to a pale leaf awn turning brown over time, by hairs on the inside surface of

the calyx, the presence of radially spreading fascicled hairs at least on the outside surface of the calyx, and by being usually erect spreading plants with woody branches.

- 2.1. The stamens of flowers of the *H. perhamata* subgroup are erect and being overtopped by much longer styles.
- 2.2. The species of the *H. arguta* subgroup are distinguished by a distinct pollination syndrome with incurved “hand-of-banana” stamens covering the ovaries and short styles, and resemble flowers of species from Western Australia, such as *H. pungens* Benth. In eastern Australia they include the species listed in Table 1.

The present study is mainly based on herbarium material and cannot provide adequate information on the conservation status of all taxa; this needs to be formally assessed by the relevant state and federal agencies. At present only general remarks were added under the ‘Conservation status’ for each taxon. Similarly ecological data on the habitat preferences of taxa might often be incomplete.

Distribution statements use standard abbreviations for regions, as used by the states and defined in standard flora publications: Jessop & Toelken (1986; S.A.), Standley & Ross (1983–1989; Qld), Harden (1990–1993; N.S.W.), Conn (1993; Vic.) and de Salas (2009–; Tas.). All species are listed in alphabetical order.

## Key to the species

1. Young branches hairy, especially below flowers
2. Young branches with only straight simple hairs (excluding intrapetiolar tuft)
  3. Flower sessile to subsessile or stalk < 2 mm long
    4. Ovaries glabrous
      5. Stamens 9 or 10 per flower; Qld (Nk) . . . . . *H. ferox*
      - 5: Stamens 3–5 per flower; NSW (CWS) . . . . . *H. pilifera*
    - 4: Ovaries hairy
      6. Stamens 8 per flower; Qld (Pc) . . . . . *H. epeduncularis*
      - 6: Stamens (4) 5 or 6 per flower
        7. Styles horizontally attached to side of ovaries; NSW (ST) . . . . . *H. pilifera*
        - 7: Styles ± vertically attached to apex of ovaries; NSW (CT) . . . . . *H. aristibracteata*
  - 3: Flowers on stalk > 2 mm long
    8. Filaments scarcely connate basally; branches almost thread-like; NSW (CT) . . . . . *H. conferta*
    - 8: Filaments connate basally; branches becoming woody; NSW (NWS) . . . . . *H. tuberculipilosa*
- 2: Young branches with radially spreading fascicled hairs and often straight simple hairs
  9. Flower sessile, stalk rarely to 3 mm long
    10. Stamens 16–24 per flower
      11. Stamens 16 per flower
        12. Hooked simple hairs over radially spreading fascicled hairs on the outer surface of the calyx lobes; 3 (2) staminodes on either side of the fertile stamens; Qld (Le) . . . . . *H. crassinervis*
        - 12: Radially spreading fascicled hairs only on the outer surface of calyx lobes; without staminodes; Qld (Le) . . . . . *H. aristisepala*
      - 11: Stamens 22–24 per flower; Qld (Bn) . . . . . *H. arguta*
    - 10: Stamens 8–10 per flower
      13. Filaments up to ½ connate basally
        14. Inner surface of calyx lobes puberulous distally; calyx lobes 7.2–8.3 mm long; NSW (ST) . . . . . *H. pustulifolia*
        - 14: Inner surface of calyx lobes glabrous; calyx lobes 4.3–5.4 mm long; Qld (Le, Mi, Nk) . . . . . *H. carnarvonensis*
      - 13: Filament scarcely connate basally
        15. Flowers sessile; leaves 0.4–0.6 mm broad; Qld (Bn) . . . . . *H. octandra*
        - 15: Flower stalk to 3 mm long; leaves 1–1.2 mm broad; NSW (CC) . . . . . *H. perhamata*
  - 9: Flower stalk > 3.5 mm long
    16. Central vein of leaves strongly bulging; Qld (Mar) . . . . . *H. incrassata*
    - 16: Central vein recessed to almost flush

17. Stamens 6 or 7 per flower; leaf lamina abruptly constricted into petiole (truncate to cordate)
18. Petiole glabrous; NSW (CC) . . . . . ***H. perhamata***
- 18: Petiole fascicled-pubescent; Qld (Le, Mi, Nk) . . . . . ***H. carnarvonensis***
- 17: Stamens 9 or 10 per flower; leaf lamina gradually constricted into petiole (cuneate);  
Qld (Co, Nk) . . . . . ***H. taeniophylla***
- 1: Young branches glabrous**
- 19. Ovaries glabrous**
- 20. Flowers sessile or with stalk < 2 mm long**
- 21. Stamens (3) 4 or 5 per flower; filaments connate basally**
- 22. Young leaves with tuberculate straight simple hairs along the flanks of the revolute margins**
- 23. Branches wiry, long-trailing, little-branched; NSW (CT) . . . . . *H. pustulata***
- 23: Branches rigid, becoming shrubby, much-branched; NSW (CC) . . . . . *H. succuneata***
- 22: Young leaves smooth**
- 24. Branches thread-like, trailing, little-branched; NSW (NT) . . . . . *H. surcularis***
- 24: Branches ± rigid-woody, spreading, much-branched; NSW (CC) . . . . . *H. succuneata***
- 21: Stamens (6) 7 per flower; filaments ± free; NSW (CWS) . . . . . *H. rasilis***
- 20: Flower stalk > 2.5 mm long**
- 25. Filaments c. half connate basally**
- 26. Bract obtuse; shrublets decumbent; SA (KI) . . . . . *H. obtusibracteata***
- 26: Bracts acute; shrublets trailing, rooting at nodes; NSW (CT, SC), Vic (EG), Tas (TSE) . . . . . *H. rufa***
- 25: Filaments scarcely connate basally**
- 27. Stamens 4 per flower; Qld (Dd) . . . . . *H. filifolia***
- 27: Stamens 6 (–8) per flower**
- 28. Calyx 3.6–3.8 mm long; leaf lamina smooth; shrubby habit; NSW (CWS) . . . . . *H. arenaria***
- 28: Calyx 4–7.4 mm long; leaf lamina tuberculate; decumbent habit;  
NSW (NWS, NT), Qld (Dd) . . . . . *H. leiocarpa***
- 19: Ovaries hairy**
- 29. Flowers sessile or with stalk < 2 mm long**
- 30. Filaments up to half connate basally**
- 31. Branches filiform; leaves with fine hairs with sunken tubercles; Qld (Mo) . . . . . *H. minima***
- 31: Branches wiry-woody; leaves with straight simple hairs on raised pale tubercles;  
NSW (NWS) . . . . . *H. tuberculipilosa***
- 30: Filaments scarcely connate basally**
- 32. Stamens 8 per flower; Qld (Pc) . . . . . *H. epeduncularis***
- 32: Stamens 5 or 6 per flower**
- 33. Shrubs to 1 m tall; NSW (NT) . . . . . *H. parvifolia***
- 33: Shrublets with decumbent branches; Vic (WAN, GR, MID),  
SA (FR, EP, NL, MU, SL, KI, SE) . . . . . *H. exutiacies***
- 29: Flower stalks > 3 mm long**
- 34. Calyx outer surface hairy, mainly with hooked simple hairs**
- 35. Stamens 3–5 (6)**
- 36. Leaf lamina abruptly constricted into petiole (truncate to cordate)**
- 37. Shrub erect, with ridged-woody branches; NSW (CC) . . . . . *H. perhamata***
- 37: Shrubby prostrate, with wiry branches; NSW (CC) . . . . . *H. prorufa***
- 36: Leaf lamina scarcely constricted into petiole (cuneate)**
- 38. Shrubs to 1 m tall, with rigid-woody branches; NSW (CC) . . . . . *H. woronorana***
- 38: Shrublets with wiry decumbent or trailing branches**
- 39. Leaves thread-like and spreading at ± right angles; seeds oblong;  
NSW (CT) . . . . . *H. nematophylla***
- 39: Leaves not thread-like and irregularly spreading; seeds obovate to  
almost spherical**

40. Filaments scarcely connate basally; young leaves with terminal transparent point; NSW (CT, CC, SC), Vic (OTPL, GPL, PROM, EG), Tas (Ki, Fu, Nw, Ne, Ch, MI, Ec) . . . . . ***H. acicularis***
- 40: Filaments at least a third basally connate; young leaves with terminal transparent point surrounded by few hairs; Qld (Mo, Wb), NSW (NC) . . . . ***H. minyantha***
- 35: Stamens 7–11
41. Leaves with fine pale wart-like tubercles, epidermal cells flat; NSW (CT) . . . . . ***H. rigens***
- 41: Leaves without pale tubercles, but often with bulging epidermal cells
42. Shrublet with prostrate wiry branches
43. Filaments scarcely connate basally; young leaves glabrous or hairy
44. Young leaves with few tuberculate hairs on flanks of leaf lamina; bracts with straight simple hairs and cilia; NSW (CT, CC, SC), Vic (OTPL, GPL, PROM, EG), Tas (Ki, Fu, Nw, Ne, Ch, MI, Ec) . . . . . ***H. acicularis***
- 44: Young leaves glabrous; bracts with minute hooked cilia; NSW (NC) . . . . . ***H. lignescens***
- 43: Filaments up to half connate basally; young leaves glabrous; NSW (ST) . . . . . ***H. armata***
- 42: Shrubs with spreading woody branches
45. Central vein of leaves ± bulging; Qld (Le) . . . . . ***H. incrassata***
- 45: Central vein of leaves ± recessed; Qld (Dd), NSW (NT) . . . . . ***H. rigens***
- 34: Calyx outer surface glabrous
46. Stamens 10; Qld (Pc) . . . . . ***H. aiodonta***
- 46: Stamens 6 or 7
47. Base of leaf lamina ± truncate into petiole; NSW (CWS) . . . . . ***H. parvifolia***
- 47: Base of leaf lamina gradually constricted into petiole: cuneate; NSW (NT) . . . . . ***H. nudicalycina***

### ***Hibbertia acicularis*** (Labill.) F.Muell.

*Pl. Victoria* 1: 17 (1862), *p.p.*, excl. some specimens cited; Benth., *Fl. Austral.* 1: 29 (1863), *p.p.*; Spicer, *Handb. Pl. Tasman.* 101 (1878); F.Muell., *Native Pl. Victoria* 1: 18 (1879), *p.p.*; F.M.Bailey & Tenison-Wood, *Proc. Linn. Soc. New South Wales* 4: 138 (1879), *p.p.*; F.Muell., *Pap. & Proc. Roy. Soc. Tasmania* 1879: *App* (*Cens. Pl. Tasman.*) 3 (1880); F.Muell., *Fragm.* 11: 93 (1880), *p.p.*, excl. specimens cited; F.Muell., *Syst. Census Austral. Pl.* 1: 2 (1882), *p.p.*; C.Moore, *Census Pl. N.S.W.* 1 (1884); F.Muell., *Key Syst. Victorian Pl.* 2: 5 (1885), *p.p.*; F.Muell., *Sec. Syst. Census Austral. Pl.* 1: 1 (1889), *p.p.*; Gilg, *Nat. Pflanzenfam.* 3, 6: 120 (1893), *p.p.*; C.Moore & Betche, *Handb. Fl. N.S.W.* 10 (1893); Rodway, *Tasman. Fl.* 4 (1903); W.A.Dixon, *Pl. N.S. Wales* 20 (1906); Ewart, *Fl. Victoria* 770 (1931), *p.p.*; N.C.W.Beadle *et al.*, *Fl. Sydney Region Ed. 2*, 390 (1972), *p.p.*; J.H.Willis, *Handb. Pl. Victoria* 2: 390 (1973); G.J.Harden & J.Everett in G.J.Harden, *Fl. New South Wales* 1: 301 (1990), *p.p.*; G.J.Harden & J.Everett in G.J.Harden, *Fl. New South Wales Ed. 2*, 1: 301 (2009), *p.p.*; B.J.Pellow, M.J.Henwood & R.C.Carolin, *Fl. Sydney Region Ed. 5*, 123 (2009). — *Pleurandra acicularis* Labill., *Nov. Holl. Pl.* 2: 6, t. 144 (1806); Poir. in Lam., *Encycl.* 8: 445 (1808); DC., *Syst. Nat.* 1: 421 (1817); Steud., *Nom. Bot.* 632 (1821); DC., *Prodr.* 1: 73 (1824); Spreng., *Syst. Veg. Ed. 16*, 2: 462 (1825); Poir., *Dict. Sci. Nat.* 41: 367 (1826); G.Don, *Gen. Hist.* 1: 74 (1831); Hook.f., *J. Bot.* 2: 402 (1840); F.Muell., *First Rep. Gov. Bot. Veg. Colony* 9 (1853); Hook.f., *Bot. Antarct. Voy. III (Fl. Tasman.)* 1: 15 (1855); A.Gray, *U.S. Expl. Exped., Phan.* 1: 23 (1854); F.Muell., *Ann. Report Bot. Gard.*

24 (1858). — *Hibbertia acicularis* var. *acicularis* Rodway, *Tasman. Fl.* 4 (1903). — **Type citation:** “in capite Van-Diemen”. **Lectotype (here designated):** Nova Hollandia et Terra Diemen (FI005585; 2 sheets, photos AD). **Isotype:** TCD0009653 (bottom specimen).

*Pleurandra triandra* Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 27(2): 280 (1854). — **Type citation:** “Prope Sidney in Tasmania legit cl. Gunn”. **Holotype:** Sidney, *s.dat., s.coll.* (KW001000420).

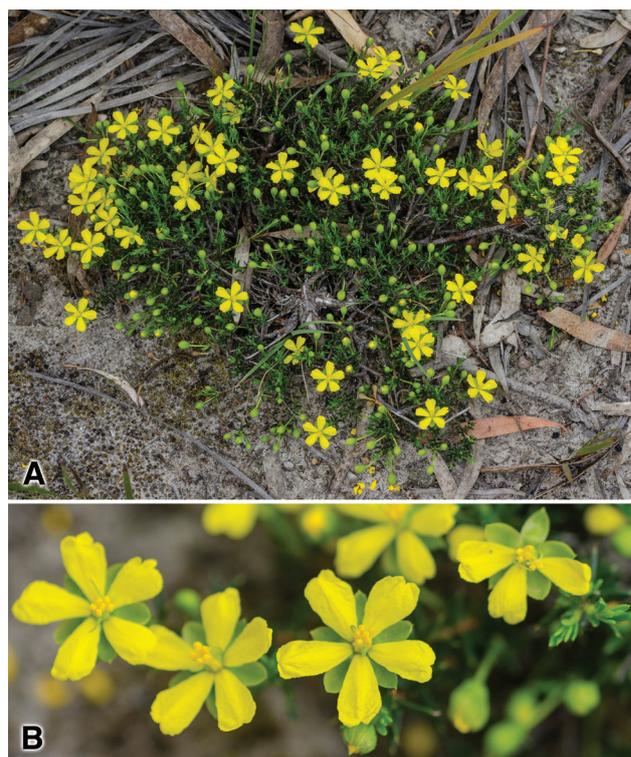
*Hibbertia acicularis* var. *triandra* Rodway, *Tasman. Fl.* 4 (1903). — **Type citation:** “George’s Bay” (type could not be traced). **Neotype (here designated):** Tasmania, Goat Bluff, near South Arm, *W.D. Jackson s.n.*, 5 Nov. 1967 (HO3048).

*Hibbertia acicularis* auct. non (Labill.) F.Muell.: Tate, *Trans. & Proc. Roy. Soc. S. Austral.* 3: 51 (1880), *p.p.*; F.M.Bailey, *Syn. Queensl. Fl.* 4 (1883), *p.p.*; R.T.Baker, *Proc. Linn. Soc. New South Wales* 21: 432 (1896), *p.p.*; F.M.Bailey, *Queensl. Fl.* 1: 14 (1899), *p.p.*; F.M.Bailey, *Compr. Cat. Queensland Pl.* (1913), *p.p.*, excl. specimen.

Shrublets spreading to decumbent, from a woody pen root; branches wiry-woody, with ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* of scattered finely tuberculate antrorsely straight simple hairs on young leaves and mainly on the flanks of the revolute margins but wearing off very soon if at all present, or persistent, ± sparsely hirsute with erect hooked simple hairs on the outer surface of calyx lobes occasionally over fine tubercles which rarely develop as minute

radially spreading fascicled hairs with up to 4 arms. *Leaves* with spreading intrapetiolar tufts of straight simple hairs 0.3–0.5 mm long and often slightly laterally spreading along the upper part of the decurrent leaf bases; *petiole* rarely to 0.4 mm long,  $\pm$  glabrous; *lamina* oblong to oblong-triangular, (1.8–) 2.5–8 (–11.6)  $\times$  0.6–1 (–1.2) mm,  $\pm$  abruptly constricted into petiole but usually without a truncate base, pointed with an awn to 0.7 mm long forming a transparent point, adaxially  $\pm$  flat, glabrescent with scattered, finely tuberculate, antrorsely spreading straight simple hairs mainly on the flanks of the revolute margins, but wearing off soon; abaxially with flush to bulging central vein usually more than twice broader than the tightly abutting revolute margins and not displaying the undersurface between them or rows of teeth on both margins, outer surface glabrescent with few antrorsely spreading straight simple hairs mainly on the revolute margins as adaxially. *Flowers* single, stalked, terminal on short-shoots on major and axillary branches, sometimes distally clustered on subsequent nodes; *flower stalk* 4.5–9 (–14.3) mm long; *buds* usually broadly ellipsoidal; *primary bract*, subtending the calyx, linear-triangular, (0.6–) 1.2–2.8  $\times$  0.2–0.4 mm, pointed, without revolute margins, puberulous with scattered antrorsely spreading straight simple hairs adaxially and mainly like cilia on the margins. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, (3.2–) 4.2–4.5 (–5.6)  $\times$  (1.2–) 1.5–1.8 mm, shortly pointed, with distal ridge indistinct, outer surface sparsely hirsute with scattered erect hooked simple hairs particularly dense towards base and sometimes overtopping a finely tuberculate surface with occasionally minute radially spreading fascicled hairs (2 or 3 spreading subequal arms) proximally, inner surface glabrous; *inner calyx lobes* ovate-elliptic to broadly elliptic, (3.1–) 4.2–4.4 (–5.4)  $\times$  2.1–2.5 mm, cuspidate to rounded or mucronate, with indistinct central ridge, outer surface rarely finely tuberculate to sparsely hirsute with scattered erect hooked simple hairs mainly along the central ridge and becoming shorter laterally, inner surface glabrous. *Petals* cuneate-obovate, 4.4–5.7 mm long, shallowly bilobed. *Stamens* (3) 4–6 (–8) in an erect cluster to one side of the ovaries; *filaments* (0.9–) 1.1–1.2 mm long, rarely slightly basally connate; *anthers* oblong, (0.8–) 1–1.6 (–1.8) mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 2 ovules, puberulous with scattered straight simple and/or bifid hairs; *styles* horizontally attached to upper third of the ovaries, then style turning down and out then straight upward, positioning the stigmas above the anthers but often slightly recurved towards them. *Fruits* on stalk with slight nodding curve. *Seeds* obovoid, c. 1.3  $\times$  c. 1.2 mm, black; *aril* fleshy at the attachment and surmounted by a narrow membranous cup covering the lower third of the seed. **Fig. 1.**

**Distribution and ecology.** Growing on sandy to skeletal soils in heathland and/or in open woodland in south-eastern New South Wales (N.S.W.) (CT, ST, SC), south-central to south-eastern Victoria (Vic.) (OTPL,



**Fig. 1.** *Hibbertia acicularis* at the Tasman Peninsula (Tas.). **A** Habit; **B** flowers. — R.W. Purdie 10453. Photos: © 2015, M. Fagg, courtesy of Australian Plant Image Index.

GPL, PROM, EG) and widespread in Tasmania (Tas.) (Ki, Fu, Nw, Ne, Ch, Ml, Ec, Sw).

**Phenology.** Flowering in Sep.–Dec. (Jan.).

**Conservation status.** Recorded from several National Parks in Victoria and Tasmania.

**Diagnostic features.** *Hibbertia acicularis* produces many herbaceous to wiry,  $\pm$  decumbent branches from a woody base, and the filaments are scarcely connate at the base in comparison to *H. rufa*, which has a similar  $\pm$  prostrate habit but differs in having connate filaments and instead of a terminal awn on leaves a tuft of hairs. This widespread species is very variable (see Variations) so that it cannot be distinguished by a single characteristic.

Smaller plants recorded from the Wilsons Promontory (Prom.) can easily be confused with a potentially new taxon from Mt Oberon (H.R. Toelken, in prep.), but the latter is distinguished by ten stamens per flower and straight, antrorsely spreading straight simple hairs on the calyx (typical of the *H. sericea* group), unlike the erect hooked hairs commonly found in the *H. acicularis* group. The two species are good examples of different leaf apices, with *H. acicularis* displaying the obvious brown terminal awn of dead tissue characteristic of the *H. acicularis* group, while the extended point of the central vein of leaves of the above taxon are the same colour as the whole leaf.

**Variations.** Although plants have usually decumbent to prostrate branches, much-branched, and especially resprouting, plants may retain a ± tufted habit.

The number of stamens per flower is commonly 6, but 7 or rarely up to 8 have been recorded, while reduced numbers of 4 or 5 or rarely as low as 3 have been recorded in some populations, particularly in north-eastern Tasmania, although they vary in the same area or on the same plant. The many collections of *Gunn 641* (some even with different dates), demonstrate a variation of 3 or 4, rarely 5 stamens per flower, sometimes even on the same plant. Gunn's concept of this form appears to comprise plants with short branches with almost fascicled short leaves. As the number of stamens per flower cannot be consistently linked with other characters, a broad concept of *H. acicularis* is maintained here.

Anthers tend to be 0.8–1.2 (–1.3) mm long, often with a truncate apex when dehiscent, on generally smaller flowers from Tasmania and in south-central Victoria, compared with 1.4–1.8 mm in south-eastern New South Wales and adjoining Victoria. However, local intermediates in eastern Victoria (e.g. *A.C. Beauglehole 31112*, *A.C. Beauglehole 62735* and *A.C. Beauglehole 71223*), prevented a clearcut distinction. The same specimens also showed considerable variation in the length of the primary bracts, which, as with anther length, are commonly longer in New South Wales than on flowers from further south. The distribution of plants with abnormal numbers of stamens and varying lengths of anthers and primary bracts only partially overlap but are not consistently connected, so that they cannot be linked to distinguish additional taxa.

While plants from the eastern foothills of southern New South Wales tend to be more robust, the length of their leaves is consistent with those of plants from eastern Victoria. A much finer plant from the Blue Mountains (*M.J. Baker Ha4*) has distinctly longer, slender leaves (11–20 × c. 1 mm) combined with longer flower stalks (15–18 mm long); this may deserve some taxonomic rank once a range of variation of this local form can confirm these distinct measurements.

**Typification.** A specimen from Labillardiere's herbarium in FI is designated as lectotype, above. The general habit of the plants on that specimen (FI005585), as well as the broad locality “in capite Van-Diemen” easily identify it as *H. acicularis*, although the stalked flowers are not retained. These are also not present on the very similar isotype specimen (TCD0009653). A specimen with flowers in the Geneva General Herbarium inscribed “*Preurandra acicularis* Labill. (Hb. Delessert) Nlle Hollande D. Webb 1834” requires more detailed investigation as to its type status.

*Pleurandra triandra* Turcz. refers to one of many Gunn specimens from the north-east coast of Tasmania, some of which have only 3 stamens per flower, others with three or four stamens. As Turczaninow only ever worked

from his herbarium, this is accepted as the holotype of the name (Mosyakin *et al.* 2019). As neither Gunn's collector's number nor date are shown on the type sheet, no isotypes can be determined.

Rodway (1903) adds no reference to *H. acicularis* var. *triandra*, when publishing that name, as he had done in the case of *Ranunculus lappaceus* var. *scapiger* (as ‘*scapigerus*’, referring to *R. lappaceus* var. *scapigerus* (Hook.) Benth.), as such it must be assumed that he intended a new variety independent of *H. triandra* Turcz. However, no contemporary or modern collections from the locality “George Bay” could be found. It is possible that he referred to a specific specimen (without indicating it) of *Gunn 641* from “George Town” for which 4 or 5 stamens per flower, or rarely 3 stamens on different specimens, have been recorded. As this could lead to further confusions, since Gunn collected specimens under that number at different dates, a later neotype, *W.D. Jackson s.n.* (HO3048), seems advisable.

#### **Selected specimens examined** (c. 90 seen)

NEW SOUTH WALES. Banksia View Conservation (Cons.) Area, Hawkesbury Rd, Winmalee, 27 Nov. 2020, *M.J. Baker Ha4* (AD); Mt Imlay near Eden, Dec. 1916, *J. Boorman s.n.* (NSW102328); Stockton, Sep. 1901, *R.H. Cambage s.n.* (NSW102321); Eden to Pambula, Oct. 1901, *J.H. Maiden s.n.* (BRI9936); La Perouse, 1929, *Cannon Michael 1954* (NSW); near golf course, La Perouse, 30 Sep. 1971, *J. Pulley 954* (CANB).

VICTORIA. C. 0.5 km N of mouth of Seal Creek (Ck), Croajingolong N.P., 22 Oct. 1991, *D. Albrecht 4871* (AD, MEL); French Island (Isl.), 25 Oct. 1987, *R. Bates 10624B* (AD); Little Ramhead, 9.5 mls [15.2 km] SSW Mallacoota PO, 9 Oct. 1969, *A.C. Beauglehole 31112* (MEL); c. 1 km E of Marlo, 27 Oct. 1969, *A.C. Beauglehole 31292* (MEL); 39 km NE of Yarram PO, 18 Dec. 1978, *A.C. Beauglehole 62735* (MEL); Lanwarrin Flora Reserve (Res.), 8. Nov. 1982, *A.C. Beauglehole 71223* & *L.K.M. Elmore* (MEL); Bairnsdale, 18 Nov. 1954, *E. Gauba s.n.* (CBG4746 at CANB); sand mines, c. 1 km S of Lang Lang, Dec. 1976, *P.K. Gullan 93* & *A.B. Wellington* (MEL); Mt Oberon, NE slopes, 25 Nov. 1970, *R.D. Hoogland 11905* (CANB, K, MEL, US); foot of Bishop Peak, Wilsons Prom., 25 Nov. 1970, *R.D. Hoogland 11909* (CANB, MEL); c. 7 mls [11.2 km] WNW of Genoa along Genoa Ck Track, 27 Nov. 1970, *R.D. Hoogland 11914* (NSW, HO; CANB, E, G, K, L, MEL, TNS, US, *n.v.*); Frankston, Nov. 1929, *A. Meebold 6496* (AD); Oakleigh, 17 Nov. 1894, *A. Morrison s.n.* (BRI, CANB); near La Trobe River (R.), Nov. 1854, *F. Mueller s.n.* (MEL 31414); Wilsons Prom., May 1853, *F. Mueller s.n.* (MEL31418); near Port Albert, May 1853, *F. Mueller s.n.* (MEL31424).

TASMANIA. Bridport, 1 Nov. 1987, *R. Bates 11319* (AD); Waterhouse Res., near One Tree Hill, 21 Nov. 1983, *A.M. Buchanan 1504* (HO); Logan Lagoon, near Pot Boil Ck, 11 Dec. 1988, *A.M. Buchanan 11115* (HO); Adventure Bay, Bruny Isl., 9 Nov. 1986, *P. Collier 1854* (HO); Blackmans Bay, 20 Jan. 1952, *W.M. Curtis s.n.* (HO); Russell R., Huon, 15 Nov. 1929, *A.V. Giblin HO3054* (HO); Russell R., Huon, Nov. 1929, *A.V. Giblin HO104482* (CANB, HO); Rocky Cape, 27 Nov. 1837, *R.C. Gunn 641/1842* (K,

NSW86697); George Town, 23 Oct. 1844, *R.C. Gunn 641* (K, NSW86604); Bridport, 15 Jan. 1948, *W.M. Hart s.n.* (HO3049); Baronia Hill, near Kingston, 8 Jan. 1970, *R.D. Hoogland 11720* (CANB; A, HO, K, L – *n.v.*); Bayley Rock, 19 Nov. 1983, *A. Moscal 3653* (HO); Tasman Peninsula, Coal Mine Road, S of Lime Bay Nature Res., 20 Oct. 2015, *R.W. Purdie 10453* (CANB); quarry sight, Rocky Cape N.P., 10 Aug. 1985, *C. Palzer 36* (HO); Blackmans Bay, Nov. 1925, *L. Rodway s.n.* (CANB6019); Blackmans Bay, 15 Dec. 1928, *L. Rodway s.n.* (HO3051); Blackmans Bay, Nov. 1929, *L. Rodway s.n.* (CANB4473); Port Sorrell, 5 Nov. 1948, *J. Somerville s.n.* (HO3046); Flinders Isl., 22 Nov. 1912, *C.S. Sutton s.n.* (MEL600867); Peter Murrell Conservation Area, 21 Jan. 2009, *M. Visoiu 525 & J. Wood* (AD, HO); near Granite Point (Pt), Bridport, 16 Dec. 1962, T. & J. Whaite 2593 (NSW); near Sandy Lagoon, Clarkes Isl., 14 Nov. 1979, *J.S. Whinray 2513* (CANB).

***Hibbertia aiodontata* Toelken, *sp. nov.***

*H. leiocarpae similis sed 10–12 staminibus, antheris 3–3.5 mm longis et ovariis tomentosis; a H. parvifoliae et H. lignescente 10–12 staminibus, antheris 3–3.5 mm longis differt.*

**Holotypus:** Queensland (Pc), Mt Castletower, 2 June 1977, *I.R. Telford 5488* (BRI AQ454539). **Isotypus:** CANB7702569.

Shrub to 0.6 m tall, much-branched, spreading; branches rigid-woody, with ridges continuing decurrent leaf bases, glabrous. *Vestiture* absent except for sparse intrapetiolar tufts and short straight simple hairs on the ovaries, or sometimes with minute straight simple to forked hairs on adaxial petiole and the outer and inner surfaces of mainly outer and rarely inner calyx lobes. *Leaves* with sparse, short intrapetiolar tufts of straight simple hairs to 0.2 mm long, not laterally spreading and usually hidden by appressed petiole; *petiole* 0.5–0.8 mm long, finely pubescent with fine, appressed, straight, simple hairs adaxially; *lamina* linear, (5.4–) 9–14 (–23.6) × 1.2–1.6 (–1.9) mm, gradually tapering into petiole, pointed with short awn to 0.4 mm long and wearing off, adaxially ± convex but with a slight depression above the central vein and glabrous, abaxially with ± recessed central vein about twice broader than the loosely abutting revolute margins and commonly displaying rows of teeth on both sides but rarely exposing the fascicled-tomentose undersurface, glabrous and smooth as adaxially. *Flowers* single, subsessile to shortly stalked, sometimes becoming leaf-opposed when overtopped by a growth flush with cauline leaves and another terminal flower, terminal on main branches, rarely with reduced leaves below; *flower stalk* 0.6–5.4 mm long; *buds* ellipsoidal to ovoid; *primary bract*, subtending calyx or on upper third of stalk, linear-triangular, 1.4–1.7 × 0.3–0.4 mm, acute, without revolute margins, glabrous; *additional bracts* 2–4, towards the base of the stalk, leaf-like, shorter but grading into cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 7–7.3 × 3.1–3.4 mm, drawn into a point, sparsely ridged towards the apex, outer surface glabrous or rarely glabrescent with minute antrorsely appressed straight simple hairs scattered at the apex,

inner surface glabrescent with minute antrorsely appressed straight simple hairs on upper half; *inner calyx lobes* elliptic to elliptic-oblongate, 7–7.4 × 3.8–4.4 mm, usually drawn into a point, ± ridged, outer surface glabrous to glabrescent with minute antrorsely appressed straight simple hairs below the apex, inner surface glabrous. *Petals* broadly obovate, 8.2–8.8 mm long, scarcely emarginate. *Stamens* 10–12 in a dense, erect cluster on one side of the ovaries; *filaments* 1–1.2 mm long, basally ± connate; *anthers* narrowly oblong, 3–3.5 mm long, subequal, slightly curved inward, abruptly constricted at apex and base. *Pistils* 2; *ovaries* broadly oblong-obovoid but slightly laterally compressed, each with 4 ovules, tomentose with very dense erect straight simple hairs including on the crest; *styles* vertically attached to the upper outer margin of the ovaries, then ± straight up in front of the stamens, positioning the stigmas well above the apex of the anthers. *Fruits* subsessile, erect. *Seeds* not seen.

**Distribution and ecology.** Grows in sandy soil on rocky granite slope in open eucalypt forest with *Eucalyptus acmenoides*, *Corymbia trachyphloia* and sparse understorey of *Allocasuarina littoralis*, *Lophostemon confertus*, *Leptospermum lamellatum* and *Eriostemon difformis*, in eastern central Queensland (Pc).

**Phenology.** Flowering in June.

**Conservation status.** Recorded from Castle Tower N.P.

**Diagnostic features.** *Hibbertia aiodontata* differs from other species with a robust habit with coarse spreading leaves, such as *H. perhamata*, *H. pustulifolia* and *H. rigens*, in lacking erect hooked hairs on the calyx and having 10–12 stamens, with anthers usually more than 3 mm long and filaments basally connate. The number of stamens and size of the anthers are unusual for the *H. acicularis* group, to which it belongs on account of the obvious, transparent terminal awn on its leaves.

**Variation.** An unusual feature of this species is the occasional presence of a few forked and/or straight simple hairs on the outer surface and/or inner surface of the outer and inner calyx lobes, but they are absent on *J. Brushe 76 & R. Hendry*.

The short intrapetiolar tufts are easily confused with the more prominent hairs on the adaxial petiole surface.

**Etymology.** The epithet *ai-odonta*, Latinised Greek, “always-toothed”, refers to the row of fine teeth commonly observed between the central vein and the revolute margins on the abaxial leaf surface.

**Specimens examined**

QUEENSLAND. E ridge of Mt Castletower, c. 300 m E of summit, 16 July 1995, *J. Brushe 74* (NE); 1 km SE of Mt Castletower, 25 June 1995, *J. Brushe 76 & R. Hendry* (NE); 17 km SE Calliope, 4 Oct. 1988, *N. Gibson T10321* (BRI).

***Hibbertia arenaria* Toelken, sp. nov.**

*H. rigenti similis sed foliis et ovariis glabris laevibusque; a H. leiocarpa habitu recto et foliis glabris laevibusque differt.*

**Holotypus:** New South Wales (CWS), Rebedys Road, Sandy Hollow, 24 Sep. 2002, S. Bell 216 (NSW).

**Isotypus:** AD291600.

Shrubs erect-spreading; branches rigid-woody, with faint ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* absent on the whole plant as even without intrapetiolar hairs or hairy ovaries. *Leaves* without intrapetiolar tufts; *petiole* 0.3–0.7 mm long, glabrous; *lamina* linear, (5.3–) 7.5–14 (–26.4) × 0.7–1.1 mm, gradually constricted into petiole, pointed with awn to 0.6 mm long and with very short transparent point wearing off soon, adaxially slightly convex, glabrous and smooth, abaxially with recessed to flush central vein rarely up to twice as broad as the tightly abutting revolute margins without exposing the undersurface or rarely displaying rows of fine teeth between them, glabrous as adaxially. *Flowers* stalked, terminal on very short short-shoots mainly in terminal positions and sometimes overtopped by new growth flushes; *flower stalk* 6.6–11.4 mm long; *buds* ellipsoidal; *primary bract* subtending the calyx, triangular, 0.3–0.5 × c. 0.2 mm long, without revolute margins, glabrous; *additional bracts* 2 or 3, at base of stalk, scale-like to usually leaf-like. *Calyx lobes* unequal; *outer calyx lobes* lanceolate-elliptic, 3.6–3.8 × 1.1–1.3 mm, acute, with central ridge becoming raised distally, outer and inner surface glabrous; *inner calyx lobes* elliptic-obovate, 3.7–3.8 × 2.1–2.4 mm, obtuse to cuspidate, with central ridge scarcely raised, outer and inner surface glabrous. *Petals* obovate to broadly obovate, 4.6–5 mm long, shallowly bilobed. *Stamens* 7 in an erect cluster to one side of the ovaries; *filaments* 0.7–0.9 mm long, scarcely connate basally; *anthers* oblong, 1.1–1.2 mm long, with outer ones slightly shorter, erect, abruptly constricted at apex and base. *Pistils* 2: *ovaries* obovoid but slightly laterally compressed, each with 2 basal ovules; glabrous, also on the crest; *styles* horizontally attached to the upper outer edge of the ovaries, then scarcely outwards before stretching straight upwards in front of the stamens, positioning the stigmas well above the anthers. *Fruits* on erect, rarely slightly curved stalk. *Seeds* not seen.

**Distribution and ecology.** Growing on sandy soil in Upper Hunter Valley, New South Wales (CWS).

**Phenology.** Flowering in September.

**Conservation status.** Unknown.

**Diagnostic features.** *Hibbertia arenaria* is superficially similar to *H. rigens*, but is completely glabrous, even without intrapetiolar hairs, and with glabrous ovaries. The leaf lamina of *H. arenaria* tapers gradually into the petiole and the tubercles, characteristic on leaves of *H. rigens* and *H. leiocarpa*, are lacking.

**Etymology.** The epithet *arenaria*, derived from the Latin, “growing on sand”.

**Specimens examined**

NEW SOUTH WALES. Gungal, Dec. 1904, J.L. Boorman s.n. (CANB, NSW102306); Nallo Mt, 13 Apr. 1968, C. Burgess NBG 1000953 (CANB); 2 mls [3.2 km] S Putty, 14 Nov. 1960, J.W. Green 2566 (NE); Mt Dangar, Sandy Hollow, 16 July 1988, R.T. Miller & C. Gibson s.n. (AD); Dingo Ck, Hunter Valley, Oct. 1984, T. Tame 1127 (NSW).

***Hibbertia arguta* Toelken, sp. nov.**

*H. crassinervi similis sed foliis infra flores pubescentibus et 22 staminibus; a H. aristisepala 22 staminibus et 3–5 staminodiis differt.*

**Holotypus:** Queensland (Bn), State Forest 132, c. 6 km ESE Brovinia, S Mundubbera, 9 Nov. 1997, A.R. Bean 12567 (BRI AQ659598, n.v.). **Isotypi:** AD99933221, MEL287078.

Shrubs c. 0.5 m tall, loosely branched; branches ± rigid-woody, with ridges largely obscured by a tomentum with dense persisting radially spreading fascicled hairs (with (3–) 5–7 often unequally long arms) also on the decurrent leaf bases. *Vestiture* mainly persistent, with predominantly radially spreading fascicled hairs on branches, outer surface calyx lobes and on ovaries as well as on additional bracts (but there the marginal cilia are usually straight simple hairs), while hairs on the abaxial surface of leaves are commonly erect, hooked simple hairs that wear off soon. *Leaves* with short intrapetiolar tufts of straight simple hairs c. 0.3 mm long and not laterally spreading; *petiole* 0.2–0.5 mm long, fascicled-pubescent above and below; *lamina* linear-triangular, rarely linear, (4.2–) 7–10 (–11.4) × 0.8–1 mm, gradually constricted into petiole, with firm sharp, transparent terminal awn, 0.3–0.5 mm long, adaxially ± flat, glabrous except for a few antrorsely spreading tuberculate bifid and/or straight simple hairs proximally, with usually straight simple hairs and scattered hooked simple hairs on raised tubercles on the sharp-edged flanges of the revolute margins, abaxially with flush central vein rarely up to twice as broad as the tightly abutting revolute margins without exposing the undersurface or rows of teeth between them, puberulous with mainly scattered erect hooked simple hairs and tuberculate straight simple hairs on the revolute margins and with antrorsely spreading, radially spreading fascicled hairs (with (1) 2–4 subequal arms on the central vein. *Flowers* sessile, terminal on ± fascicled shoots with leaves similar to cauline leaves; *flower stalk* absent; *buds* ellipsoidal; *primary bract*, linear, 3.6–4.2 × 0.4–0.5 mm, pointed with awn continuing from raised central vein but without revolute margins, fascicled-pubescent to -puberulous with tuberculate radially spreading fascicled hairs (1–3 subequal arms, but longer marginal cilia), subtended by 5–8 fascicled additional bracts with revolute margins usually completely developed but often smaller and minutely fascicled-tomentose ((1) 2–4 usually subequal arms)

on both surfaces. *Calyx lobes* unequal; *outer calyx lobes* lanceolate-elliptic, 6.3–6.5 × 1.8–2.2 mm, acuminate with terminal awn continuing from the raised central ridge, outer surface sparsely fascicled-tomentose with larger and smaller radially spreading fascicled hairs (with 3–5 subequal arms, rarely unequal on larger hairs), inner surface glabrous; *inner calyx lobes* broadly elliptic, 6.3–6.6 × 3.6–4.3 mm, acuminate with terminal awn continuing from the raised central ridge, outer surface sparsely fascicled-tomentose with larger appressed radially spreading fascicled hairs (with 3–7 subequal to unequally long arms on larger hairs) proximally and along the central ridge, becoming smaller and with fewer arms laterally towards the glabrous membranous margins, inner surface glabrous. *Petals* broadly obovate, 5.4–6.6 mm long, shallowly bilobed. *Stamens* 22 plus 3–5 outer staminodes (without fully developed anthers), all in a cluster to one side of the ovaries; *filaments* 0.8–0.9 mm long, scarcely connate basally; *anthers* oblong, 1.5–1.6 mm long, subequal except for smaller outer staminodes, slightly curved over the ovaries, ± abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 1 (2) ovules, hirsute with radially spreading fascicled hairs also on the crest; *styles* horn-like, vertically attached to the outer apex of the ovaries, then straight-erect to slightly curved in front of the stamens, positioning the minute stigmas in front of the apex of the anthers. *Fruits* sessile. *Seeds* not seen.

**Distribution and ecology.** “Heathland on small sandy plateau, with *Triodia* sp., *Acacia julifera*, *Calytrix tetragona*, *Melaleuca thymifolia*, *Babingtonia densifolia*” in south-eastern Queensland (Bn). The species is only known from the type specimen.

**Phenology.** Flowering in Nov.

**Conservation status.** Unknown, though recorded as common at the type locality.

**Diagnostic features.** *Hibbertia arguta* closely resembles *H. crassinervis*, and has the same unusual pollination syndrome with thorn-like styles in front of the anthers, which appears to mimic a similar arrangement in the *H. stricta* group except that styles in those species are thread-like. Although the flowers of both species also include an unusual feature (small staminodes on either side of the stamen cluster), they are here provisionally included in the *H. perhamata* group because of their close resemblance to *H. aristisepala* without staminodes and similar styles. However, *H. crassinervis* is distinguished from *H. arguta* by hooked simple hairs on the outer of the calyx lobes, a prominently bulging central vein of the leaves, leaf-like additional bracts and outer calyx lobe, and most importantly, it has only 16 stamens per flower.

Although the additional bracts on the fascicled shoots below each flower of *H. arguta* are similar in shape to the cauline leaves, they are not only more densely hairy than normal young leaves, but the hairs on both surfaces

are radially spreading fascicled hairs (except for the marginal sharply tuberculate straight simple hairs). No hooked hairs have been observed on the abaxial surface. As two types of leaves can be distinguished, the ones subtending the flowers are here described as additional bracts (hypsophylls) in order to draw attention to the difference.

**Etymology.** The epithet *arguta*, Latin for “sharp-toothed”, refers to the unusually pointed hair tubercles on the compressed flanks on the revolute margins of the leaves.

***Hibbertia aristibracteata* Toelken, sp. nov.**

*A. H. conferta habitu patenti ramis latis et lobis exterioribus calycis cristis centralibus et aristis terminatibus; a H. aciculari et H. minyantha floribus sessilibus bracteis quinque aristatis subtentis differt.*

**Holotypus:** New South Wales (CT), 12.9 km N Clarence on the Newnes Tunnel Rd, 7 Apr. 1971, R. Coveny 3583 (NSW224629).

Shrublets with decumbent spreading branches; branches wiry-woody, with ridges continuing from the decurrent leaf bases, glabrescent with few antrorsely appressed, straight simple hairs mainly between the leaf bases and ridges but soon wearing off. *Vestiture* of appressed straight simple hairs on branches persisting only shortly, while the intrapetiolar tufts and shortly pilose straight simple hairs on the ovaries are retained. *Leaves* with sparse intrapetiolar tufts of straight simple hairs to 0.4 mm long and laterally spreading on both sides of the decurrent leaf bases; *petiole* 0.25–0.4 mm long, glabrous; *lamina* linear, (2.6–) 4.5–7.5 (–9.3) × (0.6–) 0.8–1.1 mm, abruptly constricted into petiole but not truncate, pointed and drawn into an awn to 0.7 mm long with short caducous transparent point, adaxially flat to slightly depressed above the central vein, glabrous but minutely verruculose particularly towards and on the flanks of the revolute margins, abaxially with flush to slightly recessed central vein usually more than twice broader than the tightly abutting revolute margins and not displaying the undersurface or rarely showing rows of teeth along both margins, outer surface glabrous to minutely verruculose as adaxially. *Flowers* sessile, rarely subsessile, terminal on short-shoots either terminal on major branches or on axillary short-shoots along distal branches; *flower stalk* to 2.2 mm long; *buds* narrowly ovoid-ellipsoidal; *primary bracts* linear-triangular, 1.1–1.8 × c. 0.2 mm, pointed with short spreading awn continued from raised central vein but without revolute margins, puberulous with mainly short marginal straight simple hairs, grading into *additional bracts* 4 or 5, similar in size and with or without ± developed revolute margins, sometimes leaf-like but shorter than cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 5.2–5.4 × 1.2–1.3 mm, acuminate with terminal transparent awn continued from ± raised central ridge, outer and inner surface glabrous and smooth; *inner calyx lobes* oblong-ovate,

4.4–4.7 × 1.4–2.3 mm, acute to cuspidate and pointed, with central ridge slightly raised, outer and inner surfaces glabrous and smooth. *Petals* cuneate-obovate, 4–4.6 mm long, scarcely lobed to entire. *Stamens* 5 or 6 in an erect cluster to one side of the ovaries; *filaments* 0.8–1.1 mm long, scarcely connate basally; *anthers* oblong, 1.2–1.3 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally constricted, each with 2 ovules, shortly and sparsely pilose with straight simple hairs also on indistinct erect crest; *styles* vertically attached to the upper abaxial side of the ovaries, then straight erect in front of the stamens, positioning the stigmas well above the anthers. *Fruits* and *seeds* were not seen.

**Distribution and ecology.** “Common in sandy soil in cut over forest in association with *Leptospermum myrtifolium*, *Phyllota squarrosa*” (R. Coveny 3583) in central eastern New South Wales (NC, CT).

**Phenology.** Flowering mainly in Oct. and Nov. (Jan., Apr.).

**Conservation status.** Recorded as locally common.

**Diagnostic features.** The sessile flowers are subtended by up to five similar awned bracts, which are without revolute margins, so that the additional bracts, which are commonly recognised by their ± developed revolute margins, can only be distinguished from the primary bract by their position below the flower. These characteristics, as well as a glabrous calyx, distinguish *H. aristibracteata* from *H. acicularis*, *H. minysantha* and other decumbent species of the group. Some specimens of *H. rigens* may resemble those of *H. aristibracteata*, but the former species differs by being an erect shrub to one meter high and its stalked flowers are subtended by a single, non-spiny primary bract. The few appressed straight simple hairs on branches are unusual and are shared with *H. pilifera*, but the latter is distinguished by its fewer stamens with filaments largely connate, and flowers ± stalked. Comparable hairy branches also occur in *H. intermedia* (Toelken & Miller 2012, fig. 1E–H), but that species is distinguished by stalked flowers and numerous stamens around the ovaries.

It is also important to note that the styles are straight-erect from their attachment on the upper outer side of the ovaries, unlike the ones of *H. acicularis*, which usually first bend down and outwards and are then erect or often ± twist around the stamen bundle at least when older, so that the stigmas are often not positioned above the anthers.

**Variation.** A specimen from near the Jenolan Caves (*W.F. Blakeley s.n.*) has subsessile flowers with a slightly shorter calyx but is otherwise consistent with the characters that define the species.

**Etymology.** The epithet *aristi-bracteata*, Latin, “awned-bracteate” refers to the fact that all bracts below the sessile flowers are distinctly awned.

### **Specimens examined**

NEW SOUTH WALES. Jenolan Caves, Nov. 1899, *W.F. Blakeley s.n.* (NSW102311); Morto Gully, Lithgow, Oct. 1914, *J.L. Boorman s.n.* (NSW102312); Clarence, 26 Oct. 1962, *C. Burgess s.n.* (CANB4773); Dargans Ck, 18 Nov. 1959, *C. Burgess & N. Ford s.n.* (CBG4755A at CANB); Gloucester Tops, 15 Nov. 1962, *R.W. Earp 6202* (NSW); both sides of Glow Worm Tunnel Rd, 2.65 km SW of junction with Waratah Ridge Rd, 29 Oct. 2001, *J.W. Horn 4251* (AD, CANB, NSW; DUKE, *n.v.*); Gloucester Tops, 11 Feb. 1971, *J. Pully 714* (CANB); Newnes S.F., Newnes Plateau, 1 km N junction of State Mines Rd and Clarence Rd, 5 Nov. 1986, *B.J. Wallace 151/86* (NSW).

### ***Hibbertia aristisepala* Toelken, sp. nov.**

*A H. argutae similis sed 16 staminibus et absentia staminodiorum; a H. crassinervi absentia staminodiorum et pilis uncatis in calycibus differt.*

**Holotypus:** Queensland (Le), Bull Creek gorge, 15 km W of “Castlevale”, 4 Sep. 1990, *A.R. Bean 2213* (BRI AQ474997).

Shrubs to 0.3 m tall, moderately branched; branches rigid-woody, with raised ridges continuing from the decurrent leaf bases (largely obscured by dense fascicled leaves at the end of branches), fascicled-pubescent to -puberulous. *Vestiture* not persisting, with minute radially spreading fascicled hairs (with (3–) 5–8 subequal arms on branches, decurrent leaf bases and petiole, while leaves and the outside surface of calyx lobes with scattered, minute, straight, simple and rarely bifid hairs, soon wearing off. *Leaves* with sparse intrapetiolar tufts of straight simple hairs to 0.2 mm long obscured by clasping petiole; *petiole* 0.2–0.3 mm long, indistinct, abaxially fascicled-puberulous and with simple marginal cilia; *lamina* linear-lanceolate, (5.4–) 6–10 (–14.3) × 0.5–0.7 mm, scarcely constricted into petiole, with apex drawn into an awn to 0.7 mm long, adaxially ± flat, glabrescent with minute antrorsely spreading, straight simple hairs becoming larger and often bifid along the margins, but all wearing off soon, abaxially with ± bulging central vein to twice broader than the tightly abutting revolute margins without exposing the undersurface, outer surface puberulous with scattered straight simple hairs soon wearing off. *Flowers* sessile, terminal on major branches, tightly surrounded by densely clustered leaves at the ends of branches; *flower stalk* absent; *buds* narrowly ovoid; *primary bract* linear-lanceolate, 8.2–8.5 × 1.2–1.6 mm, leaf-like but with membranously sheathing base, puberulous with scattered straight simple hairs and marginal cilia, subtended by densely fascicled cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 7.2–7.5 × 2–2.3 mm, with central ridge ending in a terminal awn to 2.6 mm long, outer surface with few scattered minute straight simple hairs mainly towards the base and longer marginal cilia, inner surface glabrous; *inner calyx lobes* oblong-elliptic, 6.8–7 × 3.5–4.2 mm, with scarcely raised central ridge and cuspidate with awn, 0.5–0.7 mm long, outer surface with minute simple hairs towards the upper margins ending in dense cilia, inner surface glabrous.

*Petals* broadly obovate, 7.5–8 mm long, emarginate. *Stamens* 16 (single specimen) in a cluster to one side of the ovaries; *filaments* 0.4–0.6 mm long, scarcely connate basally; *anthers* oblong to oblanceolate, 1.5–1.6 mm long, tightly incurved over the styles and ovaries, usually dehiscing apically, abruptly constricted at apex and base. *Pistils* 2; *ovaries* shortly obovoid, each with 2 ovules, fascicled-tomentose; *styles* thread-like, vertically attached to outer side of the ovaries then curved over the apex of the ovary, positioning the stigmas below the apex of the anthers. *Fruits* and *seeds* not seen.

**Distribution and ecology.** Known only from the type specimen from “skeletal sandstone slope with *Dodonaea tenuifolia* and *Apatophyllum* sp.” in Queensland (Le).

**Phenology.** Flowering in Sep.

**Conservation status.** Unknown.

**Diagnostic features.** Although plants of *H. aristisepala* are superficially similar to both *H. arguta* and *H. crassinervis*, they lack the staminodes on both sides of the cluster of fertile stamens. In addition, *H. crassinervis*, which also has 16 stamens per flower like *H. aristisepala*, is further distinguished by the presence of hooked hairs on the outer surface of the outer and inner calyx lobes, and, even more obviously, by the bulging central vein of leaves, bracts, and especially the outer calyx lobes, where the raised ridge is particularly prominent at the base. However, additional collections are required in order to assess the local variation of both these species as they were recorded close to another. *Hibbertia arguta* is also distinguished from *H. aristisepala* by having 22–24 fertile stamens per flower, and shorter awns of the outer calyx lobes (only 0.4–0.5 mm long). All three species discussed above are very similar to species of the *H. mucronata* group from south-western Western Australia.

Among the unusual species in the *H. perhamata* group with radially spreading fascicled hairs on woody branches and on the outer surface of the calyx lobes but with glabrous inner surface of the calyx lobes is *H. carnarvonensis*, which differs from the three species discussed above by having 6–8 fertile stamens without additional staminodes and pointed but not distinctly awned outer calyx lobes.

**Etymology.** The epithet *aristi-sepala*, Latin, “awned-sepaled” refers to the distinctly awned calyx.

***Hibbertia armata* Toelken, sp. nov.**

*A H. aciculari staminibus septem filamentis basaliter connatis et ramis ligniscentibus; a H. aristibracteata floribus pedunculatis et filamentis basilaribus connatis differt.*

**Holotypus:** New South Wales (ST), between Marulan and Berrima, 1 Dec. 1950, *E. Gauba s.n.* (CBG4747 at CANB). **Isotypi:** MEL1579646, NSW88581.

Shrublet to 0.2 m tall, much-branched, decumbent-spreading; branches wiry but often becoming almost rigid-woody, with ridges continuing from prominent decurrent leaf bases, glabrous. *Vestiture* restricted to intrapetiolar tufts of hairs, sparsely tomentose ovaries, and scattered hooked simple hairs on the outer surface of the calyx lobes. *Leaves* with sparse intrapetiolar tufts of straight simple hairs to 0.5 mm long and not laterally spreading on the decurrent leaf bases; *petioles* 0.2–0.5 mm long, glabrous; *lamina* linear to oblong-elliptic, (2.4–) 4–6 (–7.7) × 0.4–0.6 (–0.75) mm, gradually tapering into petiole, drawn into an awn, 0.3–0.6 mm long, adaxially ± flat or slightly convex and glabrous; abaxially with flush to bulging central vein usually twice broader than the tightly abutting revolute margins without displaying the undersurface or rows of teeth between them, glabrous as adaxially. *Flowers* stalked, terminal on very short short-shoots at the base of the flower stalk, terminal and axillary on distal branches and often with overtopping branches with or without additional flowers; *flower stalk* (2.2–) 4–8 (–9.6) mm long; *buds* narrowly ovoid to ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 1.5–1.8 × 0.2–0.3 mm, pointed, flat and without revolute margins, glabrous; *additional bracts* (0–) 2 (3), leaf-like and very reduced and not grading into cauline leaves, subtended usually by 2 minute propyls mainly on axillary branches. *Calyx lobes* unequal; *outer calyx lobes* elliptic to lanceolate, (4.4–) 5.2–5.8 (–6.3) × 1.5–1.7 mm, acuminate with an awn, ± 0.5 mm long, but colourless tip caducous, with slight central ridge, outer surface sparsely hirsute with scattered hooked simple hairs, inner surface glabrous; *inner calyx lobes* oblong-obovate, 5.5–6.2 × 2–2.3 (–2.4) mm, cuspidate or rounded and mucronate, with slight central ridge, outer surface with few scattered hooked simple hairs mainly along the central ridge and towards the base, inner surface glabrous. *Petals* obovate-cuneate, 6.5–7.4 mm long, shallowly bilobed to ± emarginate. *Stamens* 7, in an erect cluster to one side of the ovaries; *filaments* 1–1.2 mm long, connate for up to one-third their length; *anthers* broadly oblong, 0.7–0.9 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 2 ovules, sparsely tomentose with erect straight simple hairs, with crest glabrous; *styles* horizontally attached to upper outer edge or ± marginal on ovaries, then curved sideways and upwards on both sides of the stamens, positioning the stigmas well above the anthers. *Fruits* and *seeds* not seen.

**Distribution and ecology.** Recorded from sandy-clay soil among low shrublets and grass under scribbly-bark *Eucalyptus* woodland in south-central New South Wales (ST).

**Phenology.** Flowering in Oct.–Dec.

**Conservation status.** Recorded as frequent near Tallong (*H.R. Toelken* 9561 & 9562).

**Diagnostic features.** *Hibbertia armata* differs from *H. rufa* by its seven stamens and the primary bract, which clasps the calyx. Both those characters are similar to *H. acicularis*, but *H. armata* is distinguished by its more robust, almost rigid-woody main branches and long-awned leaves and calyx lobes, by its seven stamens with filaments connate to a third of their length, and by the bracts as well as young leaves being glabrous. The more robust habit is similar to *H. aristibracteata*, but *H. armata* differs by its stalked flowers and basally connate filaments.

**Variation.** The length of the internodes varies greatly in this species, possibly indicating varying environmental conditions, but intrapetiolar tufts of hairs are found throughout.

**Etymology.** The epithet *armata*, Latin, “armed”, refers to the long firm awns on the leaves and outer calyx lobes.

### Specimen examined

NEW SOUTH WALES. Along Shoalhaven R., c. 30 km SW of Braidwood, 18 Dec. 1974, G.L. Stebbins & L. Pryor A-74 (CANB); E of Barbers Ck, near Bundanoon, 22 Oct. 2011, H.R. Toelken 9553 (AD, NSW); next to Tallong cemetery, 27 Oct. 2011, H.R. Toelken 9561 (AD, NSW); 2.5 km along Barbers Ck Rd, 27 Oct. 2011, H.R. Toelken 9562 (AD, NSW); Minda Clay Mine, S of Windelama, 27 Oct. 2011, H.R. Toelken 9564 (AD, NSW).

### *Hibbertia carnarvonensis* Toelken, sp. nov.

*A H. epedunculari ramis et lobis calycum pubescentibus vel hirsutis; a H. pustulifolia lobis calycum 4.2–5.3 mm longis et internis glabris, petiolis puberulis differt.*

**Holotypus:** Queensland (Le), Carnarvon Range, 27 Sep. 1940, C.T. White 11332 (BRI AQ180573).

*Hibbertia* sp. (Carnarvon Range C.T. White 11332) S.T.Reynolds in R.J.F.Hend., *Queensl. Pl Names Distribution* 65 (1997). — *Hibbertia* sp. Carnarvon Range (C.T. White 11332) Qld Herbarium, *Austral. Pl. Cens.* [online; <https://biodiversity.org.au/nsl/services/search/taxonomy>] (2011).

Shrubs to 1 m tall, much-branched, erect-spreading; branches rigid-woody, with decurrent leaf bases scarcely raised, fascicled-puberulous with minute, radially spreading fascicled hairs (with 1–4 subequal, very short arms). *Vestiture* usually not persistent, with sparse, usually radially spreading fascicled hairs with few arms and without tubercles, on branches, young leaves, bracts and outer surface of calyx and/or with straight or hooked simple hairs on leaves, bracts and outer surface of the calyx. *Leaves* with sparse, short intrapetiolar tufts of straight simple hairs to 0.3 mm long (easily confused with clusters of straight simple hair on the adaxial petioles); *petiole* 0.3–0.6 mm long, adaxially pubescent to puberulous; *lamina* linear, rarely linear-lanceolate, (4.2–) 5–7 (–8.8) × 0.4–0.6 mm, ± abruptly constricted into petiole, pointed with awn to 0.5 mm long and

usually terminated by 1 or 2 minute transparent points, adaxially convex to flat, rarely depressed above the central vein, with a densely blistered epidermis, with few scattered antrorse radially spreading fascicled hairs (with 1 (–3) subequal arms), soon wearing off, abaxially with distinctly recessed central veins usually twice broader than the tightly abutting revolute margins without exposing the undersurface but rarely with rows of teeth exhibited between them, the outer surface with a blistered epidermis as adaxially. *Flowers* subsessile, terminal or mainly on usually successive axillary short-shoots on distal branches; *flower stalk* 0.5–2 (–3) mm long; *buds* ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 1–2.2 × 0.1–0.25 mm, pointed, without revolute margins, puberulous above and below with scattered minute radially spreading fascicled hairs (1–4 fine spreading arms), particularly on the margins, with recurving pointed apex; *additional bracts* (1) 2–4 with revolute margins ± developed, shorter than but sometimes merging into the cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* lanceolate to lanceolate-elliptic, (4.3–) 4.5–5 (–5.4) × (1.9–) 2–2.5 mm, acute to pointed, with central ridge towards the apex, outer surface sparsely hirsute with hooked hairs over an undercover of scattered, tuberculate, radially spreading fascicled hairs (1–3 spreading arms, but often reduced to tubercles), particularly at the base, inner surface glabrous; *inner calyx lobes* broadly elliptic-oblong, rarely elliptic-obovate, (4.2–) 4.5–5.4 × (2.3–) 2.5–3 mm, rounded, without an obvious central ridge, outer surface sparsely hirsute with hooked simple hairs over scattered tubercles of radially spreading fascicled hairs, inner surface glabrous. *Petals* obovate, 8–9.3 mm long, scarcely emarginate. *Stamens* 6–8 in an erect cluster to one side of the ovaries; *filaments* 0.3–0.6 mm long, usually connate in bundles; *anthers* oblong, 2.6–3 mm long, subequal except for one (rarely two) inner ones longer, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but ± laterally compressed, each with 4 ovules, pubescent to almost hirsute at the apex and on crest with vertical straight simple hairs; *styles* horizontally attached to the outer side of the ovaries, then curved upwards and erect on the side of the stamens, positioning the stigmas well above the anthers. *Fruits* on shortly elongated, erect stalks. *Seeds* not seen.

**Distribution and ecology.** Grows in shallow sandy loams among sandstone rocks in woodland dominated by *Eucalyptus maculata*, *E. creba*, *Lysicarpus angustifolius*, *Petalostigma* sp. and *Dodonaea* sp. (M. Parris 9097) in Queensland (Le, Mi, Nk).

**Phenology.** Flowering in Sep.–Jan.

**Conservation status.** Recorded from Carnarvon N.P.

**Diagnostic features.** The blister-like, bulging epidermal cells, particularly of the adaxial leaf surfaces of *H. carnarvonensis*, are almost as pronounced as those of *H. pustulifolia*, but the latter species differs by the calyx lobes being about twice as long (7.2–8.3 mm long) and

puberulous on the inner surface, as well as by glabrous petioles. Conspicuously bulging epidermis cells on the adaxial leaf surfaces are also common in *H. epeduncularis*, but that species differs by the calyx lobes and branches being glabrous.

**Variation.** The radially spreading fascicled hairs on branches, calyx and particularly on the leaves of *H. carnarvonensis* often wear off so quickly that these organs seem to be glabrous; only those on the calyx have distinguishable basal tubercles, which are retained. Although the minute radially spreading hairs are usually sufficiently distinct, some bear only one arm (particularly on the petiole), so that the distinction between the two hair types breaks down.

**Etymology.** The epithet *carnarvonensis* (Latinised name) is adopted as the species has been mainly recorded from the Carnarvon Ranges.

#### **Specimens examined**

QUEENSLAND. Isla Gorge, 28 Sep. 1968, *S.L. Everist* 8028 (BRI); Dam Gorge, 19 Sep. 1984, *B. O'Keefe* 616 (BRI); Carnarvon Gorge N.P., 500 m NE of park entrance, 18 Oct. 1986, *M. Parris* 9097 & *A. Watson* (CANB); Carnarvon Ranges, Sep. 1938, *J.E. Young* s.n. (BRI10736).

#### ***Hibbertia conferta* Toelken, sp. nov.**

*A H. aristibracteata habitu pulvino ramis filiformibus et lobis exterioribus calycis sine crista centrali et arista terminali; a H. nudicalycina floribus sessilibus, basibus stylosum glabris et stylis ad ovariis verticaliter affixis differt.*

**Holotypus:** New South Wales (CT), Abercrombie Caves, 35 mls [56 km] S of Bathurst, 22 Oct. 1958, *E.F. Constable* s.n. (NSW55994).

Shrublets, much-branched from the base and very dense; branches wiry to almost thread-like, with indistinct ridges continuing from the decurrent leaf bases, puberulous to glabrescent with short antrorsely appressed straight simple hairs mainly along both sides of the decurrent leaf bases wearing off soon. *Vestiture* persistent for a short time, with fine, etuberculate, antrorsely appressed, straight simple hairs on branches and spreading marginal cilia on at least the distal part of bracts, and erect hairs on the ovaries. *Leaves* with short intrapetiolar tufts of straight simple hairs c. 0.2 mm long  $\pm$  extending on both side of the decurrent leaf bases; *petioles* 0.1–0.3 mm long, glabrous; *lamina* linear to linear-lanceolate, (4.1–) 5–7.5 (–8.6)  $\times$  0.4–0.6 mm,  $\pm$  abruptly constricted into petiole, pointed with awn to 0.7 mm long and transparent at least distally when young, adaxially  $\pm$  flat and glabrous, abaxially with flush to  $\pm$  recessed central vein often more than twice broader than the tightly abutting revolute margins without displaying the undersurface but occasionally showing rows of minute teeth between them, glabrous as adaxially. *Flowers* single, sessile on short short-shoots, terminal and/or axillary on distal main branches; *flower*

*stalk* absent; *buds* ellipsoidal; *primary bract* linear-triangular, 2.2–2.4  $\times$  0.2–0.3 mm, pointed, without revolute margins but with a  $\pm$  raised central vein, glabrous except for marginal, antrorsely spreading, straight simple hairs, grading into *additional bracts* 2–4, with  $\pm$  developed revolute margins but much smaller than and not grading into cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 4.2–4.5  $\times$  1.6–1.7 mm, pointed, without a distinct central ridge, outer and inner surfaces glabrous; *inner calyx lobes* elliptic-lanceolate, 3.8–4.2  $\times$  2.1–2.5 mm, acute, cuspidate to rounded, without distinct central ridge, outer and inner surfaces glabrous. *Petals* linear-oblongate, rarely cuneate-obovate, 4.5–6.3 mm long, emarginate to shallowly bilobed. *Stamens* 6 in an erect cluster to one side of the ovaries; *filaments* 1–1.1 mm long, scarcely connate basally; *anthers* oblong, 1.5–1.6 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid and slightly laterally compressed, each with 4 ovules, pubescent with vertical, bifid and/or straight simple hairs but the crest glabrous; *styles* vertically attached to outer apex of the ovaries, then straight and erect in front of the stamens, positioning the stigmas just above the anthers. *Fruits* subsessile. *Seeds* not seen.

**Distribution and ecology.** “Eucalypt scrub-covered hillside” in western-central New South Wales (CT). The species is only known from the type specimen.

**Phenology.** Flowering in Oct.

**Conservation status.** Unknown.

**Diagnostic features.** The cushion-like habit with very dense thread-like branches, as well as the acute outer calyx lobes without a distinct central ridge and terminal awn distinguish *H. conferta* from *H. aristibracteata*.

Plants of *H. conferta* produce an unusually large number of branches from the base and these in turn are much-branched to form very dense shrublets, but in contrast to other species all these branches are almost thread-like, similar to *H. nudicalycina*. The new species differs, however from the latter by its sessile flowers, glabrous crest of the ovary, and vertically attached styles.

**Etymology.** The epithet *conferta*, Latin, “dense” refers to the unusually much-branched habit forming very dense shrublets.

#### ***Hibbertia crassinervis* Toelken, sp. nov.**

*H. argutae similis sed 16 staminibus et foliis infra flores puberulis; a H. aristisepala praesentatione stamidiorum et pilis uncatis in sepalis differt.*

**Holotypus:** Queensland (Le), Mt. Salvator Rosa [Carnarvon] N.P., 30 Oct. 1981, *M.E. Ballingall* 436 & *M.R. Cockburn* (BRI AQ349417).

Shrubs to 0.6 m tall; branches ± rigid-woody, with indistinct ridges continuing from the decurrent leaf bases, hirsute with longer spreading straight simple hairs over an undercover of radially spreading fascicled hairs (2–5 subequal spreading arms). *Vestiture* ± persistent, with radially spreading fascicled hairs overtopped by straight simple hairs on branches, these overtopped by hooked hairs on outer surface of calyx, with tuberculate straight simple or bifid hairs sometimes with few scattered hooked hairs on the leaves and with mainly erect straight simple hairs on the ovaries. *Leaves* with sparse intrapetiolar tufts of straight simple hairs 0.2–0.3 mm long and not laterally spreading along the decurrent leaf bases; *petiole* c. 0.2 mm long, fascicled-tomentose with radially spreading fascicled hairs much shorter than on branches (3–5 subequal arms); *lamina* linear-triangular, (5.5–) 6.5–10 (–13.8) × 0.8–1.1 mm, scarcely constricted into petiole, pointed with an awn, 3–5 mm long, adaxially ± flat, puberulous with scattered antrorsely spreading bifid and/or straight simple hairs, with basal tubercles becoming larger on the dorsiventrally flattened flanks of the revolute margins and often accompanied by recurved smaller hooked simple hairs, abaxially with bulging central vein usually twice broader than the tightly abutting revolute margins without showing teeth or the undersurface between them, even more sparsely hairy than adaxially. *Flowers* single, rarely a few terminal, sessile, terminal on indistinct fascicled shoots with cauline leaves, mainly on major branches; *flower stalk* absent; *buds* ellipsoidal; *primary bract* 1, lanceolate, 5–5.4 × 0.4–0.5 mm, pointed, with flat spreading margins but with pronounced central ridge, puberulous with antrorsely spreading straight simple hairs particularly on the margins, subtended by 6–8 *additional bracts* below flower, clasping flowers and grading into cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 7.6–7.9 × 1.8–2.3 mm, acuminate with awn about as long as the blade, with raised central ridge abruptly broadened at the base, outer surface with an undercover of small tuberculate radially spreading fascicled hairs (2–5 subequal arms) usually much longer than marginal cilia, scarcely overtopped by short reflexed hooked simple hairs mainly on the upper half, inner surface mainly glabrous except for scattered antrorsely appressed straight simple hairs mainly below the awn; *inner calyx lobes* ± broadly elliptic, 5.2–5.4 × 2.8–3.3 mm, cuspidate or mucronate, rarely rounded, with indistinct central ridge, outer surface puberulous with minute radially spreading fascicled hairs often reduced to tubercles but larger as marginal cilia on the glabrous margins, sparsely overtopped by scattered short hooked hairs along the central ridge, inner surface glabrous. *Petals* obovate, 5.8–6.6 mm long, usually shallowly bilobed. *Stamens* 16 plus 2 or 3 fine staminodes on either side of the cluster, on one side of the ovaries; *filaments* 0.4–0.5 mm long, scarcely connate basally; *anthers* narrowly oblong, 1.3–1.4 mm long, subequal, erect but slightly curved forward, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 2 ovules, sparsely tomentose on the crest with spreading radially spreading fascicled

hairs (2–3 (4) arms); *styles* ± vertically attached to upper end of the ovaries, then straight-erect, positioning the stigmas just above the anthers. *Fruits* and *seeds* not seen.

**Distribution and ecology.** Growing on sandstone in open eucalypt and acacia forest in central Queensland (Le). The species is only known from the type specimen.

**Phenology.** Flowering in Oct.

**Conservation status.** Recorded from Salvator Rosa section of Carnarvon N.P., Qld.

**Diagnostic features.** The unusual leaves of *H. crassinervis* with greatly bulging central vein, accentuated by the dorsiventrally flattened revolute margins becoming sharp-edged margins on the basal third of the leaf lamina, are similar to those of *H. ferox*, but the latter species differs by having only straight simple hairs on its branches, longer and more pronounced awns, including on the outer and inner calyx lobes, and 9 stamens per flower.

Despite having many characters of the *H. perhamata* group (awned leaves, a pollination syndrome with short filiform styles ± overtopped by the 16 stamens with slender subequal anthers, and straight simple hairs together with radially spreading fascicled hairs on the branches and leaves), this species could also be placed into the *H. stricta* group. However, *H. crassinervis* shows the closest resemblance to *H. arguta*, because of its dense fascicled leaves below the flowers, and particularly as the two species have a similar pollination syndrome, but *H. crassinervis* differs by a distinctly bulging central vein, accentuated by sharp-edged bases of the leaves, by leaves below the flower that are scarcely hairier than young cauline leaves, by radially spreading hairs on the outer surface of the calyx overtopped by erect hooked simple hairs, and most importantly, by only 16 stamens per flower.

*Hibbertia crassinervis* differs from *H. aristibracteata*, the third species in the *H. arguta* subgroup, mainly by the hairy outer surfaces of the calyx lobes in addition to the very bulging central vein of leaves and distinctly larger outer calyx lobes (7.6–7.9 mm long).

**Etymology.** The epithet *crassi-nervis*, Latin, “thick-veined” refers to the unusually bulging central vein of the leaves.

***Hibbertia epeduncularis* Toelken, sp. nov.**

*H. aiodontae similis sed calycibus glabris et staminibus septem vel octo antheris, 2–2.2 mm longis, differt.*

**Holotypus:** Queensland (Pc), Mt Wheeler, 7 Aug. 1993, *P.I. Forster 13796, G.W. Wilson & R.F. Wilson* (BRI AQ568817). **Isotypus:** AD99416141.

Shrub to 0.4 m tall, much-branched, irregularly spreading; branches rigid-woody, with scarcely

raised ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* absent except for antrorsely spreading, straight simple hairs on adaxial petiole and base of the lamina, rarely on bracts, also intrapetiolar tufts and sparsely hirsute ovaries with erect, straight simple hairs. *Leaves* with sparse intrapetiolar tufts of straight simple hairs to 0.3 mm long often also  $\pm$  decurrent on both sides of the leaf base; *petiole* 0.2–0.6 mm long, often with short antrorsely spreading straight simple hairs adaxially; *lamina* linear, (4.2–) 6–9 (–11.4)  $\times$  (0.5–) 0.6–0.8 mm,  $\pm$  abruptly constricted into petiole, drawn into a terminal awn, 0.4–0.6 mm long, with transparent but caducous apex, adaxially convex to almost flat, glabrous and with epidermal cells  $\pm$  bulging, abaxially with recessed central vein often more than twice broader than tightly abutting revolute margins without displaying the undersurface but often with rows of fine teeth between them, with glabrous and  $\pm$  smooth revolute margins as adaxially. *Flowers* single, sessile to subsessile, terminal on all distal branches with few  $\pm$  fascicled leaves below; *flower stalk* 0–1 mm long; *buds* narrowly ellipsoidal; *primary bract*  $\pm$  subtending calyx, linear-lanceolate to linear-spathulate, (0.4–) 0.5–0.9  $\times$  c. 0.2 mm, pointed, without revolute margins, glabrous or with marginal straight simple hairs at base; *additional bracts* 3 or 4, leaf-like with revolute margins  $\pm$  developed, mainly below axillary flowers, rarely merging into cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* linear-lanceolate, 5.6–6.2 (–6.8)  $\times$  1.7–2 mm, acute to pointed, ridged, outer surface and inner surface glabrous; *inner calyx lobes* narrowly oblong-elliptic, 5.6–6.6 (–7)  $\times$  2.3–2.6 mm, obtuse or folded and acute, faintly ridged, outer surface and inner surface glabrous. *Petals* broadly obovate, 7.6–8.8 mm long, shallowly bilobed. *Stamens* 7 or 8 in an erect cluster to one side of the ovaries; *filaments* 1.2–1.3 mm long,  $\pm$  connate basally usually in groups; *anthers* narrowly oblong, 2–2.2 mm long, 2 or 3 slightly longer, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid and laterally compressed, each with 4 ovules, pilose to shallow hirsute on the crest with erect straight simple hairs; *styles* horizontally attached to the lateral outer side about two-thirds up the ovaries, then spreading to both sides of the stamens before straightening up, positioning the stigmas just above the outer anthers. *Fruits* sessile. *Seeds* not seen.

**Distribution and ecology.** Growing on Mount Wheeler in north-eastern Queensland (Pc), in trachyte cliffines with scattered vegetation.

**Phenology.** Flowering in Aug.

**Conservation status.** Locally common, according to *P.I. Forster 13796 et al.*

**Diagnostic features.** *Hibbertia epeduncularis* is a shrub similar to the slightly more robust *H. aiodontia* from Mt Castletower, but differs mainly by its calyx lobes being glabrous on outer and inner surfaces, as well as only 7 or 8 stamens with anthers 2–2.2 mm long.

**Variation.** While the main stems are thick and rigid-woody, the distal branches are usually wiry to twiggy.

**Etymology.** The epithet *epeduncularis*, Latin, “without peduncle” refers to the commonly sessile flowers.

#### **Specimens examined**

QUEENSLAND. Near the top of Mt Wheeler, *s.dat.*, *A. Thozet 536* (MEL1009624); top of Mt Wheeler, *s.dat.*, *A. Thozet 537* (MEL119493).

#### **Hibbertia exutiacies** N.A.Wakef.

*Vict. Naturalist* 72: 118 (1955); H.Eichler, *Suppl. J.M.Black's Fl. S. Austral.* 227 (1965); J.H.Willis, *Handb. Pl. Victoria* 390 (1973); Jessop in Jessop & Toelken, *Fl. S. Austral.* 1: 355 (1986); Toelken in N.G.Walsh & Entwisle, *Fl. Victoria* 3: 305 (1996). — **Type citation:** “Trailer common about Stawell St. Eloy D’Alton No. 13”. **Holotype:** Victoria, Stawell, *s.dat.*, *St. E.D’Alton 13* (MEL1010245).

*Hibbertia acicularis* (Labill.) F.Muell. var. *sessiliflora* J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 36: 21 (1912); J.M.Black, *Trans. & Proc. Roy. Soc. S. Austral.* 41: 48 (1917); J.M.Black, *Fl. S. Austral.* 3: 387 (1926); J.M.Black, *Fl. S. Austral. Ed. 2*, 3: 576 (1952). — **Type citation:** “Frequent in the Mount Lofty Ranges”. **Lectotype (here designated):** South Australia, Strathalbyn, 25 Sep. 1909, *J.M. Black s.n.* (AD98651233K). **Remaining syntypes:** Bridgewater, 1 Oct. 1904, *J.M. Black s.n.* (AD98651233A); Mt Lofty, 16 Oct. 1904, *J.M. Black s.n.* (AD98651233B); Mylor, 29 Oct. 1904, *J.M. Black s.n.* (AD98651233C); Morialta Gully, 29 Sep. 1906, *J.M. Black s.n.* (AD98651233E); between Gladston and Bundaleer, Oct. 1907, *J.M. Black s.n.* (AD98651233F).

*Hibbertia acicularis* auctt. non (Labill.) F.Muell.: Benth., *Fl. Austral.* 1: 29 (1863), *p.p.*; F.Muell., *Key Syst. Victorian Pl.* 2: 5 (1885), *p.p.*; F.Muell., *Sec. Syst. Census Austral. Pl.* 1: 2 (1889), *p.p.*; Ewart, *Fl. Victoria* 720 (1931), *p.p.*

Shrublets decumbent, much-branched and to 0.3 m tall; branches wiry-woody, distinctly ridged by continuation of the leaf bases,  $\pm$  densely pubescent with antrorsely appressed, straight simple hairs, often wearing off soon. *Vestiture* usually not persistent, with short, antrorsely spreading to appressed straight simple hairs on branches and leaves but the latter mainly towards the margins and intrapetiolar tufts, as well as on ovaries. *Leaves* with intrapetiolar tufts of straight simple hairs c. 0.2 mm long and not laterally spreading along the decurrent leaf bases; *petiole* 0.2–0.3 mm long, glabrous except for marginal cilia; *lamina* linear-lanceolate, (2.3–) 3.5–8 (–14.6)  $\times$  0.5–1.2 mm,  $\pm$  abruptly constricted into petiole, pointed with awn, 0.15–0.4 mm long, but normally caducous, adaxially  $\pm$  convex, glabrescent with antrorsely spreading straight simple hairs mainly along the flanks and wearing off soon but retaining  $\pm$  raised tubercles, abaxially with  $\pm$  flush central vein often twice broader than the tightly

abutting revolute margins without exposing the undersurface and rarely showing rows of teeth between them, outer surface glabrescent as above mainly on the flanks of the revolute margins. *Flowers* sessile, single or a few terminal ones on main branches and/or single axillary ones often at successive nodes on distal branches; *flower stalk* absent; *buds* ellipsoidal; *primary bracts* linear-triangular to triangular, 0.5–1.6 × 0.2–0.5 mm, pointed, without revolute margins, glabrous except for marginal cilia but often wearing of soon, grading into 1 or 4 *additional bracts* and prophylls. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 4.5–4.7 × 1.2–2 mm, pointed to acuminate, with central ridge ± raised, outer surface and inner surface glabrous; *inner calyx lobes* ovate-elliptic, 4.2–4.5 × 1.8–3.2 mm, acute to cuspidate, rarely mucronate, with central ridge ± visible, outer surface and inner surface glabrous. *Petals* obovate, 6.3–8.6 mm long, usually shallowly bilobed. *Stamens* (2) 3–6 in an erect cluster to one side of the ovaries; *filaments* 0.7–1.1 mm long, strap-like, up to one-third connate basally; *anthers* broadly oblong, 1.5–1.8 mm long, subequal, erect but central one often curved over ovaries, abruptly constricted at apex and base. *Pistils* 2; *ovaries* broadly ovoid, each with 4 ovules, tomentose with erect, bifid and/or straight simple hairs; *styles* horizontally attached to upper outer ovaries, then turning straight erect, positioning the stigmas above the anthers. *Fruits* sessile. *Seeds* obovoid to often slightly obliquely obovoid, 1.8–2.2 × 1.9–2.5 mm, black; *aril* with fleshy attachment to one side surmounted by a minutely crenate, uneven membranous cup extending more to the side opposite to the attachment, covering about one-third of the base of the seed. **Fig. 2.**

**Distribution and ecology.** Grows on gravelly to rocky outcrops in various eucalypt woodlands in western, central to north-central Victoria (WAN, GR, MID) and widespread in eastern South Australia (FR, EP, NL, MU, SL, KI, SE).

**Phenology.** Flowering in mainly Sep.–Nov.

**Conservation status.** Recorded from several conserved areas, e.g. Para Wirra Conservation Park (C.P.).

**Diagnostic features.** Although *H. exutiacies* is a widespread species with considerable local variation, it can easily be distinguished by its sessile flowers with glabrous calyx (inner and outer surface), 3–6 stamens with characteristic strap-like filaments (broader than thick) and ± connate basally, and the awn of at least young leaves is translucent with a terminal point that usually wears off.

**Variation.** Throughout the range of the species, plants have a decumbent habit with wiry branches, except in the lower Flinders Ranges, S.A., where they have a distinctly more erect habit with rigid-woody branches (e.g. *C.D. Boomama* 241). These Flinders Ranges plants have flowers with commonly 4 stamens, but from Mambray Creek occasionally decumbent plants with 6 stamens have been recorded (e.g. *D.J.E. Whibley* 4394),



**Fig. 2.** *Hibbertia exutiacies* in the Victorian Midlands. **A** Habit; **B** flowers and buds. — *R.W. Purdie* 9766. Photos: © 2014, M. Fagg, courtesy of Australian Plant Image Index.

even though this number is more commonly found further south. Plants growing in shaded moist condition (e.g. *H. Eichler* 16288, *H.P. Vonov* 419) usually produce many slender to thread-like branches from the woody base, and accordingly more slender leaves.

Flowers are usually subtended by three to five (rarely seven) additional bracts of which the lowest two, the prophylls as seen on any new branch, usually show a bulging central vein and ± developed revolute margins. The uppermost bract (primary bract) differs from the lower ones (additional bracts), by no or scarcely developed revolute margins, as well as the fact that no additional flowers develop in its axil. The flowers in terminal clusters do not only develop from the axils of successive leaves downwards, but mainly in the axils of additional bracts.

**Typification.** In Mueller's herbarium, the name *Hibbertia acicularis* var. *sessiliflora* was already used in 1877 (e.g. annotations on *S.M. Dalton* s.n.), but the varietal name was not formally described. The valid publication of that name can be linked to 6 specimens (syntypes) each with annotations by Black. They all agree with Black's brief description except for *J.M. Black* AD 98651233B, which has only 2 or 3 stamens per flower. With everything being equal for the other

five specimens, the largest specimen, being possibly also the decisive one, as it was added closest to the date of publication, is selected as a lectotype.

### **Selection of specimens examined** (290 seen)

VICTORIA. Rushworth State Forest (S.F.), 9 km SE Whroo Cleared Rd, 15 Sep. 1984, *W.L. Ashburner 41* (MEL); 2.7 mls [4.3 km] E of Kanya, 13 Sep. 1960, *H.I. Aston 612* (MEL); Lower Glenelg River, Apr. 1947, *A.C. Beauglehole 805* (MEL); Wallaby Hill Education area, Murray valley, 24 Sep. 1985, *A.C. Beauglehole 80866 & W.S. Wilson* (MEL); Dalyenong State Forest (S.F.), 9 km WNW Archdale, 8 Sep. 1979, *A.C. Beauglehole et al. 64696* (MEL); Reef Hills Regional Park, SW Benella, 2 Nov. 1979, *A.C. Beauglehole 66136* (MEL); John Smith Res., c. 12 mls [19.2 km] SW Horsham, 26 Sep. 1969, *A.C. Beauglehole 30996* (CANB, MEL); Sandhurst, 1877, *S.M. Dalton s.n.* (MEL119568); Puckapunyal, near Seymour, Sep. 1942, *C. Davis s.n.* (NSW102078); near Bendigo, Oct. 1894, *W.V. Fitzgerald s.n.* (HO3291); c. 4 mls [6.4 km] W Maryborough, along Pyrenees Hwy, 16 Sep. 1973, *R.D. Hoogland 12427* (AD, BRI, CANB, MEL; NY, TNS, *n.v.*); “The Wipstick”, c. 7 mls [11.2 km] N Bendigo, 17 Sep. 1973, *R.D. Hoogland 12428* (CANB, MEL, NSW, K; L, US, A, E, HBG, *n.v.*); Dargile Res., 9 km NE Heathcote, 27 Sep. 1987, *P.C. Jobson 113* (MEL); 10.5 km W Bacchus Marsh, 11 Nov. 1976, *T.B. Muir 5473* (MEL); Smiths Reef Historic area, 11 km NW Castlemaine, 30 Sep. 1981, *E.C. Perkins s.n.* (MEL678159); Pilchers Bridge Flora and Fauna Res., c. 50–100 m along Mudge Rd, off Carnochans Rd, 28 Sep. 2014, *R.W. Purdie 9766* (CANB; MEL, *n.v.*).

SOUTH AUSTRALIA. 19 km NW Parndana, 8 Nov. 1989, *R. Barratt & D.N. Kraehenbuehl 191* (AD); roadside Melrose to Bangor, 23 May 1977, *C.D. Boomsma 241* (AD); Padthaway, 23 Oct. 1980, *P. Canty s.n.* (AD); between Hawker and Moolooloo Station, Sep. 1956, *B.B. Carrodus s.n.* (AD); c. 3 km SW Tarka, 29 Aug. 1961, *H.M. Cooper s.n.* (AD); Bridgewater, 2 Nov. 1989, *D. Cunningham 72* (AD); Mambray Ck, 9 Sep. 1962, *N.N. Donner 573* (AD); Tothill Range, Webb Gap, c. 8 km E Waterloo, 22 Oct. 1981, *N.N. Donner 8438* (AD); Carey Gulley Rd, 17 Oct. 1957, *H. Eichler 16288* (AD); around Blue Gum Hill Well, 26 Sep. 1990, *T. Freeth & G. Ashman TF2* (AD); Parra Wirra N.P., 13 Nov. 1970, *R.D. Hoogland 11851* (CANB, AD, K); Keyneton, 11 Oct. 1933, *H. Ising s.n.* (AD); Dutchmans Stern Range, 10 Oct. 1981, *F. Mollenmans 1217* (AD, HO); Mt Lofty Ranges, Dec. 1847, *F. Mueller s.n.* (MEL119585); Range Rd, N King Georges Beach, 19 Nov. 1989, *B.M. Overton 1148* (AD); Dutchmans Stern Res., 1 Sep. 1987, *C. Pelsley-Knight 156* (AD); Wirrabara Forest Res., 4 Dec. 1984, *H.P. Vonov 153* (AD); Second Valley Forest Res., 20 Jan. 1985, *H.P. Vonov 419* (AD); Montagu Rd, 12 June 1967, *D.J.E. Whibley 2080* (AD, BRI, MEL, NSW); Mambray Ck, 5 July 1974, *D.J.E. Whibley 4394* (AD).

### **Hibbertia ferox** Jackes

*Austrobaileya* 10(2): 282 (2018). — **Holotype:** Queensland (Mi), Poison Valley Road, White Mountains National Park, 12 Apr. 2000, *K.R. McDonald KRM425* (BRI AQ0667861).

As *H. ferox* was compared with *H. acicularis* and *H. exutiacies* in the original description on account of its pungent leaf awns, this brief reference and inclusion in the key was made. However, *H. ferox* differs by two separate clusters of stamens per flower, which resembles species from south-western Western Australia, e.g. *H. drummondii*, as Hammer *et al.* (2022) pointed out.

### **Hibbertia filifolia** Toelken, *sp. nov.*

*H. minysanthae similis sed calycibus et ovariis plus minusve glabris; a H. leiocarpa foliis ligulatis et basibus foliorum cuneatis differt.*

**Holotypus:** New South Wales (NWS), ‘Gibraltar’, 30 km W of Tenterfield, 15 Nov. 2003, *L.M. Copeland 3632* (NSW). **Isotypi:** AD290149, BRI, CANB, MEL, NE081431A.

*Hibbertia acicularis* auct. non (Labill.) E.Muell.: Stanley in Stanley & E.M.Ross, *Fl. S.E. Queensland* 1: 188 (1983), *p.p.*, as for inland form.

Shrublets with many scrambling branches emerging from a woody base, little-branched; branches filiform, with distinct ridges becoming angular from decurrent leaf bases, glabrous. *Vestiture* absent except for intrapetiolar tufts and a few hairs on the base of the adaxial leaf surface and sometimes a few very short straight simple hairs below the apex of the inner calyx lobes. *Leaves* with sparse intrapetiolar tufts of straight simple hairs to 0.3 mm long and laterally extended sometimes with few scattered straight simple hairs on both sides of the leaf bases; *petiole* 0.3–0.6 mm long, puberulous to glabrescent adaxially; *lamina* linear, (5.5–) 9–14 (–25.4) × 0.4–0.7 mm, very gradually tapering into petiole, drawn into a terminal awn with a few subterminal hairs when young, adaxially ± flat or depressed above the central vein and glabrous, abaxially with recessed to ± flush central vein up to about twice broader than the tightly abutting revolute margins without displaying the undersurface or rarely with rows of teeth between them, glabrous. *Flowers* single, stalked, terminal and/or axillary often on successive nodes on distal branches, sometimes overtopping terminal one; *flower stalk* (7.7–) 11–16 mm long; *buds* narrowly ellipsoidal; *primary bract* subtending the calyx, triangular to linear-triangular, 1.1–1.7 × 0.2–0.3 mm, pointed, without revolute margins, glabrous; *additional bracts* rarely 1 or 2 (3), leaf-like but reduced, glabrous, at the base of stalk. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 3.6–4.2 × 1.5–1.7 mm, acute to pointed, faintly ridged, outer surface and inner surface glabrous; *inner calyx lobes* broadly elliptic-ovate, 3.8–4.1 × 1.7–2 mm, rounded or with mucro, outer surface puberulous on the apex, inner surface glabrous. *Petals* obovate, 4.2–5.6 mm long, shallowly bilobed. *Stamens* 4 (5) in a dense, erect cluster to one side of ovaries; *filaments* 0.4–0.7 mm long, scarcely connate basally; *anthers* slender-oblong, 1.6–1.7 mm long, subequal, stiffly erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* narrowly obovoid and laterally compressed, each with 2–4 ovules, glabrous including

on the crest; *styles* horizontally attached to upper outer side of ovaries, then curved down- and outward before straightening up and erect-spreading on the side of the stamens, positioning the stigmas laterally to apex of anthers. *Fruits* on slightly recurved stalk. *Seeds* broadly obovoid, 2–2.4 × 2–2.2 mm, brown; *aril* with fleshy attachment surmounted by a membranous, scarcely lobed cup with one side extended covering the lower third to half of the seed.

**Distribution and ecology.** Grows on slopes or gullies among grass and rocks in open eucalypt woodland in south-eastern Queensland (Dd) and north-eastern New South Wales (NWS).

**Phenology.** Flowering in Nov.–Dec.

**Conservation status.** Recorded from Sundown N.P.

**Diagnostic features.** Plants of *H. filifolia* resemble those of *H. minysantha* from coastal areas of southern Queensland, but are distinguished by the absence of the caducous transperant terminal awn on leaves, longer anthers and a glabrous calyx (rarely with a few minute cilia towards the apex of inner lobes), as well as glabrous ovaries. The terminal awn on leaves is at first transparent and surrounded and topped by minute straight simple hairs, which soon wear off, similar to *H. rufa* and allied species. The awn turns brown with age and is not caducous.

**Etymology.** The epithet *fili-folia*, Latin, “thread-like leaved” refers to the unusual fine leaves of the species.

#### **Specimens examined**

QUEENSLAND. Near Warwick, Apr. 1892, *F.M. Bailey s.n.* (NSW102052); Sundown N.P., along Severn R., 17 Dec. 1982, *P. Hazelgrove SD39* (BRI); slopes above Monday Ck near junction with Severn R., 3 Apr. 1988, *M.B. Thomas 285* (BRI).

NEW SOUTH WALES. Goonoowigal Bushland Res., SE Inverell, 1 Feb. 2001, *P. Brown 10 & S. Brown* (NE); Rock of Gibraltar, c. 30 km W Tenterfield, 12 Dec. 2002, *L.M. Copeland 3499 et al.* (NE).

#### ***Hibbertia incrassata* Toelken, sp. nov.**

*A H. crassinervi floribus peduncularibus, marginibus foliorum crassis et 9–11 staminibus; a H. taenophylla venis centralibus protuberantibus in foliis et ramis fasciculati-puberulis differt.*

**Holotypus:** Queensland (Mar), Mt Moffat, Feb. 1944, *N. Geary s.n.* (BRI AQ180569).

Shrubs rarely to 1 m tall, usually many-stemmed, erect-spreading; branches rigid-woody, with ridges continuing from decurrent leaf bases, glabrous. *Vestiture* absent except for intrapetiolar tufts, minute hairs at the apex of leaves but wearing off shortly and short forked hairs overtopped by hooked simple hairs on the bracts and outer surface of the calyx lobes, the

inner surface of calyx lobes bearing forked hairs. *Leaves* with sparse intrapetiolar tufts of straight simple hairs to 0.3 mm long and not laterally spreading; *petiole* 0.2–0.4 mm long, puberulous adaxially with short antrorsely spreading straight simple hairs; *lamina* linear, (5.2–) 7–14 (–24.4) × 0.6–0.9 (–1.2) mm, scarcely constricted into petiole, tapering into a short persistent point topped by a tuft of minute straight simple hairs and becoming brown with age, adaxially convex to flat or slightly depressed above the proximal central vein and with scattered minute appressed straight simple hairs at the apex but wearing off soon, abaxially with flush to ± bulging central vein at least twice as broad as tightly abutting revolute margins without exposing the undersurface or rows of teeth between them, glabrous as adaxially. *Flowers* stalked, terminal on major but also on short axillary short-shoots, on distal branches often forming terminal clusters; *flower stalk* 7–12 (–13.8) mm long; *buds* ovoid to ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 1.1–1.3 × c. 0.2–0.3 mm, less than half the length of the calyx, pointed, without revolute margins, with scattered minute forked hairs and few hooked simple hairs; *additional bracts* 2 or 3, on axillary short-shoots only, leaf-like but smaller than cauline leaves, at the base of stalk, glabrous. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, (6.1–) 6.4–7.2 × 2.1–2.4 mm, acute, with ridged apex, outer surface ± hirsute with larger and smaller hooked simple hairs over some minute tuberculate forked hairs, particularly proximally, inner surface puberulous with forked and/or straight simple hairs on the distal third; *inner calyx lobes* oblong-lanceolate to -elliptic, 6.5–7.4 × 3.8–4.3 mm, obtuse to rounded, scarcely ridged, outer surface shortly hirsute to pubescent with hooked simple hairs predominantly along the central ridge but with minute tuberculate forked to radially spreading fascicled hairs or just tubercles towards the membranous margins, inner surface glabrous or with few subterminal forked hairs. *Petals* not seen. *Stamens* 9–11, in an erect cluster to one side of the ovaries; *filaments* 0.7–0.9 mm long, scarcely connate basally; *anthers* oblong-ellipsoidal, 2.5–2.8 mm long, subequal, erect, abruptly constricted at apex and base, bullulate. *Pistils* 2; *ovaries* oblong-obovoid but slightly laterally compressed, each with 4 ovules, pubescent to tomentose with spreading straight simple hairs also on the crest; *styles* horizontally attached to the upper outer apex of the ovaries, then curved out- and upwards around the stamens, positioning the stigmas well above the apex of the anthers. *Fruits* on erect stalk. *Seeds* not seen.

**Distribution and ecology.** Grows in sandy soil on sandstone among shrubs in *Angophora costata* and *Eucalyptus phaeotricha* woodland in central Queensland (Le, Mar).

**Phenology.** Flowering recorded in Oct., Feb. and May.

**Conservation status.** Presumed to occur in Carnarvon N.P., Queensland.

**Diagnostic features.** The bulging central vein of the leaves, together with the hooked hairs over  $\pm$  minute tuberculate radially spreading fascicled hairs, particularly on the inner calyx lobes and long bullate anthers, are distinctive of the species. The long slender leaves of *H. incrassata* superficially resemble those of *H. taeniophylla*, but the leaves of the latter species commonly have a recessed central vein, and, in addition, radially spreading fascicled hairs on the branches.

**Variation.** Although the slender leaves are usually rarely longer than 15 mm, they are up to 24 mm long on one branch of the collection *C.T. White 9466*.

**Etymology.** The epithet *incrassata*, Latin, “thickened” refers to the bulging central vein often visible well above the revolute margins.

### Specimens examined

QUEENSLAND. 12 km NNE Mt Moffatt homestead, 13 May 1982, *V.J. Neldner & M.B. Thomas 720* (BRI); Carnarvon Range between Roma and Springsure, 26 Oct. 1933, *C.T. White 9466* (BRI).

### *Hibbertia leiocarpa* Toelken, *sp. nov.*

*H. rigenti similis sed pedunculis filiformibus et calycibus ovariisque glabris; a H. parvifolia ovariis glabris et ramis filo metallicis similis; a H. filifolia petiolis brevissimis et basibus foliorum truncatis differt.*

**Holotypus:** New South Wales (NT), Chandlers Peak, Guyra, Mar. 1917, *J.L. Boorman s.n.* (NSW102291).

**Isotypus:** CANB220840.

Shrublets rarely exceeding 0.3 m tall, much-branched, decumbent; branches wiry becoming rigid-woody, with obvious ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* absent except for intrapetiolar tufts extending to the sides of the leaf bases. *Leaves* with intrapetiolar tufts to 0.6 mm long and shortly decurrent on upper part of both sides of the leaf bases; *petiole* 0–0.3 mm long, glabrous; *lamina* linear to linear-triangular, (2.8–) 3.5–7 (–10.3)  $\times$  (0.5–) 0.65–0.9 (–1.1) mm, abruptly constricted or often with almost truncate base, drawn into a terminal awn, 0.3–0.5 mm long, with short transparent point when young, adaxially  $\pm$  flat or slightly depressed above the central vein and irregularly verruculose, abaxially with broad recessed central vein rarely more than twice broader than the tightly abutting revolute margins without exhibiting the undersurface but often with rows of teeth between them, glabrous to verruculose as adaxially. *Flowers* stalked, single to several in succession forming terminal clusters, terminal on very short short-shoots, terminal but mainly axillary on distal branches; *flower stalk* filiform, (4–) 6–12 (–14.6) mm long; *buds* ellipsoidal; *primary bract* subtending the calyx, triangular, rarely linear-triangular, (0.4–) 0.5–1  $\times$  0.1–0.2 mm, acute to pointed, flat and without revolute margins, glabrous except for some marginal cilia proximally; *additional bracts* 2 or 3 (–6), leaf-like

and with  $\pm$  developed revolute margins but shorter than cauline leaves, all towards the base of stalk. *Calyx lobes* unequal; *outer calyx lobes* narrowly elliptic, (4.1–) 5–6 (–7.4)  $\times$  1.8–2.6 mm, acute to pointed, with scarcely visible ridge, outer surface and inner surface glabrous; *inner calyx lobes* broadly elliptic, (4–) 5–6 (–7.2)  $\times$  2.2–2.8 mm, obtuse to rounded, without obvious ridge, outer surface and inner surface glabrous. *Petals* broadly obovate, 7.2–9.5 mm long, shallowly bilobed. *Stamens* 6 (–8) in a dense erect cluster to one side of the ovaries; *filaments* 0.4–0.7 mm long,  $\pm$  basally connate; *anthers* broadly oblong, 1.6–2 mm long, with usually 2 inner ones often longer, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovate but distinctly laterally compressed, each with 4–6 ovules, glabrous including on the crest; *styles* horizontally attached to the lateral outer side of ovaries and then curved down, out, and upwards on both sides of the stamens, positioning stigmas above the anthers. *Fruits* on straight to scarcely curved stalk. *Seeds* obliquely obovoid and laterally compressed, 1.3–1.4  $\times$  1.6–1.8 mm, dark brown; *aril* with fleshy attachment surmounted by an undulating membranous cup covering at least the lower third of the seed.

**Distribution and ecology.** Grows often on hill tops among granite rocks in *Eucalyptus dealbata* and *Angophora floribunda* forest (*J. Armstrong 691*) in south-eastern Queensland (Dd) and north-eastern New South Wales (NWS, NT).

**Phenology.** Flowering recorded for Mar., June, Aug. and Nov.

**Conservation status.** Recorded from Single N.P.

**Diagnostic features.** The leaves of *H. leiocarpa* resemble smaller leaves of *H. rigens* by their usually  $\pm$  truncate base and verruculose surface, but the new species differs by its thread-like flower stalks and completely glabrous calyx, as well as an ovary with laterally attached styles. It also resembles *H. parvifolia*, but is distinguished by its completely glabrous ovaries, as well as being usually a low spreading shrublet.

Some forms of *H. leiocarpa*, especially young fast-growing branches, have much more slender leaves (e.g. *J. Armstrong 691*), which resemble those of *H. filifolia*, but they are typically abruptly constricted into a very short petiole; in addition, *H. filifolia* has 4 stamens per flower.

**Variation.** Although the main stems are usually also rigid-woody, similar to *H. rigens*, the lateral branches of *H. leiocarpa* are much finer and the whole plant tends to be decumbent rather than erect-spreading.

The leaves, especially young leaves, vary greatly, not only in length but also in width, because the revolute margins are so strongly inrolled that the central vein is at times almost covered (e.g. *J. Armstrong 691*, *A. Macpherson BRI9938*).

The length of the calyx lobes also varies greatly and is apparently quite unrelated to further elongation when fruiting, as the calyx is also distinctly accrescent in this species.

Although the specimen *J.B. Williams NE52403A* has a distinctly woody main stem, it must be identified as *H. leiocarpa* and not as *H. parvifolia*, because of glabrous ovaries and leaf-like additional bracts.

**Etymology.** The epithet *leio-carpa*, Latinised Greek, “smooth-fruited”, referring to the completely glabrous ovaries and the resulting fruit of this species.

### **Specimens examined**

QUEENSLAND. Portion 87, Stalling Lane, 15.7 km SW Stanthorpe, 29 Nov. 1994, *D. Halford Q2306* (BRI); Stanthorpe, *s.dat.*, *C.T. White 9399* (BRI); Balladean, 14 Oct. 1933, *A. Macpherson s.n.* (BRI AQ180800A & B).

NEW SOUTH WALES. 3.2 km E Howell, 28 Nov. 1973, *J. Armstrong 691* (NSW); near Ebor, Oct. 1987, *R. Bates 11568* (AD); c. 10 mls [16 km] from Tingha, 1 Nov. 1929, *W.F. Blakely, E.N. McKie & T. Youman s.n.* (CANB, NSW102292); Howell, June 1904, *J.L. Boorman s.n.* (NSW102293); Tingha, Oct. 1903, *R.H. Cambage s.n.* (NSW102295); 500 m N of Single N.P., 27 Oct. 1999, *L.M. Copeland & N.E. Noble 1952* (NE); Howell, 13 mls [20.8 km] W Tingha, 21 Sep. 1966, *D.J. McGillivray 2460* (NSW); Howell, Aug. 1905, *J.H. Maiden & J.L. Boorman s.n.* (NSW1102294); MacIntyre Falls, 2 June 1998, *J. Paul 18 et al.* (AD, CANB); 27 km WNW Wandsworth on rd to Tingha, 18 Oct. 1989, *H.R. Toelken 7059* (AD, NSW); New England, *s.dat.*, *C. Stuart s.n.* (MEL31427); 32 km W Bundora on Bingara Rd, Apr. 1977, *H.J. Wissmann NE35470* (NE); Howell, Nov. 1966, *J.B. Williams NE52403A* (NE).

### ***Hibbertia lignescens* Toelken, sp. nov.**

*H. minysanthae similis sed ramis rigide lignosis, calicibus 5.2–5.5 mm longis, staminibus 6 vel 7, et antheris 2–2.2 mm longis differt.*

**Holotypus:** New South Wales (NC), 0.5 km N turnoff to Kungala on Grafton–Glenreagh Rd, 23 Oct. 1989, *H.R. Toelken 7997* (NSW). **Isotypi:** AD290147, BRI, CANB, K, MEL, PERTH.

Shrubs 0.5 m tall with erect, much branched habit; branches becoming rigid-woody, with often indistinct ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* consists of short straight erect hairs restricted to sparse intrapetiolar tufts and on the ovaries, while the calyx lobes are ± covered with often recurved hooked simple hairs. *Leaves* with sparse intrapetiolar tufts of few straight simple hairs c. 0.3 mm long and not laterally spreading along the sides of the decurrent leaf bases; *petiole* 0.3–0.5 mm long, glabrous; *lamina* linear, (3.8–) 7–11 (–17.7) × 0.6–1.1 mm, ± abruptly constricted into petiole, with short awn to 0.4 mm long topped by a minute transparent point, adaxially slightly convex, glabrous, smooth to minutely verruculose, but with scattered tubercles (no hairs observed) along the

flanks of the revolute margins, abaxially with recessed central vein up to twice as broad as the tightly abutting revolute margins without displaying the undersurface but often showing rows of teeth between them, smooth except for scattered tubercles on the revolute margins, as adaxially. *Flowers* stalked, single, terminal on major distal branches but on axillary branches often with scarcely reduced leaves; *flower stalk* (3.2–) 6.3–8.4 mm long; *buds* ellipsoidal; *primary bract* ± subtending the calyx, linear to linear-triangular, 0.5–0.8 (–1.6) × c. 0.2 mm, pointed, flat and without revolute margins, with minute hooked simple hairs mainly along the margins; *additional bracts* 3 or 4, leaf-like, but shorter than cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* elliptic-lanceolate to elliptic, 5.2–5.4 × 1.5–1.8 mm, acute, scarcely ridged, outer surface with scattered, erect to recurved hooked hairs (denser proximally), inner surface glabrous; *inner calyx lobes* linear-elliptic to elliptic-obovate, 5.3–5.5 × 2.6–3 mm, obtuse to rounded, with indistinct central ridge, outer surface with few scattered erect to recurved hooked hairs mainly along the central ridge and finely tuberculate laterally beside the glabrous membranous margins, inner surface glabrous. *Petals* broadly obovate, 4.7–5.5 (–6.3) mm long, shallowly bilobed. *Stamens* 6 or 7 in an erect cluster to one side of the ovaries; *filaments* 0.9–1.1 mm long, scarcely connate basally; *anthers* narrowly oblong, (1.9–) 2–2.2 mm long, subequal or central one slightly longer, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* oblong-obovoid but slightly laterally constricted, each with 4 ovules, puberulous to pilose with erect straight simple hairs but a glabrous crest; *styles* horizontally attached to upper outer side of the ovaries, then spreading sideways and upwards outer the stamens, positioning the stigmas above the anthers. *Fruits* on erect stalks. *Seeds* obovoid, 1.5–1.6 × 1.5 mm, shiny black; *aril* with fleshy attachment surmounted by an almost entire, membranous cup covering the lower third of the seed.

**Distribution and ecology.** “On sandstone hill in dry sclerophyll forest with *Eucalyptus pyrocarpa* and *E. baileyana*” in north-eastern New South Wales (NC).

**Phenology.** Flowering in Sep., Oct.

**Conservation status.** Unknown.

**Diagnostic features.** While *H. lignescens* is similar to *H. minysantha*, it is distinguished by its shrubby habit with stiff-woody branches, larger flowers with flowering calyx lobes 5.2–5.5 mm long, and 6 or 7 stamens per flower, each with anthers 2–2.2 mm long. It is also significant that the crests of the ovaries in *H. lignescens* are glabrous, while they are erect-pilose in *H. minysantha*.

**Etymology.** The epithet *lignescens*, Latin, “becoming woody”, refers to the branches of this species, which become rigid-woody.

**Specimens examined**

NEW SOUTH WALES. 8 km N of Glenreagh, 12 Sep. 1974, *J.B. Williams s.n.* (NE42136A, NSW); 8 km N of Glenreagh, 12 Sep. 1974, *J.B. Williams s.n.* (NE42147A, NSW).

***Hibbertia minima* Toelken, sp. nov.**

*H. surculari similis sed cum pilis in ovariis, in foliis et in apice lobis calycorum externorum differt.*

**Holotypus:** Queensland (Mo), 'Mudjimba Environmental Park', 6 Jan. 1998, *G. Leiper s.n.* (BRI AQ659349).

Shrublet with slender, spreading, little-branched branches; branches filiform, with scarcely raised ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* of straight simple hairs in the intrapetiolar tufts and on the ovaries, and non-persistent minute straight simple hairs on young leaves and upper outer surface of the outer calyx lobes. *Leaves* with sparse intrapetiolar tufts of straight simple hairs c. 0.2 mm long but usually unequally long and not spreading laterally along the decurrent leaf bases; *petiole* 0.2–0.3 mm long, glabrous; *lamina* linear, (3.3–) 4.5–8 (–9.7) × 0.5–0.7 mm, gradually constricted into petiole, with short brown awn c. 0.2 mm long and covered with many minute straight simple hairs, adaxially ± flat with slight depression above the central vein, puberulous to glabrescent with minute antrorsely spreading straight simple hairs with sunken tubercles, abaxially with flush central vein up to twice broader than the tightly abutting revolute margins without displaying the undersurface or rows of fine teeth between them, glabrescent with few to no straight simple hairs as adaxially. *Flowers* sessile, terminal on major branches; *flower stalk* absent; *buds* narrowly ellipsoidal to almost cylindrical; *primary bract* linear-triangular, 2.1–2.4 × 0.2–0.4 mm, acute, lacking obvious central vein or revolute margins, glabrous; *additional bracts* 2 or 3, leaf-like, but much shorter than cauline leaves. *Calyx lobes* unequal to subequal; *outer calyx lobes* linear-lanceolate, 3.2–3.4 × 1–1.2 mm, pointed, without distinct central ridge, outer surface glabrous except for scattered spreading straight simple hairs at the apex, inner surface glabrous; *inner calyx lobes* narrowly elliptic-ovate, 3.1–3.3 × 1.2–1.5 mm, pointed, with indistinct central ridge, outer surface and inner surface glabrous. *Petals* obovate-cuneate, 2.5–3.2 mm long, emarginate to entire. *Stamens* 4 in an erect cluster to one side of the ovaries; *filaments* 0.8–0.9 mm long, with lower third connate; *anthers* linear-oblong, 0.7–0.8 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 1 basal ovule, puberulous to pubescent but with glabrous crest and with erect straight simple hairs; *styles* horizontally attached to the upper outer surface of the ovaries, then curved outwards and upwards on both sides of the stamens, positioning the stigmas just above the apex of the anthers. *Fruits* sessile on erect stalks. *Seeds* not seen.

**Distribution and ecology.** Growing on sand under *Melaleuca quinquenervia*, *Hibbertia vestita* and grasses in south-eastern Queensland (Mo).

**Phenology.** Flowering in Jan.

**Conservation status.** Recorded from Maroochy River C.P. near Mudjumba Beach.

**Diagnostic features.** Specimens of *H. minima* resemble those of *H. surcularis* closely because of their little-branched, thread-like branches, but *H. minima* is distinguished by hairy ovaries and fine hairs on the leaves and on the apex of the outer calyx lobes.

**Etymology.** The epithet *minima*, Latin, "smallest" refers to the very small flowers of the species.

**Specimen examined**

QUEENSLAND. 2 km NW of Mt Emu, along Mt Emu Rd, 6 May 1993, *D. Halford Q1683* (BRI).

***Hibbertia minysantha* Toelken, sp. nov.**

*H. lignescens similis sed floribus parvioribus, 2–4 stamibus et antheris 0.5–0.6 mm longis; a H. aciculari 2–4 stamibus antheris 0.5–0.6 mm longis et filamentis connatis ad basim; a H. filifolia calycibus et ovariis puberulis vel pilosis differt.*

**Holotypus:** Queensland (Wb), near Noosa Heads, 13 Oct. 1970, *R.D. Hoogland 11793* (CANB204590).

**Isotypi:** CANB204591, CANB204592; BRI, NSW, K, L, *n.v.*

*Hibbertia acicularis* auctt. non (Labill.) F.Muell.: F.Muell., *Pl. Victoria* 1 (1862), *p.p.*, as for Moreton Isl. (MEL31430); Benth., *Fl. Austral.* 1: 29 (1863), *p.p.*; F.Muell., *Syst. Census Austral. Pl.* 1: 2 (1882), *p.p.*; F.M.Bailey, *Syn. Queensl. Fl.* 4 (1883), *p.p.*; F.Muell., *Sec. Syst. Census Austral. Pl.* 1: 1 (1889), *p.p.*; Gilg, *Nat. Pflanzenfam.* 3, 6: 120 (1893), *p.p.*; F.M.Bailey, *Queensl. Fl.* 1: 14 (1899), *p.p.*; F.M.Bailey, *Compr. Cat. Queensland Pl.* 21 (1913), *p.p.*; T.Stanley in T.Stanley & E.Ross, *Fl. S.E. Queensland* 1:188 (1983), *p.p.*, as for coastal specimens.

*Hibbertia* sp. (Coolum Beach P.R.Sharpe 2314) S.T.Reynolds in R.J.F.Hend., *Queensl. Pl. Names Distribution* 65 (1997). — *Hibbertia* sp. Coolum Beach (P.R. Sharpe 2314) Qld Herbarium, *Austral. Pl. Cens.* [online; <https://biodiversity.org.au/nsl/services/search/taxonomy>] (2011).

Shrublets, c. 0.2 m tall, with decumbent-spreading branches from woody rootstock; branches mainly wiry and with ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* absent except for sparse intrapetiolar bristles in axils of distal leaves and sometimes short terminal tufts of straight simple hairs on young leaves, bracts and calyx, and scattered hooked simple hairs on the outer surface of calyx lobes. *Leaves* with or without sparse short intrapetiolar bristles rarely in tufts 0.2–0.3 mm long and mainly towards

the margins of the petiole; *petiole* 0.2–0.5 (–0.9) mm long, ± dorsiventrally compressed, glabrous; *lamina* linear, (3.4–) 6–10 (–27.3) × 0.5–0.6 (–0.7) mm, scarcely constricted into petiole, tapering into terminal transparent awn, 0.1–0.2 mm long, and often with a few terminal hairs on young leaves but wearing off soon, adaxially ± flat or slightly convex, with strongly revolute glabrous margins, abaxially with flush to recessed central vein usually up to twice as broad as the tightly abutting revolute margins without displaying the undersurface or rows of teeth between them, glabrous except for occasional retained terminal tuft. *Flowers* stalked, terminal and mainly axillary along distal main branches; *flower stalk* (2.5–) 3–8 (–15.4) mm long; *buds* narrowly ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 1.1–1.3 × 0.1–0.2 mm, acute and often with short terminal bristle, without revolute margins, glabrous, rarely with some marginal hooked hairs; *additional bracts* 0–2 (–4), at base of stalk, usually scale-like and grading into prophylls, rarely grading to reduced leaves with ± revolute margins, glabrous. *Calyx lobes* unequal; *outer calyx lobes* narrowly oblong to oblong-elliptic, 3.0–3.3 (–3.5) × 1.2–1.4 (–1.5) mm, acute and usually with terminal tuft of straight simple hairs, without obvious central ridge, outer surface hirsute with ± densely scattered hooked hairs, inner surface glabrous; *inner calyx lobes* usually broadly oblong-elliptic, (2.8–) 3.0–3.3 × 1.3–1.5 mm, abruptly constricted into shortly acute apex or cuspidate, without obvious central ridge, outer surface with few hooked simple hairs along the centre, rarely glabrous, inner surface glabrous. *Petals* narrowly oblanceolate to oblong-oblanceolate, 2.5–3.5 (–3.8) mm long, deeply emarginate to shallowly bilobed. *Stamens* (2) 3 or 4 in an erect cluster to one side of the ovaries; *filaments* 0.8–1 mm long, basally connate; *anthers* broadly oblong, 0.5–0.6 mm long, subequal, ± incurved, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but slightly laterally compressed, each with 2 ovules, puberulous to pilose with ± scattered erect straight simple hairs particularly towards the apex and on the crest; *styles* horizontally attached to upper outer edge of ovaries, then ± curved back and outwards before straightening to erect on either side of the stamens, positioning the fine stigmas well above the apex of the anthers. *Fruit* on recurved stalk. *Seed* obovoid to almost spherical but slightly laterally compressed, 1.8 × 1.6 mm, dark brown; *aril* with fleshy attachment surmounted by membranous cup covering one-third to half of the base of the seed.

**Distribution and ecology.** Grows in low heath or sclerophyll scrub on present and old coastal sand dunes in south-eastern Queensland (Wb, Mo) and north-eastern New South Wales (NC).

**Phenology.** Flowering in Dec.

**Conservation status.** Recorded from Woodgate, Great Sandy N.P. and Noosa N.P.

**Diagnostic features.** The 3 or 4 stamens per flower with basally connate filaments resemble the arrangement of stamens in flowers of the *H. rufa* subgroup, but the primary bract of *H. minysantha* is unusual for this group of species as it clasps the calyx although the flowers are stalked, and in addition the slender leaf laminae are awned more like in species of *H. acicularis* subgroup. The similar *H. filifolia* from the granitic substrates of central southern Queensland (Dd) has similar slender leaves, but differs by the absence of the transparent terminal awns, and, most importantly, by a completely glabrous calyx, as well as the slender anthers, 1.5–1.9 mm long. Very small flowers are also recorded for *H. minima*, but it differs from *H. minysantha* by sessile flowers and a glabrous crest above the pubescent ovary.

**Variation.** Most flowers are terminal on short axillary short-shoots with rarely more than 2–4 often reduced leaves (additional bracts), which are usually caducous, i.e. only scars at the base of the stalk bear reference to their existence. Sometimes these leaves are bract-like (e.g. *C.T. White 12245*), but then also the flower stalk is very short. However, the leaf scars below the flowers at successive nodes indicate single terminal flowers.

**Etymology.** The epithet *minys-antha*, Latinised Greek, “small-flowered”, refers to the very small flowers of this species.

#### Specimens examined

QUEENSLAND. Wide Bay Military Training Area, 22 Sep. 1980, *L.G. Adams 3598* (BRI, CANB); Bribie Isl., 16 Sep. 1934, *S.T. Blake 7054* (BRI); Bribie Isl., 18 Sep. 1938, *S.T. Blake 13851* (BRI, CANB, NSW); North Stradbroke Isl., 30 Aug. 1969, *R.G. Coveny 2007* (NSW); Moreton Isl., Blue Lagoon, 27 Mar. 1973, *L. Durrington 179* (BRI); 1 km W Poona Pt, 20 Oct. 1993, *P.I. Forster 13917* & *G. Smyrell* (AD, BRI); Orchid Beach township, Fraser Isl., 2 Sep. 2004, *P.I. Forster 30184* (AD, BRI); Fraser Isl., 5 km WNW Orchid Beach, 4 Sep. 2004, *P.I. Forster 30254* (AD); Burrum Heads Rd, Sep. 1965, *C.H. Gittins 1120* (BRI, NSW); Cooloola, 4 Sep. 1971, *A.G. Harrold 103* (BRI); Stradbroke Isl., 8 Oct. 1960, *H.S. McKee sub S.T. Blake 7378* (CANB, NSW); Moreton Isl., Aug. 1855, *F. Mueller s.n.* (MEL31430); Woodgate N.P., *s.dat.*, *J. Randall 401* (BRI); Bribie Isl., 29 Sep. 1984, *A.J. Self 12* (BRI); Noosa, 2 Sep. 1985, *P.R. Sharpe 3864* (BRI); Noosa, 8 Sep. 1985, *P.R. Sharpe 3947* & *G. Batianoff* (BRI, NSW); near Cape Moreton, 1890, *J. Shirley s.n.* (MEL31426); Moreton Isl., *s.dat.*, *J.H. Simmonds s.n.* (BRI180320); Fraser Isl., 15 Aug. 1971, *D.A. Smith 36* (BRI); Coolool Research Station, 9–11 Nov. 1964, *L.S. Smith* & *E.M.P. Knowles 12223* (BRI); on bank of Teewah Ck along Cooloola Way, 12 Nov. 1993, *H.R. Toelken 8489* (AD, BRI, CANB, MEL, NSW); Tin Can Bay, 11 Sep. 1943, *C.T. White 12245* (BRI, CANB).

NEW SOUTH WALES. Ballina, Aug. 1891, *W. Bäuerlen 431* (NSW); Ballina, Aug. 1891, *W. Bäuerlen 456* (NSW); Byron Bay, 13 Sep. 1970, *C. Bell 107* (BRI); Stockyard Ck, Cooldale Rd, Oct. 1909, *J.L. Boorman s.n.* (NSW102300); South West Rocks, 3 Jan. 1967, *R.G. Coveny s.n.* (NSW102319); Hungry Head, 6 Jan. 1958, *C.K. Ingram s.n.* (NSW102323); Minnie Waters, electricity easement next to

Illaroo Restarea Rd/Minnie Waters Rd, *R. Miller AD54* (AD, BRI, CANB, NSW); Tweed R., 1911, *J.H. Simmonds s.n.* (BRI, NSW102324); 10 km NW Iluka, 7 Sep. 1967, *J.B. Williams s.n.* (NE30412A).

***Hibbertia nematophylla* Toelken, sp. nov.**

*A H. aciculari ramis et foliis firme filiformibus et expansis, et seminibus oblongatis differt.*

**Holotypus:** New South Wales (CT), S of Old Bathurst Road, 13 Oct. 2022, *R.T. & J. Miller 13.10.2022 – 04* (NSW). **Isotypus:** AD290151.

Shrublets to 0.5 m tall when supported, decumbent to trailing, sparsely branched; branches thread-like, wiry, but firming progressively and to 70 cm long, with ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* glabrescent to absent or comprising a few hooked simple hairs on the flanks of the margins of the leaves and primary bracts, but wearing off almost instantly, scattered hooked hairs on the outer surface of the calyx lobes, with distinct intrapetiolar tufts of straight simple hairs and pubescent ovaries with glabrous crests. *Leaves* with stiffly erect intrapetiolar tufts of straight simple hairs to 0.5 mm long and slightly laterally spreading to the groove between the leaf base; *petiole* 0–0.4 mm long, indistinct, glabrous; *lamina* linear to thread-like, (5.4–) 9–14 (–18.6) × 0.3–0.5 mm, abruptly constricted into the petiole, pointed with a transparent awn to 0.7 mm long, spreading almost at right angles to the branches, adaxially slightly convex with a faint depression above the central vein, glabrescent with few scattered hooked simple hairs mainly along the margins, but wearing off almost immediately and remaining faintly tuberculate, abaxially with a recessed central vein slightly broader than the abutting revolute margins rarely exposing the finely fascicled-tomentose undersurface but commonly with rows of teeth on opposite surfaces, outer surface glabrous except for the occasional hooked simple hair on the revolute margins. *Flowers* single, stalked, terminal on terminal and lateral branches with additional short-shoots terminating in a flower forming often terminal groups; *flower stalk* 4.5–10.7 mm long; *buds* slender-ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 1.2–1.5 × c. 0.2 mm, awned, flat to incurved, with minute hooked simple hairs mainly along the margins; *additional bracts* 2 or 3 (–5) at base of stalk, similar in shape and size to the primary bract. *Calyx lobes* unequal; *outer calyx lobes* ovate, 3.8–4.3 × 1.4–1.7 mm, pointed, without raised central ridge, outer surface with few to many scattered tuberculate hooked simple hairs, inner surface glabrous; *inner calyx lobes* broadly ellipsoidal to obovoid-ellipsoidal, 3.8–4.4 × 2.4–3.2 mm, obtuse to rounded or mucronate, without raised central ridge, outer surface with few minute hooked simple hairs along the narrow central strip surrounded by broad glabrous membranous margins, inner surface glabrous. *Petals* broadly obovate, 8.4–10.2 mm long, with rounded to emarginate apex. *Stamens* 6 or 7 (8) in an erect cluster to one side of the

ovaries; *filaments* 0.5–0.7 mm long, scarcely connate basally; *anthers* oblong, 1.9–2.2 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovate, each with 1 or 2 ovules, pubescent but with glabrous crest; *styles* often red, horizontally attached to the outer apex of the ovaries, then spreading outward and upwards along the stamen cluster to position the stigmas well above the anthers. *Fruits* on spreading stalks. *Seeds* oblong, 1.8–2 × 0.8–0.9 mm, pale brown; *aril* with slightly fleshy attachment surmounted by a ± entire membranous one-sided cup covering ± one third of one side of one end of the seed.

**Distribution and ecology.** Growing on skeletal sandy soil with gravelly sandstone or rocks in eucalypt woodland with scattered shrubs of *Grevillea phyllicoides*, *Patersonia sericea*, *Caustis flexuosa* and *Anisopogon avenaceus* in the central-eastern New South Wales (CT, CC).

**Phenology.** Flowering in Aug.–Dec.

**Conservation status.** Described as infrequent to rare with occasional scattered plants often associated with rock outcrops.

**Diagnostic features.** Similar to *H. acicularis* but with firm thread-like branches, leaves spreading at about right angles to the branches, and oblong seeds with the aril attached to one side.

**Variation.** Collectors (*R.T. & J. Miller 31 Aug. 2022 – 01-07*) have commented on flowers with red styles from Martins Lookout Trail, Springwood, but this seems a more widespread phenomenon based on the maturity of the flowers according to observations on herbarium material. Similarly, the records from Major Mitchell Res., Blaxland, of maroon-coloured tubercles below the hooked simple hairs on the similarly ± maroon-coloured outer of the calyx lobes are a variable feature on live material.

**Etymology.** The epithet *nemato-phylla*, Latinised Greek, “thread-like leaves” refers to the long narrow leaves.

**Specimens examined**

NEW SOUTH WALES. Winmalee, 29 Apr. 2021, *M.J. Baker H5(i), H5(ii) & H5(iii)* (AD, NSW); Major Mitchell Res., Blaxland, *R.T. & J. Miller, P. Rossington 31.8.2022 – 08-12* (AD, NSW); Major Mitchell Res., Blaxland, *R.T. & J. Miller 13.10.2022 – 01-03 & 05-09* (AD, NSW); c. 0.4 km S along Martins Lookout Trail from end of Farm Rd, Springwood, *R.T. & J. Miller 31.8.2022* (AD, NSW); Martins Lookout Trail at junction with easterly fire trl, Springwood, *R.T. & J. Miller 31.8.2022 – 03, 04* (AD, NSW); near end of Martins Lookout Trail before Lookout Trail carport, Springwood, *R.T. & J. Miller 31.8.2022* (AD, NSW); W of corner Jockbet St and Wiltshire Rd, Agnes Banks, 6 May 2022, *M. Sullivan M7 & M8* (AD).

***Hibbertia nudicalycina* Toelken, sp. nov.**

*H. confertae similis sed floribus peduncularibus et stylis horizontaliter afixis ad ovaria differt.*

**Holotypus:** New South Wales (CT), W side of unsealed Kings Tableland Rd, 15.5 km S of junction with Great Western Hwy, 27 Oct. 2001, *J.W. Horn 4242* (NSW854224). **Isotypi:** AD294000; CANB, DUKE, MEL, *n.v.*

Shrublets with short, much-branched spreading branches from a woody base; branches wiry becoming ± rigid-woody, with slight ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* restricted to intrapetiolar tufts and puberulous ovaries but fine tubercles scattered over the leaf surfaces occasionally have very short straight simple hairs on lower flanks. *Leaves* with bristly intrapetiolar tufts of straight simple hairs 0.4–0.6 mm long and laterally spreading on either side of the decurrent leaf bases; *petiole* 0.2–0.4 mm long, glabrous; *lamina* linear-triangular, rarely linear, (3.6–) 4.5–6.5 (–8.6) × 0.5–0.8 mm, gradually constricted into petiole but becoming more abrupt on mature leaves, pointed with awn, 0.3–0.5 mm long, ending in a transparent point when young, adaxially ± flat, covered with scattered aculeate tubercles rarely with very short antrorse spreading hairs on proximal flanks of juvenile leaves, abaxially with slightly recessed central vein often more than twice broader than the tightly abutting revolute margins without displaying the undersurface but often with rows of teeth on their margins, finely tuberculate as adaxially. *Flowers* stalked, terminal on major branches and on short axillary branches; *flower stalk* 4.7–8.2 mm long; *buds* ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 0.7–0.9 × c. 0.15 mm, pointed, without revolute margins, glabrous; *additional bracts* 2–3, at base of stalk, leaf-like, with ± recurved margins, shorter than cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* lanceolate-elliptic, 4.6–5 × 1.3–1.6 mm, pointed, with indistinct central ridge, outer and inner surface glabrous; *inner calyx lobes* oblong-elliptic, 4.7–5.1 × 2.1–2.6 mm, obtuse to rounded, with indistinct central ridge, outer and inner surface glabrous. *Petals* obovate-cuneate, 4.1–4.6 mm long, emarginate to shallowly bilobed. *Stamens* 7 in an erect cluster to one side of the ovaries; *filaments* 0.7–0.9 mm long, scarcely connate basally; *anthers* oblong, 1.6–2 mm long, outer one shorter, erect to slightly incurved, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 2 ovules, puberulous, rarely glabrous, with erect straight simple hairs particularly towards the base and scattered to absent on the crest; *styles* horizontally attached to the upper outer side of the ovaries, then straight-erect in front of the stamens, positioning the stigmas above the anthers. *Fruits* on erect stalk. *Seeds* not seen.

**Distribution.** Grows on yellow sand on roadside sandstone ridge with heath-like vegetation dominated by *Banksia*, *Calytrix*, *Grevillea*, *Isopogon*, papilionoid legumes and *Boronia* (*J.W. Horn 4242*), recorded from central and north-eastern New South Wales (CT, NT).

**Phenology.** Flowering in Nov.

**Conservation status.** Occurs possibly in Mount Kaputar N.P. (close to *C.H. Cambage 2343*) and Goulbourn River N.P. (close to *M. Sherring et al. s.n.*), N.S.W.

**Diagnostic features.** Specimens of *H. nudicalycina* resemble those of *H. parvifolia* but are distinguished by their gradually constricted leaf lamina into the petiole, and especially by the much smaller, unicellular aculeate tubercles of the leaves, while they are irregularly shaped and multicellular on leaves of the latter species. *Hibbertia nematophylla* differs from *H. nudicalycina* by hooked simple hairs on the outer of the calyx lobes, longer and narrower leaves and by the presence of additional bracts similar to the primary bract at the base of the stalk.

Although *H. rasilis* seems to be a much more robust plant, it closely resembles *H. nudicalycina* by its almost complete absence of hairs and seven stamens per flower, but the new species is distinguished by its almost truncate bases of adult leaves, by laterally spreading intrapetiolar tufts on both sides of the leaf bases, and by the ovary being sparsely covered with straight simple hairs, particularly at its base.

**Variation.** A specimen from Lees Pinch (*M. Sherring et al. s.n.*) broadly agrees with *H. nudicalycina* but the ovaries are quite glabrous.

**Etymology.** The epithet *nudi-calycina*, Latin, “naked-calyx” refers to the absence of hairs on the outer and inner surfaces of the calyx.

***Specimens examined***

NEW SOUTH WALES. Mt Lindesay Station, Nandewar Mnts, 4 Nov. 1909, *R.H. Cambage 2343* (NSW102297); Lees Pinch, 5 Sep. 2000, *M. Sherring s.n.*, *R.G. Coveny, A.E. Orme & G. Towler* (AD155860; NSW, *n.v.*).

***Hibbertia obtusibracteata* Toelken**

*J. Adelaide. Bot. Gard.* 16: 67, fig. 2A–C (1995). —

**Holotype:** South Australia (KI), Branch Creek Road, 2 Nov. 1986, *R. Bates 7651* (AD98649363). **Isotype:** CANB, G, K, MEL, MO.

*Hibbertia acicularis auct. non* (Labill.) F.Muell.: Jessop in Jessop & Toelken (eds), *Fl. S. Austral.* 1: 354 (1986).

Shrublets spreading-decumbent to erect, rarely to 0.5 m tall, much-branched; major branches rigid-woody, with faint ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* absent even without intrapetiolar tufts, but with scattered paler tubercles on leaves, especially on the flanks of the revolute margins but also seen occasionally on young branches. *Leaves* without intrapetiolar tufts of straight simple hairs; *petiole* 0.1–0.2 (–0.3) mm long, glabrous; *lamina* linear to linear-triangular, (2–) 2.5–4.5 (–5.6) × 0.3–0.6 (–0.75) mm, ± abruptly constricted into petiole and often with truncate

bases, pointed with awn to 0.2 mm long and transparent at apex but wearing off soon, adaxially  $\pm$  convex, glabrous and minutely tuberculate, abaxially with  $\pm$  recessed central vein at the base often more than twice broader, but distally  $\pm$  as broad as the tightly abutting revolute margins, without displaying the undersurface or rows of teeth on the margins of both, with revolute margins with scattered minute paler tubercles as adaxially. *Flowers* stalked, terminal on short short-shoots in terminal or commonly in axillary position on distal branches; *flower stalk* (2.2–) 4.4–12.5 (–19.5) mm long; *buds*  $\pm$  broadly ellipsoidal; *primary bract* below the middle of the stalk, broadly oblong, elliptic to obovate, rarely spatulate, 1.3–1.7  $\times$  0.2–0.35 mm, with obtuse to commonly rounded apex, scale-like and without revolute margins, glabrous; *additional bracts* 0–2 (3), at base of stalk, grading into primary bract(s), scale-like, glabrous, subtended by usually 2 leaf-like small prophylls with  $\pm$  well-developed revolute margins, usually obtuse and with or without terminal point. *Calyx lobes* unequal to subequal; *outer calyx lobes* lanceolate to lanceolate-elliptic, 4–4.3  $\times$  1.9–2.2 mm, acute, without obvious central ridge, outer and inner surface glabrous; *inner calyx lobes* broadly oblanceolate to obovate-elliptic, 3.8–4.2  $\times$  2.1–2.5 mm, obtuse to rounded, without obvious central ridge, outer and inner surface glabrous. *Petals* obovate, 4.2–7 mm long, shallowly bilobed. *Stamens* (4–) 6 (7) in an erect cluster to one side of the ovaries; *filaments* 1.2–1.5 mm long, scarcely connate basally; *anthers* oblong, 1.2–1.3 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovate but slightly laterally compressed, each with 1 (2) basal ovules, glabrous including on the crest; *styles* horizontally attached to  $\pm$  the middle of the outer side of the ovaries, then curved outwards and upwards on both side of the stamens, positioning the stigmas well above the anthers. *Fruits* on erect stalks. *Seeds* narrowly, often obliquely, obovoid, 1.2  $\times$  1.6 mm, brown; *aril* with fleshy attachment surmounted by a short membranous cup covering the lower third of the seed.

**Distribution and ecology.** Growing on laterite in scrub vegetation only on Kangaroo Isl. in South Australia (KI).

**Phenology.** Flowering in Sep.–Dec.

**Conservation status.** Recorded from Flinders Chase N.P.

**Diagnostic features.** The broadly oblong to spatulate bracts (primary bracts grading into additional bracts) are scale-like, with  $\pm$  abruptly constricted to rounded apex and without revolute margins; they remain unique in the *H. acicularis* group. Some flowering short-shoots are very reduced so that they are only subtended by two leaf-like small prophylls with usually  $\pm$  developed revolute margins, as can be observed on any vegetative branching.

*Hibbertia obtusibracteata* is a completely glabrous shrub, even without intrapetiolar tufts. The clear

terminal awn on leaves wears off soon, similar to those in *H. exutiacies*, from which *H. obtusibracteata* is distinguished by stalked flowers and the broad obtuse bracts at or near the base of the flower stalk.

### Specimens examined

SOUTH AUSTRALIA. Eastern side of Hundred Line Rd, N South Coast Rd, 19 July 1996, *R. Davies* 96/112 (AD); Bomb Alley, 2.5 km S Playford Hwy, 16 Sep. 2012, *M. Habi* 1 (AD); northern corner of section 3, Hundred of Seddon, 21 Sep. 1983, *R. Davies & W. Bushman s.n.* (AD98647278); Parndana Res., 5 Oct. 1969, *G. Jackson* 629 (AD); South Coast Rd, 6 km E Vivonne Bay, 5 Sep. 1981, *G. Jackson* 1498 & 1499 (AD); bottom of Kohinoor Hill, 21 Oct. 1990, *G. Jackson* 3011 (AD); Eleanor Sands, Hundred of Newland, 19 Sep. 1962, *T.R.N. Lothian* 900c (AD); Playford Hwy, 16 Sep. 1989, *D.E. Murfet* 833 (AD); Playford Hwy, top of Kohinoor Hill, 18 Dec. 1989, *B.M. Overton* 1125 (AD); 4.4 km N West Bay intersection, 8 Nov. 1989, *A. Robinson & C. Halstead* NPK110749 (AD); Rocky R., Sep. 1908, *R.S. Rogers s.n.* (AD, NSW86698).

### *Hibbertia octandra* Toelken, *sp. nov.*

*H. taeniophyllae similis sed floribus sessilibus, octo antheris, foliis patentibus, caespitibus intrapetiolaribus pilis longis et setosis differt.*

**Holotypus:** Queensland (Bn), Cania Gorge National Park, 28 Oct. 1999, *D. Halford* Q3857A (BRI AQ492549).

Shrubs spreading, much-branched; branches wiry-woody, with ridges continuing from the leaf bases, fascicled-pubescent to -puberulous with fine tuberculate radially spreading hairs (2–5 subequal arms), also on the decurrent leaf bases, scarcely overtopped by few laterally extended intrapetiolar bristles in the groove next to the leaf bases. *Vestiture*  $\pm$  persistent, with minute radially spreading fascicled hairs on branches and calyx, with latter overtopped by few erect hooked simple hairs, while leaves are glabrescent with scattered minute tuberculate bifid and/or mainly straight simple hairs which wear off very soon. *Leaves* with bristly intrapetiolar tufts of straight simple hairs to 1.4 mm long, sparsely spreading laterally along the sides of the leaf bases; *petiole* 0.2–0.5 mm long, pubescent with bifid and/or straight simple hairs; *lamina* narrowly linear, (8.3–) 10–16 (–35.6)  $\times$  0.4–0.6 (–0.7) mm, scarcely constricted into petiole, pointed with short pointed apex, c. 0.3 mm long, turning brown soon, adaxially convex, glabrescent with minute tuberculate, antrorsely spreading straight simple, rarely bifid hairs more common proximally, wearing off almost immediately but retaining pale tubercles, abaxially with recessed central vein rarely to twice as broad as the  $\pm$  tightly abutting revolute margins with minutely fascicled-tomentose undersurface rarely visible but often with rows of minute teeth between them, outer surface glabrescent as adaxially. *Flowers* sessile, single or a second axillary flower developing close below, terminal on short axillary short-shoots on major branches; *flower*

*stalk* absent; *buds* broadly ovoid to almost spherical; *primary bract* linear-triangular, 1–1.3 × c. 0.2 mm, pointed, without revolute margins, clasping the calyx, glabrescent with minute, antrorsely and radially spreading hairs (1–3 subequal arms), grading into 2 or 3 *additional bracts* on axillary short-shoots, minute, leaf-like and recurved, often caducous. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 4.4–4.6 × 1.5–1.8 mm, pointed, with faint central ridge but obviously broadened proximally, outer surface puberulous to glabrescent, with minute scattered tuberculate bifid hairs overtopped by few scattered short erect hooked simple hairs mainly proximally, inner surface puberulous with minute antrorsely appressed fine bifid and/or straight simple hairs below the apex; *inner calyx lobes* elliptic, 4.5–4.8 × 2.8–3.3 mm, obtuse to rounded, with indistinct central ridge but broadened proximally, outer surface puberulous with minute scattered tuberculate somewhat antrorsely and radially spreading fascicled hairs (2–4 subequal arms) mainly along the central ridge and becoming smaller and disappearing altogether on the glabrous membranous margins, rarely overtopped by occasional erect hooked simple hairs, inner surface with few minute antrorsely appressed straight simple hairs below the apex. *Petals* not seen. *Stamens* 8 (single specimen), in an erect cluster to one side of the ovaries; *filaments* 0.7–0.8 mm long, scarcely connate basally; *anthers* oblong, 1.3–1.5 mm long, with slightly smaller outer ones, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 2 basal ovules, puberulous with fine vertical bifid and/or straight simple hairs but with short glabrous crest; *styles* vertically attached to the outer apex of the ovaries, then straight erect on ± both sides of the stamens, positioning the stigmas above the anthers. *Fruits* subsessile, erect. *Seeds* not seen.

**Distribution and ecology.** Grows in south-eastern Queensland (Bn) on sandy talus slope below a cliff line covered with open eucalypt forest with a dense shrubby understorey. The species is only known from the type specimen.

**Phenology.** Flowering in Oct.

**Conservation status.** Recorded from Cania Gorge N.P.

**Diagnostic features.** The long slender leaves with usually bifid tuberculate hairs of *H. octandra* resemble those of *H. taeniophylla*, which differs by stalked flowers with 10 stamens and very short intrapetiolar hairs. The combination of very long slender leaves spreading at about right angles to the branches, as well as the broadly ellipsoidal to almost spherical flower buds with 8 stamens identify *H. octandra*.

**Etymology.** The epithet *oct-andra*, Latinised Greek, “eight males (stamens)” refers to the number of stamens per flower in the type specimen.

***Hibbertia parvifolia* Toelken, sp. nov.**

*H. rigenti similis sed calycibus glabris, bracteis additionalibus squamiformibus et stylis afixis circiter in mediis ovariorum; a H. leiocarpa ovarii pubescentibus, bracteis additionalibus squamiformibus et fruticibus patentibus ramis rigidis differt.*

**Holotypus:** New South Wales (NT), top of range near Backwater, 30 Oct. 1929, W.F. Blakely, E.N. McKie & T. Bouman s.n. (NSW102305). **Isotypus:** CANB220839.

*Hibbertia acicularis* auct. non (Labill.) F.Muell.: Benth., *Fl. Austral.* 1: 29 (1863), p.p., quoad C. Stuart 185, New England, & A. Cunningham 25, Wellington Valley.

Shrubs to 1 m tall, much-branched; branches rigid-woody, with indistinct ridges in continuation of the leaf bases, glabrous. *Vestiture* absent except for the intrapetiolar tufts, minute marginal cilia on bracts, and pubescent ovaries. *Leaves* with short intrapetiolar tufts of straight simple hairs 0.2–0.3 mm long and not laterally spreading; *petiole* 0.2–0.3 mm long, glabrous; *lamina* linear-triangular or -lanceolate, (2.6–) 4–6.5 (–8.2) × 0.9–1.3 mm, abruptly constricted into petiole and with a ± truncate base, pointed with awn, 0.3–0.4 mm long, with transparent apex (rarely opaque), adaxially ± convex, moderately densely, finely verrucose without hairs at any stage, abaxially with ± recessed central vein often more than twice broader, particularly towards the base, than tightly abutting revolute margins often showing rows of teeth between them but not the undersurface, revolute margins verrucose but central vein almost smooth. *Flowers* usually shortly stalked, terminal on short short-shoots in terminal or axillary position on distal branches; *flower stalk* 3.5–8 (–14.6) mm long; *buds* ellipsoidal; *primary bract* subtending calyx, linear-triangular, 1.2–1.4 × c. 0.2 mm, pointed, without revolute margins, with minute marginal cilia; *additional bracts* 2–4, at base of stalk, scale-like and awned, with slightly revolute margins developing but rarely becoming leaf-like, grading into prophylls. *Calyx lobes* unequal; *outer calyx lobes* lanceolate-elliptic, 5.1–5.3 × 1.4–1.5 mm, pointed, with indistinct central ridge, outer and inner surface glabrous; *inner calyx lobes* ovate-elliptic, 4.7–5 × 2.6–3.1 mm, obtuse to rounded, without distinct central ridge, outer and inner surface glabrous. *Petals* cuneate-obovate, 5.4–6 mm long, scarcely bilobed. *Stamens* 6 in an erect cluster to one side of the ovaries; *filaments* 0.9–1 mm long, scarcely connate basally; *anthers* oblong, 1.8–2 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 4 ovules, sparsely pubescent with erect bifid and/or straight simple hairs but glabrous crest; *styles* horizontally attached to ± mid-outer side of the ovaries, then straight-erect, positioning the stigmas just above the anthers. *Fruits* on short erect stalks. *Seeds* not seen.

**Distribution and ecology.** Growing on clay in *Eucalyptus* woodland in New South Wales (CWS, NT).

**Phenology.** Flowering in Oct.

**Conservation status.** Unknown.

**Diagnostic features.** The much-branched plants of *H. parvifolia* resemble those of *H. rigens*, but are distinguished by their glabrous calyx and styles being attached to about the middle of the side of the ovaries. Specimens of *H. parvifolia* also resemble *H. leiocarpa*, as all three species have abruptly constricted leaf laminas into the petiole, but *H. leiocarpa* differs from the former two species by its glabrous ovaries. *Hibbertia parvifolia* is also distinguished from both the above two species by its scale-like additional bracts on a short shoot at the base of the flower stalk, while the flowers of *H. leiocarpa* and *H. parvifolia* are commonly born on stalks with widely spaced, fully developed leaves, though these are occasionally shorter than cauline leaves.

The glabrous calyx and pubescent ovaries of *H. nudicalycina* are similar to those of *H. parvifolia*, but the aculeate tubercles of the leaves are unicellular while the tubercles on leaves of *H. parvifolia* are irregularly shaped and multicellular.

**Etymology.** The epithet *parvi-folia*, Latin, “small-leaved” is in reference to the leaves being smaller than those of *H. rigens*.

#### **Specimens examined**

NEW SOUTH WALES. Wellington Valley, Oct. 1825, *A. Cunningham 25* (BRI AQ180325); Emmaville Rd, c. 22.6 km S of junction with Moore Street in Emmaville, 20 Oct. 2001, *J.W. Horn 4186* (AD, CANB, NSW; DUKE, *n.v.*); Castle Doyle, Armidale, Oct. 1915, *J. Martin s.n.* (NSW102298); New England, *s.dat.*, *C. Stuart 185* (MEL31442, MEL31449); along White Rock Rd, SE Mudgee, 4 Apr. 1993, *H.R. Toelken 8456* (AD); Pheasant Mtn, Backwater, 21 Dec. 1967, *H.J. Wissmann NE30404a* (NE).

#### ***Hibbertia perhamata* Toelken, *sp. nov.***

*H. pustulifoliae similis sed filamentis irregulariter connatis, foliis et petiolis fasciculati-puberulis, et calycis distincte brevioribus (5.2–5.8 mm longis); a H. epedunculari ramis, foliis et calycis pilis fasciculatis differt.*

**Holotypus:** New South Wales (CC), Windsor–Singleton Rd, W side of Hunter Range near Howes Mountain, 12 Oct. 1993, *R.G. Coveny 16552 & A.J. Whalen* (NSW284203). **Isotypi:** AD99426198; BRI, CHR, CANB, HO, MEL, *n.v.*)

Shrubs to 0.75 m tall, much branched; branches rigid-woody, with sparse ridges continuing from the leaf bases, fascicled-puberulous with scattered minute radially spreading fascicled hairs (3–6 subequal arms), also on the decurrent leaf bases. *Vestiture* usually not persistent, with minute radially spreading fascicled hairs on branches and leaves, short intrapetiolar

tufts of straight simple hairs and an undercover of radially spreading fascicled hairs reduced to tubercles overtopped by erect hooked simple hairs on the calyx lobes. *Leaves* with minute intrapetiolar tufts of straight simple hairs to 0.2 mm long and not spreading laterally; *petiole* 0.4–0.9 mm long, minutely fascicled-puberulous; *lamina* linear to linear-lanceolate, (5.2–) 7–10 (–12.8) × 0.9–1.2 mm, abruptly constricted into the petiole, pointed with dried awn, adaxially slightly convex, minutely fascicled-puberulous with scattered minute radially spreading fascicled hairs (2–4 subequal arms) but wearing off almost immediately, abaxially with ± recessed central vein often twice broader than the usually tightly abutting revolute margins rarely exposing rows of slender teeth on both sides as well as a minutely tuberculate undersurface, outer surface minutely fascicled-puberulous as adaxially. *Flowers* subsessile, terminal and up to 5 on a short axillary short-shoot below terminal one on distal main branches; *flower stalk* to 3 mm long; *buds* slender-ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 1.5–2.8 × 0.2–0.3 mm, acute, without revolute margins, fascicled-puberulous with minute radially spreading fascicled hairs (2–4 subequal arms), grading into *additional bracts* 2 or 3 (–5) on axillary short-shoots, leaf-like, very small and with scarcely developed revolute margins, often caducous. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 5.5–5.8 × 1.6–1.8 mm, acute to pointed, with central ridge usually indistinct, outer surface ± densely hirsute with minute undercover of radially spreading fascicled hairs often reduced to tubercles, overtopped by often dense hooked hairs longer along the central ridge and becoming shorter laterally, inner surface puberulous with fine antrorsely appressed straight simple hairs on the distal third; *inner calyx lobes* oblong-lanceolate, oblong-elliptic, 5.2–5.6 × 2–2.6 mm, acute to obtuse, with central ridge indistinct, outer surface with undercover of dense tubercles right to the margins of the glabrous membranous margins, overtopped by scattered hooked simple hairs along the central ridge, inner surface puberulous with scattered very fine antrorsely appressed straight simple hairs below the apex. *Petals* 5.4–6.2 mm long, shallowly bilobed. *Stamens* 8–10 in an erect cluster to one side of the ovaries; *filaments* 0.8–1 mm long, scarcely connate at the base; *anthers* narrowly oblong, 1.8–2.1 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* oblong-obovate, each with 4 ovules, hirsute to villous with erect to spreading radially spreading fascicled hairs also on the crest; *styles* horizontally attached to upper outer side of ovaries and then shortly spreading outward before straightening up in front of the stamens, positioning the stigmas well above the anthers. *Fruits* and *seeds* not seen.

**Distribution and ecology.** Sandstone ridge with *Eucalyptus sclerophylla* and *Angophora euryphylla* forest in eastern-central New South Wales (CC).

**Phenology.** Flowering in Sep.

**Conservation status.** Recorded from the Wollemi N.P.

**Diagnostic features.** *Hibbertia perhamata* has sessile flowers and superficially resembles *H. epeduncularis*, but plants of the latter are, in contrast to *H. perhamata*, practically completely glabrous, particularly on the calyx. *Hibbertia pustulifolia*, though more robust, is also very similar to *H. perhamata*, but the latter is distinguished by its irregularly connate filaments, young leaves and their petioles being covered with minute radially spreading fascicled hairs (glabrous in *H. pustulifolia*), while the calyx lobes are distinctly shorter.

**Variation.** A specimen (*J.L. Boorman s.n.*; NSW 102303) from Frenches Forest requires recollecting and reassessment, as it might represent a distinct species distinguished from the similar *H. perhamata* by stalked flowers, truncate leaves and glabrous branches and leaves.

**Etymology.** The epithet *per-hamata*, Latin, “densely hooked” refers in particular to the outer calyx lobes, which are densely covered with hooked simple hairs.

### **Specimens examined**

NEW SOUTH WALES. Drip Rock, Wollemi N.P., 21 Sep. 2007, *S. Bell 23* (AD); Colo Heights to Putty, 23 Nov. 1959, *E.F. Constable s.n.* (CANB; NSW48898, *n.v.*); within 1 ml. [1.6 km] N of Putty turnoff, Nov. 1963, *C. Debenham s.n.* (AD, NSW229712); ridge above Stony Waterhole crossing, Mellong Ck area, Windsor–Singleton Rd, *C.P. Gibson, G.W. Carr & R.T. Miller 29.10.2005–015* (AD).

### ***Hibbertia pilifera* Toelken**

*J. Adelaide Bot. Gard.* 25: 77, fig. 1M, N. (2011). — **Holotype:** New South Wales, Adams Lookout, Bungonia Gorge, 10 Nov. 1966, *M. Evans 2519* (CANB161485). **Isotypes:** CANB161484, NSW 102318; A, K, L, *n.v.*

Spreading shrublets 0.15 m tall, tufted to becoming decumbent, usually  $\pm$  branched above and below soil level, repeatedly rooting; branches wiry, with long ridges continuing from the decurrent leaf bases, tinged pink, sparsely short-sericeous to glabrescent. *Vestiture* rarely persisting for a long time, mainly on distal branches and calyx with mainly antrorsely appressed  $\pm$  straight simple hairs usually becoming radially spreading fascicled hairs on stalk below flowers or on proximal outer surface of outer calyx, rarely also with scattered straight simple hairs on leaves but soon wearing off. *Leaves* with or without short intrapetiolar tufts of straight simple hairs to 0.2 mm long usually hidden by appressed petiole and not laterally spreading; *petiole* 1.5–3.0 (–3.5) mm long, glabrous to glabrescent with scattered appressed straight simple hairs; *lamina* linear, narrowly oblong-elliptic to -lanceolate, (4.6–) 5.0–7.5 (–8.8)  $\times$  5.4–6.5 (–7.2) mm,  $\pm$  gradually constricted into petiole, drawn into awn, 0.3–0.4 mm long, with short transparent point which wears off soon, adaxially  $\pm$  flat, glabrous to glabrescent with scattered antrorsely appressed straight simple hairs, abaxially with recessed central vein often up to twice broader than the tightly abutting revolute

margins without displaying the undersurface but rows of minute teeth are often visible on both sides, glabrous or glabrescent also on the vein. *Flowers* stalked, terminal on main branches and/or on axillary short-shoots; *flower stalk* (0–) 5.0–8.0 (–10.2) mm long; *buds* narrowly ovoid; *primary bract* on lower third of stalk, linear-triangular to -elliptic, 1.2–1.5  $\times$  c. 0.25 mm, acute, with central vein and revolute margins absent, glabrescent with antrorsely appressed short straight simple hairs, grading into 2–3 *additional bracts*, leaf-like, on short-shoots, short, slender rarely with  $\pm$  developed revolute margins, often caducous. *Calyx lobes* unequal; *outer calyx lobes* narrowly elliptic-oblong, 4.2–4.4  $\times$  1.4–1.6 mm, acute to obtuse, with  $\pm$  distinct central ridge, outer surface pubescent to puberulous with a range of smaller and larger radially spreading fascicled hairs (1–3 (4) subequal arms), especially towards the apex and base, inner surface glabrous; *inner calyx lobes* oblong-ovate, 4.8–5.0  $\times$  1.8–2.3 mm, abruptly constricted into a short point to rounded, without distinct ridge, outer surface glabrescent with mainly scattered antrorsely appressed straight simple hairs mainly along the central ridge becoming shorter towards the glabrous membranous margins, inner surface glabrous. *Petals* oblong-obovate to oblong-elliptic, 5.6–6.4 mm long, shallowly lobed to scarcely emarginate. *Stamens* 3–5 in a dense erect cluster to one side of ovaries; *filaments* 1.2–1.3 mm long, 0.8–1.0 mm connate; *anthers* oblong, 1.5–1.7 mm long, subequal, stiffly erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but  $\pm$  laterally compressed, each with 4 ovules, glabrous including on crest; *styles* horizontally attached to  $\pm$  mid-outer side of the ovaries and curved outwards and upwards on both sides of the stamens, positioning the erect stigmas just above the apex of the anthers. *Fruits* on recurved stalks. *Seeds* not seen.

**Distribution and ecology.** Grows in dry sclerophyll eucalypt woodland of *Eucalyptus amplifolia*, *E. bosistoana* and *E. eugenoides* in central New South Wales (NWP, CWS, CC, CT, ST).

**Phenology.** Flowering in Sep.–Nov.

**Conservation status.** Only noted at two roadside localities and one other site in Bungonia State Conservation Area: rare and extremely vulnerable (*R. Miller 23–29*, pers. obs.). The species was not relocated at Adams Lookout, in the vicinity of Bungonia Gorge, but the species is cryptic even when in flower.

**Diagnostic features.** *Hibbertia pilifera* has flowers similar to other species of the *H. rufa* subgroup, but the outer surface of the calyx of this species, as well as its branches, are commonly covered with appressed straight simple hairs; only occasionally with radially spreading fascicled hairs below flowers and on the lower outer surface of the outer calyx lobes. *Hibbertia pilifera* shares this type of pubescence with *H. tuberculipilosa*, but the latter species is distinguished by its tuberculate hairs and dense straight simple hairs on the ovaries. While the antrorsely appressed straight simple hairs

on the calyx are a diagnostic characteristic of the *H. sericea* group, it is restricted to these two species in the *H. acicularis* group. The two species are not placed into the *H. sericea* group, because these straight simple hairs are thought to be derived from reduced radially spreading fascicled hairs, as indicated by the pronounced tubercles, which are otherwise typical of fascicled hairs, and in addition the two species have the typical pollination syndrome of the *H. rufa* subgroup unlike species of the *H. sericea* group.

**Variation.** The appressed hairs on most parts of the plants wear off soon, so that they are best observed on the distal parts of young branches. The vestiture is particularly well developed below flowers, where it is usually retained for a longer time. Some plants have hairs restricted to the region of several nodes below the flowers and only the occasional hair can be observed on the rest of the plant, but these hairs are usually well developed, i.e., they are not as reduced as the hairs sometimes found in *H. surcularis*.

Although the flowers are usually distinctly stalked, localised specimens have been recorded with subsessile to sessile flowers (e.g. *T. & S. Whaite* 3256).

### Specimen examined

NEW SOUTH WALES. Black Mtn, NE Scone, Sep. 2007, *S. Bell* 20, 21 & 22 (AD, NSW); Allyn R., Aug. 1906, *J.L. Boorman s.n.* (NSW102279); Murrurundi, 1 Oct. 1907, *R.H. Cambage s.n.* (NSW102285); near Scone, 1884, *Miss Carter s.n.* (MEL35555); c. 3 mls [4.8 km] ENE Glen Davis, 26 Sep. 1964, *E.F. Constable* 5103 (NSW); "Lowestoft" 27 mls [38.2 km] E of Tamworth, 18 Apr. 1956, *E.F. Constable s.n.* (NSW37922); Cedar Ck, Widdin Valley, W of Denman, 2 Sep. 1957, *E.F. Constable s.n.* (NSW102276); Reubens Gully, SSW Baerami Ck, 25 Oct. 1970, *R.D. Hoogland* 11830 (CANB, NSW; K, L, A *n.v.*); Oxley Park, 19 Sep. 1985, *J.R. Hoskins s.n.* (NSW224465); Bungonia SCA, *R. Miller* 15.10.2008–23–29 (AD); Horton Valley, Barraba, 28 Sep. 1929, *F.A. Rodway s.n.* (NSW102280); Barraba, Sep. 1912, *H.W.R. Rupp s.n.* (NSW102282); 7 mls [11.2 km] NE of Capertree on rd to Glen Davis, 30 Aug. 1969, *T. & S. Whaite* 3256 (NSW); near Scone, Nov. 1903, *A.L. White s.n.* (NSW102283).

### *Hibbertia prorufa* Toelken, *sp. nov.*

*H. rufae similis sed staminibus sex filamentis liberis et bracteis primariis amplexantibus calycem; a H. aciculari foliis truncatis et stylis horizontaliter affixis ad ovaria differt.*

**Holotypus:** New South Wales (CC), Pioneers Park Malabar, 15 Sep. 1982, *R. Coveny* 11289 & *P. Hind* (NSW224459). **Isotypus:** CANB375833.

Shrublets with prostrate-spreading branches; branches wiry-woody, with distinct ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* ± persistent, with erect hooked simple hairs on outer surface of calyx but also with straight simple hairs of the intrapetiolar tufts and on ovaries. *Leaves* with bristly intrapetiolar

tuft of straight simple hairs 0.3–0.5 mm long and not laterally spreading; *petiole* 0.2–0.3 mm long, glabrous; *lamina* linear-triangular, (2.8–) 3.5–7.4 × 0.7–0.9 mm, abruptly constricted into petiole and usually becoming a ± truncate base, pointed with awn, 0.5–0.8 mm long, and ending in a transparent point, adaxially ± slightly convex, glabrous, abaxially with ± bulging central vein usually twice broader than the tightly abutting revolute margins without exposing the undersurface or rows of teeth between them, glabrous as adaxially. *Flowers* stalked, terminal on major branches and axillary branches or rarely on short-shoots; *flower stalk* 5.6–12.8 mm long; *buds* broadly ellipsoidal; *primary bract* subtending the calyx, linear to linear-triangular, 1.6–1.9 × c. 0.2 mm, pointed, without revolute margins, glabrous; *additional bracts* 2–4 on base of short-shoots, like primary bract with reduced central vein and revolute margins grading into prophylls. *Calyx lobes* unequal; *outer calyx lobes* elliptic-lanceolate, 4.2–4.5 × 1.8–2 mm, pointed, with indistinct distal central ridge, outer surface hirsute to sparsely hirsute with erect hooked simple hairs, inner surface glabrous; *inner calyx lobes* elliptic, 4–4.2 × 1.9–2.3 mm, rounded, rarely mucronate, with central ridge scarcely raised, outer surface sparsely hirsute with short erect hooked simple hairs becoming even sparser towards the glabrous membranous margins, inner surface glabrous. *Petals* obovate-cuneate, 4.1–4.6 mm long, shallowly bilobed to emarginate. *Stamens* 6 in an erect cluster to one side of the ovaries; *filaments* 1.3–1.4 mm long, scarcely connate basally; *anthers* oblong, 1.2–1.3 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* ± obovoid and laterally compressed, each with 4 ovules, puberulous including on crest with bifid and/or straight simple hairs; *styles* horizontally attached to the upper outer side of the ovaries and then sideways before becoming straight-erect along the stamens, positioning the stigmas above the anthers. *Fruits* on scarcely curved stalks. *Seeds* not seen. **Fig. 3.**

**Distribution and ecology.** Grows on sandy soil scattered in thick scrub with *Acacia suaveolens*, *Dillwynia retorta*, *D. glaberrima*, *Lambertia formosa*, *Leptospermum attenuatum*, *L. laevigatum*, *Ricinocarpos pini-folius*, etc., in eastern central New South Wales (CC).

**Phenology.** Flowering in Sep.

**Conservation status.** Occurs in Kamay-Botany Bay N.P. and presumably also in Malabar Headland N.P.

**Diagnostic features.** Specimens of *H. prorufa* closely resemble those of *H. rufa*, particularly because of their prostrate habit and ± truncate-based leaves, but the flowers bear six stamens with free filaments and the primary bract clasps the calyx. The flower characters show closer resemblance to *H. acicularis*, which however has a cuneate base of the leaf lamina and styles that are first ± vertically attached to upper outer surface of the ovaries and then point straight up in front of the stamens.



**Fig. 3.** *Hibbertia prorufa* near Cape Banks, Kamay-Botany Bay N.P., Sydney. **A** Habit; **B, C** close up of flowers. — Photos: T.A. Hammer.

**Etymology.** The epithet *pro-rufa*, Latin, “instead of *rufa* (the species)” refers to the close resemblance of this species to *H. rufa*, though there are fundamental differences between the two species.

#### **Specimens examined**

NEW SOUTH WALES. Malabar Rifle Range, Oct. 1988, *A. Hall 041* (AD); Buxton, 30 Sep. 1951, *J.W. Whaitte 948* (NSW).

#### ***Hibbertia pustulata* Toelken**

*J. Adelaide Bot. Gard.* 25: 78, fig. II–L (2012). —

**Holotype:** New South Wales, Mt Hay Rd, N of Leura, 13 Oct. 2006, *C.P. Gibson 56* (AD290146). **Isotypes:** CANB, K, MEL, NSW, NY.

Decumbent shrublets to 0.15 m tall, sparsely branched; branches wiry, with ridges continuing from the decurrent leaf bases, brown, glabrous. *Vestiture* not persistent, comprising scattered short antrorse straight simple hairs on raised tooth-like tubercles which remain or are rarely much reduced after the hairs have worn off, mainly restricted to abaxial surface (especially towards the margins and apex) of leaves. *Leaves* without intrapetiolar tufts of straight simple hairs; *petiole* 0.2–0.6 mm long, glabrous; *lamina* linear, linear-elliptic to linear-lanceolate, (2.5–) 4.5–7.5 (–8.6) × (0.5–) 0.7–0.8 (–1.0) mm, gradually constricted into petiole, acute often with short straight simple hairs and without

a well-developed awn or rarely with a transparent point, adaxially ± convex with a groove above the central vein, glabrous to puberulous along the flanks with antrorsely spreading tuberculate straight simple hairs wearing off soon, but with paler tubercles usually remaining, abaxially with ± bulging central vein at least twice broader than the tightly abutting revolute margins without displaying the undersurface nor rows of teeth between them, puberulous when young, the hairs soon wearing off but retaining scattered paler tubercles mainly along the margins and towards the apex. *Flowers* terminal on terminal and axillary branches, sessile and surrounded by a cluster of one to several bracts and few fascicled leaves, often at successive nodes on distal branches; *flower stalk* absent; *buds* narrowly ellipsoidal or rarely ovoid; *primary bract* ovate, rarely triangular, 0.7–1.1 × 0.6–0.75 mm, acute to pointed, scale-like, without central ridge or revolute margins, glabrous but with ± dense cilia; *additional bracts* 2–5, leaf-like, grading into cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* narrowly elliptic-lanceolate, (5.2–) 5.9–6.3 × 2.5–2.6 mm, acute to pointed, with scarcely raised central ridge distally, outer and inner surface glabrous; *inner calyx lobes* lanceolate, rarely ovate, (5.3–) 5.8–6.5 × 3.2–3.4 mm, shortly pointed, without central ridge, outer and inner surface glabrous. *Petals* obovate-spathulate, 7.6–9.3 mm long, distinctly emarginate. *Stamens* 4 in a dense cluster to the one side of the ovaries; *filaments* 0.9–1.2 mm long, ± basally connate; *anthers* narrowly oblong, 2.3–2.5 mm long,

subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* broadly obovoid but distinctly laterally compressed, each with 4–6 ovules, glabrous including on the crest; *styles* horizontally attached to ± mid-lateral surface and curved outwards and upwards on both sides of the stamens, positioning the erect stigmas above the apex of the anthers. *Fruits* sessile. *Seeds* not seen.

**Distribution and ecology.** Recorded from sandy to gravelly soil, often with poor drainage, in sedge swamps, heath, scrub, or *Eucalyptus* woodland vegetation on Central Tablelands, New South Wales (CT).

**Phenology.** Flowering in Aug.–Oct.

**Conservation status.** Recorded in the Blue Mountains N.P. and Wollemi N.P.

**Diagnostic features.** *Hibbertia pustulata* differs from other species in the *H. rufa* subgroup, which are characterised by four or five stamens with ± connate filaments, by its filaments being often scarcely connate basally. In addition, the new species has scattered raised paler tubercles, which are the bases of short hairs, on the flanks and abaxial leaf surfaces. Although it shares the presence of these tuberculate hairs on leaves with *H. tuberculipilosa*, it is distinguished by sessile flowers on all branches and glabrous ovaries.

**Variation.** There is a considerable variation in the size of leaves from different areas, varying from slightly smaller ones without terminal hairs (or even their basal tubercles) from the heath/woodland of the upper Blue Mountains, to longer leaves with usually terminal hairs from sedge swamps in the mid-Mountains (M.J. Baker & D. Coleby, pers. comm.). However, as no clearcut separation nor consistent additional characters could be confirmed, a taxonomic rank of these local forms is left pending molecular assessment.

First flowers are usually single and terminal on their terminal or axillary branchlets, followed by 1 to few short bracts and few fascicled leaves and then by spaced cauline leaves below it, regardless of whether the flower is situated on a terminal or axillary branch (e.g. *M.J. Baker* 3). On some specimens (*M.J. Baker* 12, *D. Coleby* 22) a second flower may develop closely below the dried-up first one and the additional bracts of a previous flower (which was no longer present, so that it appeared to be from the previous season). It is important to note that the new flowers developed from the axils of subtending fascicled leaves and not from the axil of one of the additional bracts, as is commonly observed in other species of *Hibbertia* when additional flowers are produced in the same season. There are usually only up to three fascicled leaves in addition to a full set of bracts below these additional flowers on both these specimens.

Furthermore, the filaments of flowers on the specimen *M.J. Baker* 1 are recorded on fresh material as connate up to a quarter of their length, while on other

specimens, for instance, *M.J. Baker* 3, they are “barely connate”.

#### **Selection of specimens examined** (42 seen)

NEW SOUTH WALES. Kings Tableland, Wentworth Falls, 28 Aug. 2020, *M.J. Baker* 1, 3 & 4.1 (AD); Kings Tableland, Erskine Range, 215–229 Tableland Rd, 28 Aug. 2020, *M.J. Baker* 8 (AD); Woodford Ck Fire Trail c. 152 m east of locked gate at northern end of Clear View Parade, Hazelbrook, 4 Sep. 2020, *M.J. Baker* 10 (AD); walking track to Fairy Falls, North Lawson Park, 4 Sep. 2020, *M.J. Baker* 12 (AD); Chester Trail, Kings Tableland, c. 200 m west of Tableland Rd and the end of Chester Rd, 30 Sep. 2020, *M.J. Baker* 13 (AD); 91–111 Glossop Rd, Linden, 17 Sep. 2020, *M.J. Baker* 15 (AD); SE Wollemi N.P., c. 300 m W of Mt Tootie Rd, 15 Aug. 2007, *S. Bell* 1 (AD, NSW); Sublime Pt Res., Leura, 24 Apr. 2019, *D. Coleby* 22, 25 & 28 (AD); Lacy Tableland, 2 Oct. 1990, *C.P. Gibson* 034 (AD); Wentworth Falls, 25 Mar. 2006, *C.P. Gibson* s.n. (AD, NSW); 4.2 km N along Mt Hay Rd from Leura Public School, 31 Aug. 2020, *A.E. Orme* 1596 & *E.C. Orme* (AD, NE, NSW).

#### ***Hibbertia pustulifolia* Toelken & R.T. Miller, sp. nov.**

*H. perhamatae similis sed filamentis vix connatis, foliis juvenibus et petiolis glabris et plus minusve pustulatis, et calycibus longioribus (7.2–8.3 mm long); a H. carnarvonensis calycibus longioribus et puberulis interne, et petiolis glabris differt.*

**Holotypus:** New South Wales (ST), Point Hill 666 (2), near Starlights Trail, Natai National Park, *R.T. & J. Miller* 18.10.2007–74 (NSW). **Isotypus:** AD290152.

Shrubs c. 1 m high, much-branched; branches rigid-woody, with faint ridges continuing from the leaf bases, fascicled-puberulous with minute radially spreading fascicled hairs (2–4 (–6) subequal arms) also on the decurrent leaf bases but usually fewer. *Vestiture* ± persistent, with minute radially spreading fascicled hairs on branches and on calyx but on the latter overtopped by erect hooked simple hairs, and no hairs observed on the densely pustulate leaves. *Leaves* with scant interpetiolar tufts of straight simple hairs c. 0.15 mm long and not laterally spreading; *petiole* 0.4–0.7 mm long, glabrous; *lamina* linear, (3.8–) 4.5–10 (–15.4) × 1.1–1.4 mm, abruptly constricted into petiole, pointed with extension of central vein becoming a dry awn to 0.4 mm long, sometimes with a short transparent point and few minute straight simple hairs, adaxially ± flat, densely pustulate with bulging epidermal cells above, and especially on revolute margins, while central vein is smooth, abaxially with flush, rarely recessed central vein often more than twice broader than the tightly abutting revolute margins without exposing the undersurface but often exhibiting rows of teeth between them, glabrous as adaxially. *Flowers* subsessile, terminal on branches and short axillary short-shoots, often in terminal clusters; *flower stalk* 1.8–3 mm long; *buds* ellipsoidal; *primary bract* subtending calyx, triangular to lanceolate-triangular, 1.8–2.4 × 0.3–0.4 mm, pointed, with central vein and revolute margins indistinct, puberulous with minute antrorsely

spreading tuberculate radially spreading fascicled hairs (2 or 3 (4) subequal arms), glabrous below, grading into 2–3 *additional bracts* on base of stalk, mainly scale-like, rarely leaf-like with  $\pm$  reduced revolute margins and with few to several antrorsely spreading minute fascicled hairs. *Calyx lobes* unequal; *outer calyx lobes* lanceolate to elliptic-lanceolate, 7.2–8.3  $\times$  2.2–2.8 mm, pointed, with central ridge, outer surface sparsely hirsute with a range of erect hooked simple hairs overtopping minute tuberculate radially spreading fascicled hairs particularly at the base, inner surface puberulous with minute, often antrorsely spreading radially spreading fascicled hairs (2–4 subequal arms) on the upper half; *inner calyx lobes* ovate to ovate-elliptic, 7.5–7.8  $\times$  3.2–3.6 mm, bluntly acute, obtuse, rarely rounded, with faint central ridge, outer surface puberulous with an undercover of minute antrorsely to laterally appressed radially spreading fascicled hairs up to the glabrous membranous margins but also slightly larger and spreading on the distal margins, overtopped by few scattered erect hooked simple hairs along the central ridge, inner surface puberulous with minute, often antrorsely spreading radially spreading fascicled hairs (2 or 3 subequal arms) below the apex. *Petals* narrowly to broadly obovate, 8–10 (–12.3) mm long, shallowly bilobed. *Stamens* 8 or 9 in an erect cluster to one side of the ovaries; *filaments* 1–1.3 mm long, with basal third connate; *anthers* ellipsoidal, 2–2.4 mm long, subequal, erect, slightly tapering to both ends. *Pistils* 2; *ovaries* oblong-obovoid and scarcely laterally compressed, each with 2–4 ovules, hirsute with fine radially spreading fascicled hairs even on the crest; *styles* horizontally attached to the outer upper ovaries and then spreading outwards and upwards, positioning the stigmas outer and above the anthers. *Fruits* on short erect stalks. *Seeds* not seen.

**Distribution and ecology.** Frequently observed, but only on hilltop slopes with shelving sandstone outcrops, overtopped by woodland comprised of *Corymbia gummifera*, *Eucalyptus punctata*, *E. sieberi*, stringybark sp. and *Allocasuarina littoralis*, with a sparse understory of *Leptospermum trinervium*, *Banksia serrata*, *Isopogon anethifolius*, *Persoonia laevis*, etc. and a ground layer of *Phyllanthus hirtellus*, *Goodenia hederacea*, *Pomax umbellata* and *Lomandra obliqua*, in central-southern New South Wales (ST).

**Phenology.** Flowering in Oct. and Nov.

**Conservation status.** Recorded from Natai N.P. and Burratorang State Conservation Area.

**Diagnostic features.** The very dense and obvious blister-like epidermal cells on the upper surface of the leaves are not found in other species of the *H. acicularis* group. It is, however, significant that the much smaller bracts, and especially the additional bracts, have minute tuberculate antrorsely and radially spreading fascicled hairs, though these are often reduced to bifid hairs. The absence of the hairs on the leaves and especially on the petiole distinguishes the new species from superficially

similar specimens of *H. perhamata*, but this species has irregularly connate filaments on some stamens.

**Variation.** Four collections from the same area show little variation except for the size of leaves.

**Etymology.** The epithet *pustuli-folia*, Latin, “blistered-leaves” refers to the unusually densely pustulate upper surface of the leaves.

#### **Specimens examined**

NEW SOUTH WALES: Burratorang State Conservation Area, along the walking trail loop 95 m SE of Burratorang Lookout, 80 m S of Burratorang Lookout Rd, 12 Nov. 2022, T.A. Hammer 352 & A.E. McDougall (AD291336, CANB, NSW); Point Hill 666 (1), R.T. & J. Miller 18.10.2007–73 (AD); Point Hill 666 (3), R.T. & J. Miller 18.10.2007–75 (AD); Point Hill 666 (4), R.T. & J. Miller 18.10.2007–76 (AD).

#### ***Hibbertia rasilis* Toelken, sp. nov.**

*H. lignescens similis sed ramis, foliis, calycibus et praecipue ovariis glabris differt.*

**Holotypus:** New South Wales (CWS), SE Muswellbrook, 5 Nov. 1993, H.R. Toelken 8464 (NSW).

**Isotypi:** AD106541, BRI, CANB, HO, K, L, MEL, MO, PERTH.

Shrub with spreading to decumbent branches to 40 cm long; branches wiry-woody, with ridges continuing from the decurrent leaf bases, glabrous and smooth. *Vestiture* absent except for sparse intrapetiolar tufts but also wearing off. *Leaves* with short intrapetiolar tufts of straight simple hairs 0.2–0.3 mm long and not extending laterally along the sides of the decurrent leaf bases; *petiole* 0.2–0.6 mm long, glabrous; *lamina* linear, (8.2–) 10–22 (–31.3)  $\times$  0.7–1.2 mm, gradually constricted into petiole, pointed with short transparent awn, 0.2–0.4 mm long, but wearing off soon, adaxially slightly convex, glabrous, rarely with minute tubercles below the awn, abaxially with recessed central vein often more than twice broader than the tightly abutting revolute margins without exhibiting the undersurface and rarely showing rows of teeth on both sides, outer surface glabrous as adaxially. *Flowers* stalked, terminal on major branches, subtended by successive, very short axillary short-shoots; *flower stalk* 1.1–5.3 (–6.3) mm long; *buds* slender ellipsoidal; *primary bract* subtending the calyx, linear-triangular, 0.8–1.5  $\times$  c. 0.2 mm, without revolute margins, glabrous except for terminal papillae; without *additional bracts* but with 2 basal prophylls. *Calyx lobes* unequal; *outer calyx lobes* elliptic, 4.3–4.5  $\times$  1.3–1.6 mm, acute, with indistinct central ridge, outer and inner surface glabrous; *inner calyx lobes* elliptic to elliptic-obovate, 4.4–4.6  $\times$  2.1–2.5 mm, acute, mucronate to rounded, with indistinct central ridge, outer and inner surface glabrous. *Petals* 5.6–6.7 mm long, shallowly bilobed. *Stamens* 6 or 7 in an erect cluster to one side of the ovaries; *filaments* 1–1.2 mm long, scarcely connate basally; *anthers*

oblong, 1.8–2 mm long, subequal, mucronate, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with 2–4 ovules, glabrous but the crest often tuberculate; *styles* horizontally attached to upper outer side of ovaries, then straight-erect in front of outer stamens, positioning the stigmas above the apex of the anthers. *Fruits* on erect stalks. *Seeds* obovoid to almost spherical, 1.5–1.6 × 1.5 mm, brown; *aril* with fleshy attachment surmounted by spreading, scarcely lobed membranous cup covering the lower third of the seed.

**Distribution and ecology.** Grows on sandy soil in depressions in western-central New South Wales (CWS).

**Phenology.** Flowering in Oct. and Nov.

**Conservation status.** Unknown.

**Diagnostic features.** One of the 1 to 3 terminal bristles on the leaves is thicker and awn-like, but shorter than in other species, such as *H. minysantha* or the more robust *H. lignescens*, but *H. rasilis* is immediately distinguished by its very much longer leaves, as well as the glabrous calyx and ovaries. The glabrous leaves seem to be due to an extreme reduction of the hairs, as fine slightly sunken tubercles can be observed on leaves, which are otherwise smooth unlike those of many other species with bulging epidermis cells.

**Etymology.** The epithet *rasilis*, Latin, “shaved” refers to the plants being at all stages glabrous, although minute tubercles as possible bases for hairs were observed on the leaves.

#### **Specimens examined**

NEW SOUTH WALES. Gungal, Dec. 1904, J.L. Boorman s.n. (NSW102306, NSW102307); gully N of Murrumbo Ck, Wollar to Denman, 11 Apr. 1953, H.S. McKee 658 (NSW).

#### **Hibbertia rigens Toelken, sp. nov.**

*H. leiocarpae similis sed habitu robusto erecto, pilis uncinatis in calice et ovaris pubescentibus vel hirsutis; a H. parvifolia calycibus hirsutis vel puberulis, ramis floriferis foliis et stylis affixis ad apices laterales ovariorum differt.*

**Holotypus:** Queensland (Dd), 2 mls [3.2 km] E Lyra, 17 Oct. 1970, R.D. Hoogland 11809 (CANB 205124).

**Isotypi:** CANB 205123; BRI, K, L, n.v.

*Hibbertia* sp. (Girraween NP D.Halford+ Q1611) S.T.Reynolds in R.J.F.Hend., *Queensl. Pl Names Distribution* 65 (1997). — *Hibbertia* sp. Girraween NP (D. Halford+ Q1611) Qld Herbarium, *Austral. Pl. Cens.* [online; <https://biodiversity.org.au/nsl/services/search/taxonomy>] (2011).

Shrubs to 1 m tall, sparsely branched, irregularly spreading; branches rigid-woody, with ridges continuing

from raised decurrent leaf bases, glabrous. *Vestiture* mostly absent except for intrapetiolar tufts and pubescent ovaries with erect straight simple hairs, and ± dense to sparse hooked simple hairs on calyx lobes or very rarely a few on the flanks of young leaves. *Leaves* with sparse intrapetiolar tuft of straight simple hairs 0.2–0.4 mm long; *petiole* 0.2–0.4 mm long, glabrous; *lamina* linear-lanceolate to linear-triangular, (2.5–) 4–8 (–15.4) × (0.6–) 0.9–1.3 (–1.5) mm, abruptly constricted or often with truncate base, drawn into an awn to 0.5 mm long, ending in a transparent point but becoming darker later, adaxially usually ± flat or slightly depressed above the central vein and irregularly verruculose to tuberculate or rarely with a few hooked simple hairs on the flanks of the revolute margins but wearing off soon, abaxially with broad strongly recessed central vein rarely to twice broader at the base than the tightly abutting revolute margins without exposing the undersurface but occasionally showing rows of teeth between them, outer surface glabrous and verruculose as adaxially. *Flowers* stalked to sessile, terminal on all branches and rarely on ± fascicled axillary short-shoots; *flower stalk* (0.8–) 3–6 (–12.7) mm long (elongating when fruiting); *buds* ellipsoidal; *primary bract* subtending the calyx, triangular to linear-triangular, (0.5–) 1.2–1.5 × 1.5–2.2 mm, acute, without revolute margins, puberulous and/or with marginal cilia; *additional bracts* 2 or 3, at the base of flower stalk on rare short-shoots, scale-like with scarcely developed revolute margins, puberulous. *Calyx lobes* unequal; *outer calyx lobes* lanceolate to lanceolate-elliptic, (4.1–) 5.2–5.7 × 1.7–2.8 mm, pointed, slightly ridged towards the apex, outer surface ± densely covered with hooked simple hairs particularly proximally, inner surface glabrous; *inner calyx lobes* oblong-elliptic, 5.4–5.6 × 2.1–2.6 mm, rounded, without central ridge, outer surface with few hooked and/or minute straight simple hairs to glabrous, inner surface glabrous. *Petals* broadly obovate, 7.4–9.6 mm long, shallowly bilobed. *Stamens* 5 or 6 (–8) in dense erect cluster to one side of the ovaries; *filaments* 1–1.3 mm long, often slightly connate basally; *anthers* broadly ellipsoidal to oblong, 1.8–2.1 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid and somewhat laterally compressed, each with 4 ovules, pubescent to hirsute with erect straight simple hairs but sometimes with glabrous crest; *styles* horizontally attached to the outer side of the ovaries, then curved out and straight erect on both sides of the stamens, positioning the stigmas just above anthers. *Fruits* on straight to slightly curved stalk. *Seeds* obliquely obovoid to reniform and laterally compressed, 1.2–1.3 × 1.6–2.1 mm, dark brown; *aril* with fleshy attachment surmounted by a membranous cup with irregular shallow lobes and covering the lower third of the seed.

**Distribution and ecology.** Grows usually in association with granite outcrops in heath-like undergrowth in sclerophyll eucalypt forests in southern Queensland (Dd) and northern New South Wales (NWS, NT), and on sandstone in sclerophyll eucalypt forests in eastern-central New South Wales (CC, CT).

**Phenology.** Flowering mainly in Aug.–Dec., but some flowers recorded throughout the year.

**Conservation status.** Recorded from Boonoo Boonoo N.P., Kings Plains N.P., Torrington State Conservation Area and Woollemi N.P., N.S.W., and Giraween N.P., Qld.

**Diagnostic features.** *Hibbertia rigens* is very variable and is similar to *H. leiocarpa*, but the new species is distinguished by its generally more robust-woody erect habit, the presence of hooked simple hairs on the calyx, and essentially by the pubescent to hirsute ovaries. It also resembles *H. parvifolia*, but, although that species is not only less robust, it is mainly distinguished by its completely glabrous calyx, by styles attached to the side of the ovaries and by its scale-like additional bracts on a short-shoot at the base of the flower stalk. *Hibbertia rigens* and *H. leiocarpa* usually bear  $\pm$  fully developed leaves that are often not fascicled on some short axillary short-shoots below flowers, and only occasionally distinctly smaller than cauline leaves and with  $\pm$  reduced revolute margins as typical of additional bracts. In fact, even primary bracts of some specimens of *H. rigens* show some variation, like first signs of developing slightly recurved margins.

The similar woody branches of plants of *H. pustulifolia* can easily be distinguished from those of *H. rigens* by their fascicled tomentum on branches, but these hairs also form an undercover under the hooked simple hairs on the outer surface of the calyx lobes.

**Variation.** In spite of the generally slightly longer calyx lobes of the southern population of *H. rigens* north of the Blue Mountains (5.2–5.7 mm), as compared to those of the northern population on the north-western border of New South Wales with Queensland (3.8–4.3 mm), these measurements of the calyx lobes are not consistent enough to retain two different taxa.

The hooked hairs on at least the outer calyx lobes are  $\pm$  dense in the northern population, while they are less common and often wear off completely on southern plants. Their density varies on the inner calyx lobes and the hairs are often much reduced, e.g. there are minute, antrosely appressed straight simple hairs at the calyx base, but if examined in detail some of these appear to have a hooked apex, i.e., they are presumably depauperate hooked simple hairs.

The ovaries are always pubescent to hirsute, but if viewed from the top they might appear partially glabrous because of a glabrous crest along the apex of the ovaries.

**Etymology.** The epithet *rigens*, Latin, “stiff, rigid” refers to the stiffly erect plants with rigid-woody stems of this species and even the stiffer flower stalk, in comparison to the filiform flower stalks of the very similar species *H. leiocarpa*.

## Specimens examined

### Northern form

QUEENSLAND, Wyberba, 30 Dec. 1988, *R. Bates 16559* (AD); Wyberba, 25 Jan. 1933, *S.T. Blake 4667* (BRI); near Wyberba, 2 Nov. 1971, *S.T. Blake 23649* (BRI, CANB); Stanthorpe, July 1904, *J.L. Boorman s.n.* (NSW102302); Bald Rock Ck, N Wallangarra, 16 May 1967, *E.J. Carroll 781* & *I.R. Telford* (CANB); Inglewood–Stanthorpe rd, 23 Nov. 1947, *D.M. Gordon 98* (BRI); Mt Norman, 6 Dec. 1970, *D. Hockings s.n.* (BRI); near Jollys Falls, 19 Oct. 1970, *R.D. Hoogland 11809* (BRI, CANB, K); Wyberba, Oct. 1972, *K. McArthur s.n.* (BRI); Stanthorpe, 29 Oct. 1963, *L. Pedley 1429* (BRI); near Wyberba, 20 Aug. 1971, *T.L. Ryan 51* (BRI); Mt Norman, 9 May 1970, *I.R. Telford 1689* (CANB).

NEW SOUTH WALES. Boonoo Boonoo, Nov. 1904, *J.L. Boorman s.n.* (NSW102301); Kings Plains N.P., 16 Oct. 1993, *R.G. Coveny 16610* & *A.J. Whalen* (AD, NSW; BRI, *n.v.*); Kings Plains N.P., 1 km N of falls, 8 Mar. 1995, *J.T. Hunter 2865* (NE); 19 km E Deepwater, on Miles Shaw Rd, Butterleaf, 1 Dec. 1995, *J.T. Hunter* & *P.J. Clarke 3779* (NE); Torrington SCA, 2.7 km on Carpet Snake T1 from DCT, 7 Jan. 1997, *C.E. Nano, L.M. Copeland* & *P. Croft 32* (NE); New England, Dec. 1881, *C. Stuart 760* (MEL31438); New England, *s.dat.*, *C. Stuart s.n.* (MEL31432); Barool N.P., 18 Dec. 1918, *M. Sullivan 1* (AD).

### Southern form

NEW SOUTH WALES. Valley Heights, Aug. 1899, *W. Bäuerlein 2418* (NSW); Kangaroo Waterholes, 28 Dec. 1961, *C. Burgess s.n.* (CANB); Kangaroo Waterholes, 29 Dec. 1961, *C. Burgess s.n.* (NSW); Mt Wilson, 3 Dec. 1948, *E.F. Constable s.n.* (CANB, NSW28230); Boorai Ridge above Colo R. Gorge, 12 Feb. 1977, *R. Coveny 9115* & *P. Hind* (NSW); near Bowens Ck on Bilpin to Mt Irvine rd, 20 Sep. 1979, *R. Coveny 10456* (NSW); Staircase Hill, quarry at crest of hill near entrance to “High Wollemi”, 77 km N Wilberforce on Windsor–Singleton rd, 8 Aug. 1992, *R. Coveny 15435* & *A. Leishman* (AD, CBG, HO; PRE, *n.v.*); track on E side of Green Gully, Wollemi N.P., 2 Dec. 1987, *F.E. Davies 292* & *B. Rimes* (CANB); c. 1.5 mls [2 km] NE of Mt Gaspers, 17 Feb. 1971, *W.E. Fisher 275* (CANB, 2 sheets); Gaspers Mtn Army Airstrip, 9 mls [14.4 km] NE Glen Davis, 26 Apr. 1965, *D.J. McGillivray* & *A.N. Rodd R168* (NSW); FT Crownland off Sackville Ferry Rd, *R.T. Miller 23.10.2008–84–86* (AD); FT Crownland off Sackville Rd, S of Maroota, *R.T. Miller 23.10.2008–87–88* (AD); c. 1.7 km SSE along firetrail from end of Greens Rd, Warrimoo, 15 Dec. 2001, *A.E. Orme 212* & *R. Johnstone* (AD); Putty Rd, 2 mls [3.2 km] N Glossodia turnoff, 20 Feb. 1961, *M.E. Phillips NBG14164* (CANB); 8 km from Agnes Banks towards Springwood, 28 Sep. 1971, *J. Pulley 841* (CANB); off Chapmans Parade, 7 km from Faulconbridge, 28 Sep. 1971, *J. Pulley 854* (CANB); Gaspers Mtn Army Airstrip, 9 mls [14.4 km] NE of Glen Davis, 26 Apr. 1965, *A.N. Rodd* & *D.J. McGillivray 1164* (NSW, 2 sheets).

***Hibbertia rufa*** N.A.Wakef.

*Vict. Naturalist* 72: 119 (1955); J.H. Willis, *Handb. Pl. Victoria* 2: 388 (1973); G.J. Harden & J. Everett in G.J. Harden, *Fl. New South Wales* 1: 301 (1990); Toelken in N.G. Walsh & T. Enwisle, *Fl. Victoria* 2: 307 (1996); A.M. Gray (2009) in M.F. Duretto, *Fl. Tasmania Online: Dilleniaceae* (ver. 2009.2); A. Fairley & P. Moore, *Native Pl. Sydney Region* 78 (2010); Toelken, *J. Adelaide Bot. Gard.* 25: 78, fig. 10, P (2011). — **Type citation:** “Reedy Creek, 3 miles east of Cann River, Victoria; J. H. Willis and N. A. Wakefield; 22/10/1948”. **Lectotype (here designated):** Reedy Creek, 3 mls [4.8 km] E of Cann River, East Gippsland, Victoria, *J.H. Willis & N.A. Wakefield s.n.* (MEL35552). **Isolectotypes:** MEL658094; NSW86703.

*Hibbertia stricta* var. *pedunculata* Maiden & E. Betche, *Proc. Linn. Soc. New South Wales* 24: 640 (1900). — **Type citation:** “Wingello (J.L. Boorman, November, 1899)”. **Holotype:** NSW102289.

Shrublets rarely to 0.3 m tall, trailing to scrambling, rarely erect-spreading, with rhizome or branches rooting and/or often suckering; branches wiry and to 0.5 m long, with ridges continuing from decurrent leaf bases, glabrous rarely puberulous, usually reddish brown. *Vestiture* comprising scattered fine short straight simple hairs occasionally on the branches, on leaves (in particular on flanks and terminal), soon wearing off or usually absent except for intrapetiolar tufts of straight simple hair in distal leaf axils. *Leaves* with short intrapetiolar tufts of straight simple hairs to 0.2 mm long and not laterally spreading; *petiole* 0.2–1.3 mm long, glabrous; *lamina* linear-lanceolate to -triangular, (1.8–) 4–9 (–10.6) × (0.8–) 1–2 (–2.5) mm, with truncate to cordate base, acute to pointed but not awned, with one to usually few terminal hairs wearing off soon, adaxially flat to slightly convex and sometimes ± grooved above the central vein, glabrous or sometimes with few antrorsely spreading straight simple hairs along the upper flanks but wearing off soon, abaxially with ± flush to slightly bulging central vein usually more than twice broader at least proximally than the ± tightly abutting revolute margins without displaying the undersurface but often showing rows of teeth between them, glabrous except for few scattered hairs on the flanks as adaxially. *Flowers* single, terminal on terminal and axillary short-shoots continuing usually from successive distal leaf axils downwards, with up to six flowers on major branches; *flower stalk* (0.2–) 5–15 (–24.4) mm long; *buds* narrowly ovoid; *primary bracts* at the base of the stalk, linear-lanceolate to elliptic-triangular, 0.5–1.4 × 0.2–0.4 mm, acute, rarely obtuse, scale-like without revolute margins and central vein scarcely raised, glabrous except for often with terminal tuft but wearing off soon, grading into 1–2 *additional bracts*, scale-like, grading into 2 smaller opposite prophylls. *Calyx lobes* unequal; *outer calyx lobes* narrowly lanceolate- to elliptic-oblong, (2.2–) 3–4.5 (–5.3) × 1.8–2.4 mm, acute often becoming obtuse to rounded, without obvious central ridge, outer and inner surface

glabrous; *inner calyx lobes* broadly elliptic to oblong-obovate, (2.3–) 3.2–5 (–5.6) × (2.0–) 2.2–3.6 mm, rounded or cuspidate, without obvious central ridge, outer and inner surface glabrous. *Petals* obovate, (3.5–) 5.5–7 (–8.2) × (2.4–) 2.8–4 mm, ± deeply emarginated to shallowly bilobed. *Stamens* (3) 4, in an erect cluster to one side of the ovaries; *filaments* 0.9–1.3 mm long and 0.9–1.1 mm connate; *anthers* oblong, 1.4–1.6 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* broadly obovoid and ± laterally compressed, with (2) 4 ovules, glabrous including the crest; *styles* horizontally attached to mid-outer side of the ovaries, then curved outwards and upwards on both sides of the stamens, positioning the erect stigmas just above the apex of the anthers. *Fruits* on ± recurved stalks. *Seeds* not seen.

**Distribution and ecology.** Locally common in moist heath-like vegetation or along streams, rarely overtopped by eucalypts in southern New South Wales (CT, SC), eastern Victoria (EG) and rare in eastern Tasmania (TSE).

**Phenology.** Flowering in Sep.–Nov.

**Common name.** Brown guinea-flower (Gray 2009).

**Conservation status.** Widespread and present in several conservation areas in southern New South Wales and Victoria but known only from one locality in north-western Tasmania.

**Diagnostic features.** Although *H. rufa* was originally included under *H. acicularis*, it does not have the characteristic extended pointed central vein nor a single terminal transparent awn, but rather a tuft of 2–6 minute straight simple hairs at the leaf apex. One or two of these hairs are often more robust, but not awn-like as in species of the *H. acicularis* subgroup. Specimens of *H. rufa* can usually be easily identified by the absence of a primary bract clasping the base of the calyx. Even in depauperate specimens with almost sessile flowers (see variation below) the bracts are ± spreading. *Hibbertia prorufa*, although closely resembling *H. rufa*, is distinguished by a small primary bract clasping the calyx, as well as additional bracts at the base of the flower stalk, and most importantly ± free filaments.

**Variation.** While plants from the eastern Southern Tableland of New South Wales are usually very vigorous with long, often scarcely branched, trailing branches, a specimen from Boyd River near Jenolan Caves (*J. Crawford & L. Williams CBG43386*) is very small and much-branched, so that the whole plant appears more compact. The length of the short-shoots and the peduncles also varies considerably and might in rare cases be almost absent (e.g. *J. Crawford & L. Williams CBG43386* from New South Wales, *A.C. Beauglehole 34440* from Victoria and *L. Rodway HO3043* or *MEL35557* from Tasmania), but the broad basal scale-like bracts at successive nodes are obvious.

Wakefield (1955) also commented on such depauperate specimens, which are diminutive in every respect. Their leaves are, for instance, only (1.5–) 3.0–3.8 (–5.5) mm long.

**Typification.** Wakefield (1955) states that the type material is at MEL. The main sheet (MEL35552, *det.* N.A. Wakefield) of *H. rufa*, selected as a lectotype, contains 4 pieces, each with typical flowers and leaves of the species and is expressly described as “pieces all from a single plant”. Another sheet (MEL658094, also *det.* N.A. Wakefield), inscribed “was recovered from the Victorian Reference Collection”, is an isolectotype. A note on the lectotype by J.H. Willis: “part of the material donated to Sydney Herbarium, 1961” identifies the isolectotype NSW86703 (without *det.* N.A. Wakefield).

As only a single specimen of *H. stricta* var. *pedunculata* (Maiden & Betche 1900) was found, it is regarded as a holotype.

#### **Selection of specimens examined** (39 seen)

NEW SOUTH WALES. 5 mls E Nerriga, 27 Oct. 1965, *L.G. Adams 1478* (CANB; B, E, K, L, MEL, NSW, US, *n.v.*); 3.5 km WSW Mt Tianjara, 2 Mar. 1981, *L.A. Adams & K. Pajmans 3692* (CANB); Paddys R. Bridge, 2.3 km NW Penrose, 20 Oct. 1980, *J.D. Briggs 692* (NSW; CANB, *n.v.*); near Boyd R., between Jenolan & Kanangra, 14 Nov. 1965, *J. Crawford & L. Williams s.n.* (CBG43386 at CANB); c. 2 km W Mt Corang, 26 Sep. 1973, *R. Pullen & J. Story 4983* (NSW); SE of Robertson, 18 Apr. 1943, *F.A. Rodway s.n.* (NSW102288).

VICTORIA. W of Genoa River, 7 Nov. 1973, *A.C. Beauglehole 34440* (MEL); c. 2 mls [3.2 km] W Genoa, 27 Nov. 1970, *R.D. Hoogland 11917* (MEL; CANB, *n.v.*); Genoa Ck, 31 Oct. 1969, *J.H. Willis s.n.* (MEL35553).

TASMANIA. Georges Bay, Oct. 1892, *L. Rodway s.n.* (*sub* W. Fitzgerald) (HO3043, MEL35557).

#### ***Hibbertia succuneata* Toelken, *sp. nov.***

*H. surculari similis sed habitu rigidiore ramosissimo, foliis acutis, et filamentis sparsim connatis differt.*

**Holotypus:** New South Wales (CT), Behind New South Wales National Park and Wildlife Service visitor centre in Blackheath, at the NE terminus of Govetts Leap Road, Blue Mountains N.P., 28 Oct. 2001, *J.W. Horn 4244* (NSW854228). **Isotypus:** AD290142; CANB, DUKE, *n.v.*

Shrublets much-branched and spreading; branches ± rigid-woody, with ridges continuing from the decurrent leaf bases, glabrous. *Vestiture* absent except for few minute temporary hairs on the leaves, especially on margins and terminal to the leaf awn. *Leaves* without intrapetiolar tufts; *petiole* 1.4–1.7 mm long, indistinct, glabrous; *lamina* linear, (3.2–) 4–9 (–10.3) × 0.5–0.8 mm, scarcely constricted into the petiole, pointed with awn, 0.2–0.4 mm long, but without transparent point and instead with 2 to few short straight simple

hairs, adaxially ± convex with scattered minute antrorsely appressed straight simple hairs on tubercles mainly along the flanks of the revolute margins but wearing off soon, abaxially with flush to ± recessed central vein rarely up to twice broader than the tightly abutting revolute margins without displaying the undersurface and rarely showing rows of teeth between them, glabrous to slightly tuberculate on the flanks as adaxially. *Flowers* sessile, terminal with often 2 densely clustered axillary flowers attached on mainly major branches and each flower subtended by 1 to few fascicled and often slightly reduced leaves; *flower stalk* absent; *buds* not seen; *primary bract* lanceolate-triangular, 1.1–1.3 × c. 0.2 mm, pointed, without revolute margins, with few marginal cilia; *additional bracts* 2 or 3, ovate, scale-like, with dense minute marginal hairs. *Calyx lobes* unequal to subequal; *outer calyx lobes* linear-lanceolate, 4.8–5 × 1–1.2 mm, pointed, with distal ridge scarcely raised, outer and inner surface glabrous; *inner calyx lobes* linear-elliptic, rarely linear-lanceolate, 4.5–4.7 × 1.3–1.8 mm, pointed, with distal ridge scarcely raised, outer and inner surface glabrous. *Petals* not seen. *Stamens* 4 in a dense erect cluster to one side of the ovaries; *filaments* 1.3–1.4 mm long, c. one-third connate basally; *anthers* narrowly oblong, 1.6–1.7 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* oblong and laterally compressed, each with 4 ovules, glabrous including on the crest; *styles* horizontally attached to ± mid-outer side of the ovaries, then curved outwards and upwards on the sides of the stamens, positioning the stigmas just above the anthers. *Fruits* on erect stalks. *Seeds* not seen.

**Distribution and ecology.** Recorded from clayey soil over sandstone in very open, sclerophyll eucalypt woodland with understory of grassy heath with species of *Hakea*, *Symphionema* and *Leptospermum* in central-eastern New South Wales (CT).

**Phenology.** Flowering in Apr. and Oct.

**Conservation status.** Recorded from Yengo N.P.

**Diagnostic features.** The flowers of *H. succuneata* resemble those of members of the *H. rufa* subgroup, and especially *H. surcularis* on account of the sessile flowers and narrow leaves, but the new species is distinguished by its much-branched, ± rigid branches, absence of a distinct terminal leaf awn and sparsely connate filaments (c. one-third).

**Etymology.** The epithet *suc-cuneata*, Latin, “almost (somewhat) cuneate” refers to the base of the leaf lamina, which is slightly and very gradually tapering into the petiole.

#### **Specimen examined**

NEW SOUTH WALES. Yengo N.P., c. 2.25 km S of junction with Mogo Ck Rd, 4 Apr. 2007, *S. Bell 2* (NSW).

**Hibbertia surcularis** Toelken

*J. Adelaide Bot. Gard.* 25: 80, fig. 1Q, R (2012). —  
**Holotype:** New South Wales, Bark Hut Swamp in Boonoo Boonoo Forest Res., 20 Oct. 1989, H.R. Toelken 7979 (NSW). **Isotypes:** AD290149, BRI, CANB, K, B, MO, PERTH.

*Hibbertia rufa* auctt. non N.A. Wakef.: N.C.W. Beadle, *Stud. Fl. N.E. New South Wales* 3: 255 (1976), p.p.; G.J. Harden & J. Everett, *Fl. New South Wales* 1: 301 (1990), p.p. (see Notes below).

Shrublets rarely to 0.3 m tall, erect-spreading, little branched, mainly suckering from underground rhizomes; branches filiform to thin-wiry, with ridges continuing decurrent leaf bases, reddish brown, glabrous. *Vestiture* restricted to one or few short terminal hairs on the acute apex of leaves and calyx lobes. *Leaves* without intrapetiolar tufts; *petiole* 2–3.5 (–4.5) mm long, glabrous; *lamina* linear to linear-elliptic, (3.9–) 5.0–8.0 (–10.2) × (0.5–) 0.6–0.8 mm, gradually tapering into petiole, acute to shortly pointed without obvious awn, but with a short transparent point often subtended by 1 to few finer erect hairs, all wearing off soon, adaxially ± flat and glabrous, abaxially with flush to slightly bulging central vein often more than twice broader at the base than the tightly abutting revolute margins without displaying the undersurface or rows of teeth between them, glabrous. *Flowers* sessile, terminal or axillary on distal main branches subtended by 3–5 acropetally decreasing fascicled leaves grading into cauline leaves; *flower stalk* absent; *buds* narrowly ovoid; *primary bracts* linear-triangular, 0.9–1.2 × 0.2–0.3 mm, acute to subulate, with central vein and revolute margins ± absent, glabrous; *additional bracts* 3 (4), short leaf-like, but grading into cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* elliptic-oblong, (3.6–) 3.8–4.5 (–4.8) × (1.6–) 1.8–2.1 mm, pointed to acute, ridged on distal third, outer and inner surface glabrous; *inner calyx lobes* oblong-ovate, (3.7–) 4.0–4.7 (–5.0) × (2.4–) 2.6–3.0 mm, shortly pointed to cuspidate, slightly ridged towards the apex, outer and inner surface glabrous. *Petals* obovate, 5.6–7.7 mm long, shallowly bilobed. *Stamens* 4 in a dense erect cluster to one side of the ovaries; *filaments* 1.0–1.2 mm long, 0.8–1.0 mm connate basally; *anthers* oblong, 1.6–1.8 mm long, subequal, stiffly erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but laterally compressed, each with (3) 4 (5) ovules, glabrous also on the crest; *styles* horizontally attached to the mid-lateral outer side of the ovaries and then curved outwards and upwards on either side of the stamens, positioning the erect stigmas just above the apex of the anthers. *Fruits* and *seeds* not seen.

**Distribution and ecology.** Grows in damp or swampy areas in sedge- or heathland in or surrounded by eucalypt forests or woodland, often along creeks in New South Wales (NT) and possibly south-eastern Queensland.

**Phenology.** Flowering in Oct. and Nov.

**Conservation status.** Locally common and conserved in Gibraltar Range N.P. and Werrikimbe N.P.

**Diagnostic features.** *Hibbertia surcularis* and *H. rufa* have very similar flowers, often in an arrangement at successive nodes, but the new species is distinguished by its much more delicate habit, being erect-branched shrublets interconnected from a suckering subterranean rhizome, by cuneate leaf bases, and especially by sessile flowers, which are subtended by leaves. The flowers of *H. succuneata* are also subtended by leaves, but that species differs by rigid, not herbaceous branches and by axillary flowers densely clustered to the terminal one. *Hibbertia surcularis* has a more distinctive shrubby habit than the similar *H. pilifera*, but differs by its glabrous branches and calyx lobes, usually four stamens and sessile flowers. *Hibbertia pustulata*, which resembles *H. surcularis* by its bluntly acute leaf apex without a well-developed awn but surrounded by a few hairs, is nevertheless distinguished by its tuberculate antrorse hairs mainly on the margins of the leaves and bracts.

**Variation.** The central vein of the leaf is broad and usually ± flush with, or rarely slightly recessed to, the revolute margins on either side of it. It was never found to bulge or protrude above them, as is commonly observed in *H. pustulata*.

**Notes.** The existence of this species with sessile flowers was referred to as potentially distinct in previous floras, viz. Beadle (1976) and Harden & Everett (1990), but has never been followed up, probably because of its close resemblance to other species.

**Specimens examined**

NEW SOUTH WALES. Cathedral Mt, Oct. 1987, R. Bates 11359 (AD); Gibraltar Range, Oct. 1987, R. Bates 11396 (AD); Basket Swamp picnic area, 9 km from Mt Lindesay Hwy, 14 Oct. 1993, R.G. Coveny 16577 & A.J. Whalen (AD; BRI, CANB, MEL, NSW, n.v.); near Mulligans Hut, Gibraltar Range N.P., 22 Nov. 1970, R.D. Hoogland 11824 (CANB, NSW, K; L, n.v.); Werrikimbe N.P., 10 Oct. 1987, J.R. Hosking s.n. (NSW224543; NE, n.v.); Boonoo Boonoo, Sep. 1884, C.H. Knoetzschn s.n. (MEL1003814); Grass Tree Swamp, near junction of Racecourse Trail and Spokes Trail, Werrikimbe N.P., 8 Nov. 1992, P.G. Kodela 201, P.D. Hind & T.A. James (AD; CANB, NSW, UNSW, n.v.); slopes SE Cathedral Rocks, 23 Oct. 1974, J.M.B. Smith 53 (NE); Bullock Ck, 14 km W New England N.P., 23 Nov. 1974, G.L. Stebbins & J. Williams A-66 (CANB); Sandy Ck, Nov., s.anno, C. Stuart 267 (MEL1003812, MEL1003813, MEL1003815); Bullock Ck, c. 14 km W Point Lookout, Ebor area, 23 Nov. 1974, J.B. Williams NSW224539 (NSW).

**Hibbertia taeniophylla** Toelken, sp. nov.

*H. octandrae* similis sed floribus sessilibus, foliis erectis vix expansis et caespibus intrapetiolaribus brevibus; a *H. incrassata* foliis venis centralibus plerumque recessis, ramis et foliis pilis fasciculatis differt.

**Holotypus:** Queensland (Co), Mt Bellenden Ker, 1891, *S. Johnson s.n.* (MEL1009621). **Isotypi:** MEL1009620, MEL1009622, MEL1009626.

Shrubs to 1.2 m tall, ± branched; branches rigid-woody, with ridges continuing from the decurrent leaf bases, fascicled-puberulous with scattered minute tuberculate radially spreading fascicled hairs (2–4 (–6) subequal arms). *Vestiture* ± persistent, comprising minute tuberculate radially spreading fascicled hairs on branches and on calyx overtopped by erect hooked simple hairs on calyx and bracts, while minute tuberculate straight simple hairs occur on leaves but wear off very soon. *Leaves* with sparse intrapetiolar tufts of straight simple hairs to 0.2–0.4 mm long and not laterally spreading along the sides of the decurrent leaf bases; *petiole* 0.3–0.6 mm long, puberulous with bifid and/or straight simple hairs; *lamina* linear, (4.3–) 6–14 (–24.4) × 0.5–0.7 mm, gradually tapering into the petiole, with shortly pointed awn, 0.2–0.4 mm long, but often wearing off, adaxially ± convex, glabrescent with minute tuberculate antrorsely spreading bifid and/or straight simple hairs particularly proximally and towards the apex but wearing off soon, abaxially with distinctly recessed central vein up to twice broader than the tightly abutting revolute margins without exposing the undersurface or rarely with rows of minute teeth between them, glabrescent as above. *Flowers* single, stalked and terminal on major branches, or on axillary branches below the old terminal flower with cauline leaves; *flower stalk* 2.8–5 (–7.3) mm long; *buds* ellipsoidal; *primary bract* ± subtending the calyx, linear-lanceolate, 2.1–3.3 × 0.3–0.4 mm, with reduced revolute margins, puberulous with scattered minute radially spreading fascicled hairs mainly along the margins and abaxially overtopped by scattered erect hooked hairs. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 6.1–6.5 × 1.8–2 mm, pointed, with distinct distal central ridge continued into a terminal point, outer surface with undercover of minute tuberculate radially spreading fascicled hairs (2–4 subequal arms) overtopped by erect hooked simple hairs mainly towards the base and along the central ridge, inner surface with minute bifid and/or straight simple hairs below the apex; *inner calyx lobes* broadly elliptic to ovate-elliptic, 6–6.2 × 2.6–3.3 mm, cuspidate to mucronate, with indistinct central ridge, outer surface with faint undercover of minute tuberculate radially spreading fascicled hairs ((1) 2 or 3 subequal arms) becoming smaller to just tubercles towards the glabrous membranous margins, overtopped by scattered erect hooked simple hairs mainly along the central ridge, inner surface glabrous. *Petals* obovate, 5.5–6.7 mm long, shallowly bilobed to entire. *Stamens* 10 in an erect cluster to one side of the ovaries; *filaments* 1.7–1.9 mm long, scarcely connate basally; *anthers* narrowly oblong, 1.5–1.8 mm long, with outer ones slightly shorter, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid but slightly laterally compressed, each with 4–6 ovules, hirsute with dense erect straight simple hairs; *styles* horizontally attached to the upper half of the outer sides of the ovaries, then curved up and erect,

positioning the stigmas well above the anthers. *Fruits* on short erect stalks. *Seeds* obovoid to almost spherical, 2.2 × 2.1 mm, black; *aril* with fleshy attachment and surmounted by slightly lobed membranous cup covering the lower third to half the base of the seed.

**Distribution and ecology.** Growing on gravelly substrate (quartz/feldspar porphyry) with heath in woodland in northern Queensland (Co, Nk).

**Phenology.** Flowering in Apr.

**Conservation status.** Recorded from Wooroonooran N.P. (Mt Bellenden Ker, but that specimen was collected in 1891).

**Diagnostic features.** The long slender leaves of *H. taenio-phylla* superficially resemble those of *H. incrassata*, but the latter species differs mainly by the absence of radially spreading fascicled hairs on branches and leaves, as well as by the distinctive bulging central vein of the leaves.

**Variation.** The two specimens examined from Mt Bellenden Ker and Ben Lomond, although geographically very far apart, agree in all characteristics sufficiently closely to accept them as belonging to the same species. Further populations are likely to be found on mountains between these two extremes.

**Etymology.** The epithet *taenia-phylla*, Latinised Greek, “strap-like leaved” refers to its long linear leaves.

#### **Specimen examined**

QUEENSLAND. Ben Lomond Mining lease, 8 Apr. 2008, *B.R. Jackes BL63* (AD); Muggrave R., 1891, *S. Johnson s.n.* (MEL31451); Expedition Range, 1879, *M.A. Thozet s.n.* (MEL31421).

#### ***Hibbertia tuberculipilosa* Toelken, *sp. nov.***

*A H. pilifera ramis et foliis pilis simplicibus tuberculatis et ovaris pubescentibus differt.*

**Holotypus:** New South Wales (NWS), Warrumbungle Ranges, Oct. 1899, *W. Forsyth s.n.* (NSW102296).

Shrubs moderately branched; branches wiry-woody, with ridges continuing from the decurrent leaf bases, puberulous to pubescent with antrorsely appressed, tuberculate straight simple hairs. *Vestiture* ± persistent, with ± tuberculate straight simple hairs on branches and leaves and ciliate margins of particularly the inner calyx lobes, while on the ovaries often additional bifid or even trifid hairs occur. *Leaves* with sparse intrapetiolar tufts of straight simple hairs 0.2–0.4 mm long and laterally spreading mainly on both sides of the decurrent ridges; *petioles* 0.2–0.5 mm long, puberulous with antrorsely spreading to appressed straight simple hairs; *lamina* linear, (4.2–) 6–11 (–12.8) × 0.5–1.1 mm, abruptly constricted into petiole, pointed with awn to 0.5 mm long and with a somewhat transparent apex, adaxially slightly convex, puberulous

with scattered, antrorsely spreading straight simple hairs on distinct paler tubercles, which remain when hairs wear off, abaxially with  $\pm$  recessed glabrous central vein about twice broader than the tightly abutting revolute margins without exposing the undersurface and only sometimes with a row of teeth on both sides is showing, with revolute margins with scattered, antrorsely spreading tuberculate straight simple hairs as adaxially. *Flowers* usually subsessile, terminal and/or axillary on distal branches; *flower stalk* 0.2–0.8 mm long; *buds* obovoid; *primary bract* on lower part of the stalk, triangular-lanceolate, 0.6–1  $\times$  c. 0.2 mm, acute to pointed, without revolute margins, glabrescent with mainly marginal cilia, grading into 1 or 2 (3) *additional bracts*, which are linear-elliptic to oblanceolate and usually also  $\pm$  without revolute margins grading into shorter prophylls. *Calyx lobes* unequal; *outer calyx lobes* lanceolate, 4.3–4.4  $\times$  1.8–2.1 mm, acute to obtuse, without obvious central ridge, outer and inner surface glabrous; *inner calyx lobes* elliptic to elliptic-obovate, 4.2–4.5  $\times$  2.6–2.9 mm, obtuse to usually rounded, without distinct central ridge, outer surface glabrous except for ciliate distal margins, inner surface glabrous. *Petals* obovate, c. 4.5 mm long, shallowly bilobed. *Stamens* (3) 4 in a dense erect cluster to one side of the ovaries; *filaments* 0.8–1 mm long, with basal third connate; *anthers* oblong, 1.2–1.3 mm, subequal,  $\pm$  erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid and scarcely laterally compressed, each with 4 ovules, pubescent, particularly on the crest, with vertically appressed bi- and trifid hairs; *styles* horizontally attached to the upper third outer surface of the ovaries, then straight up, positioning the stigmas just above the anthers. *Fruits* on short erect or scarcely recurved stalks. *Seeds* obovoid or sometimes almost spherical, 2–2.2  $\times$  2–2.1 mm, shiny black; *aril* with fleshy attachment surmounted by a short membranous cup covering the basal quarter of the seed.

**Distribution and ecology.** Known only from Warrumbungle Ranges in central New South Wales (NWS), but the habitat is unknown.

**Phenology.** Flowering in Oct.

**Conservation status.** Recorded as rare from the Warrumbungle N.P., though both known specimens date back to the 1800s.

**Diagnostic features.** The four stamens per flower, with filaments up to one-third connate, resembles the pollination syndrome of flowers of the *H. rufa* subgroup, but the obvious, somewhat coarse tuberculate straight simple hairs on the leaves, the glabrous calyx lobes, except for marginal cilia, and especially the erect hirsute hairs on the ovaries including the crest distinguish *H. tuberculipilosa* from other species of the subgroup. In particular, *H. tuberculipilosa* is distinguished from *H. pilifera* by antrorsely appressed hairs with raised tubercles on the branches and leaves, and especially the hirsute ovaries.

**Etymology.** The meaning of the epithet *tuberculipilosa*, Latin, “tubercled-haired”, is most obvious on the leaves.

### Specimen examined

NEW SOUTH WALES. *s. loc.*, 1825, *A. Cunningham* 25 (MEL31435, MEL31437).

### *Hibbertia woronorana* Toelken

*J. Adelaide Bot. Gard.* 25: 72, fig.1A–C (2012). —

**Holotype:** New South Wales: Woronora River at Heathcote Bridge, 13 Sep. 1972, *R.D. Hoogland* 12257 (MEL572180). **Isotype:** CANB, K, NSW, L, US, *n.v.*

*Hibbertia acicularis* *auct. non* (Labill.) F.Muell.: *A.A.Hamilton, Proc. Linn. Soc. New South Wales* 40: 628 (1915), as per specimens from Woronora River.

Shrublets to 1 m tall, much-branched; main branches rigid-woody, with ridges continuing from the decurrent leaf bases soon becoming obscure, glabrous. *Vestiture* absent except for short intrapetiolar tufts and short erect to antrorse straight simple hairs on the ovary. *Leaves* often without or with sparse short intrapetiolar tuft of straight simple hairs to 0.15 mm long and usually hidden by appressed petiole; *petiole* 0.2–0.5 (–0.7) mm long,  $\pm$  dorsiventrally compressed, glabrous; *lamina* linear-lanceolate to linear when revolute margins are strongly recurved, (5.3–) 7.0–9.0 (–11.3)  $\times$  (0.45–) 0.6–0.7 (–0.85) mm,  $\pm$  gradually constricted into petiole, with apex drawn into terminal awn, 0.2–0.6 (–0.85) mm long, and with transparent point, adaxially  $\pm$  flat and glabrous, abaxially with usually deeply recessed central vein as wide to almost twice broader than the tightly abutting revolute margins without displaying the undersurface or rows of teeth between them, glabrous as adaxially. *Flowers* stalked, terminal but often becoming  $\pm$  leaf-opposed due to successive overtopping by axillary growth flushes from the top subtending leaves, each with another flower, mainly on distal main shoots; *flower stalk* (8.8–) 11–13 (–14.7) mm long; *buds* ellipsoidal to narrowly ovoid; *primary bract* on upper third, linear, rarely linear-triangular, 0.6–0.8 (–1.1)  $\times$  0.1–0.2 mm, acute or with short terminal bristle, with central vein scarcely visible and without revolute margins, glabrous; *additional bracts* 2 (3), at base of stalk, leaf-like, but shorter than cauline leaves. *Calyx lobes* unequal; *outer calyx lobes* narrowly oblong to oblong-elliptic, (3.8–) 4.0–4.3  $\times$  1.2–1.5 mm, acute, without visible central ridge, outer and inner surface glabrous; *inner calyx lobes* oblong-ovate to oblong-elliptic, (3.7–) 4.0–4.3  $\times$  2.2–2.7 mm, abruptly constricted into shortly acute apex to mucronate, without visible central ridge, outer and inner surface glabrous. *Petals* oblanceolate to oblong-oblanceolate, (3.3–) 3.9–5.0 (–5.4) mm long, emarginate, rarely bilobed. *Stamens* (4) 5 or 6; *filaments* 1.0–1.2 mm long, up to one-third connate; *anthers* narrowly oblong, 1.25–1.4 mm long, subequal, erect, abruptly constricted at apex and base. *Pistils* 2; *ovaries* obovoid and scarcely laterally compressed, each with 2

(–4) ovules, tomentose to puberulous including on the crest; *styles* horizontally attached to upper outer edge of the ovaries, then spreading outward and erect on either side of the stamen cluster, positioning the fine stigmas well above the apex of the anthers. *Fruits* on ± recurved stalks. *Seed* not seen.

**Distribution and ecology.** Restricted to the mid and lower reaches of the Woronora River, New South Wales (CC). Growing on rocky sandstone slopes or deep sandy bars with sclerophyll forest comprised of *Angophora costata*, *Corymbia gummifera*, *Eucalyptus punctata* and stringybark sp. in association with *Allocasuarina littoralis*, *Doryanthes excelsa*, *Banksia serrata*, *Dodonaea triquetra*, *Platysace linearifolia*, *Epacris pulchella*, *Hakea dactyloides*, *Grevillea buxifolia*, *Grevillea diffusa*, *Acacia linifolia*, *Xanthosia tridentifera* and locally more diverse (R.T. Miller, pers. obs.).

**Phenology.** Flowering in Sep.–Dec.

**Conservation status.** “Highly restricted small localised populations within Heathcote N.P. though locally common at some other sites” (R.T. Miller & J. Miller 18.3.2007–69). “Extremely vulnerable to disturbances, and rare and endangered downstream of the Needles (R.T. Miller & J. Miller 1.11.2008–11), probably extinct in Como vicinity” (R.T. Miller, pers. obs.).

**Diagnostic features.** *Hibbertia woronorana* is superficially similar to *H. acicularis* but can be distinguished by being a woody erect shrub to 1 m tall and is completely glabrous (i.e. even including the calyx). The shorter leaves are spreading at about right angles to the branches, the calyx is only 3.7–4.3 mm long and the anther 1.25–1.4 mm long, while the filaments are connate in the lower third.

Although the filaments are usually connate in the lower third, some were observed to be fused up to two-thirds on some plants. Since this species has 4–6 stamens of subequal length, it seems likely that *H. woronorana* has a similar pollination syndrome to species of the *H. rufa* subgroup, but differs also from those species by woody branches and an erect habit to 1m tall.

**Variation.** The primary bract does not subtend the calyx, but is usually found in the upper third of the flower stalk. Its position on the stalk varies considerably even sometimes on the same plant.

### Specimens examined

NEW SOUTH WALES. Woronora R. near Como on sandbanks, Dec. 1893, *E. Betche s.n.* (NSW102275); Woronora R., 2 Oct. 1901, *E. Cheel s.n.* (NSW102273); Heathcote, Woronora R., Oct. 1915, *A.A. Hamilton s.n.* (NSW102274); Water Board track above Woronora R., R.T. & J. Miller 18.3.2007–69 (AD, NSW); Woronora R. between Forbes Ck and the Needles, R.T. & J. Miller 1.11.2008–11 (AD).

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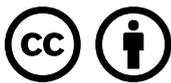
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