A taxonomic revision of *Anisomeles* R.Br. (Lamiaceae)

A.R. Bean

Summary

Bean, A.R. (2015). A taxonomic revision of *Anisomeles* R.Br. (Lamiaceae). ***Austrobaileya* 9(3): 321–381.** The genus *Anisomeles* R.Br., naturally occurring from southern Asia to northern Australia, is taxonomically revised, and its phylogenetic placement is discussed. 26 species are recognised, of which 18 species are newly described (*A. antrorsa* A.R.Bean, *A. brevipilosa* A.R.Bean, *A. bundeyensis* A.R.Bean, *A. carpentarica* A.R.Bean, *A. dallachyi* A.R.Bean, *A. eriodes* A.R.Bean, *A. farinacea* A.R.Bean, *A. grandibractea* A.R.Bean, *A. languida* A.R.Bean, *A. lappa* A.R.Bean, *A. leucotricha* A.R.Bean, *A. macdonaldii* A.R.Bean, *A. ornans* A.R.Bean, *A. papuana* A.R.Bean, *A. principis* A.R.Bean, *A. viscidula* A.R.Bean, *A. vulpina* A.R.Bean, *A. xerophila* A.R.Bean), and one, *A. ajugacea* (F.M.Bailey & F.Muell.) A.R.Bean, is a new combination. Diagnostic morphological characters are discussed, and a comprehensive identification key to the species and four regional keys are provided. A summary of the chemical properties and cytology of two common Asian species is presented. Illustrations, images and detailed distribution maps are provided for all species, and their ecology and phytogeography are discussed. Lectotypes are chosen for *Anisomeles candicans* Benth., *A. cuneata* J.Jacq. ex Fenzl, *A. heyneana* Benth., *A. inodora* R.Br., *A. moschata* R.Br. and *A. salviifolia* R.Br.

Key Words: Lamiaceae, *Anisomeles*, *Anisomeles ajugacea*, *Anisomeles antrorsa*, *Anisomeles brevipilosa*, *Anisomeles bundeyensis*, *Anisomeles carpentarica*, *Anisomeles dallachyi*, *Anisomeles eriodes*, *Anisomeles farinacea*, *Anisomeles grandibractea*, *Anisomeles languida*, *Anisomeles lappa*, *Anisomeles leucotricha*, *Anisomeles macdonaldii*, *Anisomeles ornans*, *Anisomeles papuana*, *Anisomeles principis*, *Anisomeles viscidula*, *Anisomeles vulpina*, *Anisomeles xerophila*, *Epimeredi*, Asia flora, Australia flora, Malesia flora, nomenclature, new species, indumentum, morphology, identification keys, distribution maps, conservation status

A.R. Bean, Queensland Herbarium, Department of Science, Information Technology and Innovation, Brisbane Botanic Gardens, Mt Coot-tha Road, Toowong, Queensland 4066, Australia. E-mail: Tony.Bean@dsiti.qld.gov.au

Introduction

Anisomeles R.Br. is a genus belonging to Lamiaceae subfamily Lamioideae (Harley *et al.* 2004). Its species are short-lived perennial shrubs distributed in northern Australia, Malesia and southern Asia. The genus was described by Robert Brown (Brown 1810), with three species, *A. salviifolia* R.Br., *A. moschata* R.Br. and *A. inodora* R.Br., based on specimens that he himself collected from northern Australia, and a specimen collected earlier by Banks and Solander. Soon afterwards, it was realised that two species named by Linnaeus from India (*Nepeta indica* L. and *Nepeta malabarica* L.) were referable to *Anisomeles* (Sims 1819).

Bentham (1848) provided a comprehensive taxonomic treatment of *Anisomeles*, where he enumerated eight species – the three species of Brown from Australia, and five from India and south-east Asia. Later, Bentham (1870) recognised only one species (*A. salviifolia*) for Australia, but at the same time documented four 'forms', with Brown's three species associated with two of these forms. He commented, "with the very large number [of specimens] from various localities now before me, I am unable to assign any positive limits to any of the following [forms]". Bentham's taxonomy was subsequently followed, and hence *A. salviifolia* was applied to all Australian populations of *Anisomeles* for many years. Domin (1928) maintained *A. salviifolia* as the sole Australian species, but erected several varieties based partly on the

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differing indumentum patterns. None of these varieties was accepted by Australian botanists of the time.

Keng (1969) used the name *Anisomeles salviifolia* for some Malesian material, but later he (Keng 1978) considered that even *A. salviifolia* could not be maintained, reducing it to a synonym of *A. malabarica* (L.) R.Br. On this basis, the name *A. malabarica* was subsequently adopted by all Australian herbaria for nearly all Australian *Anisomeles* specimens, and this has been mainly the *status quo* until this revision. Bhatti & Ingrouille (1996) used the name *A. salviifolia* for specimens originating in Australia and New Guinea, although this was partly based on the erroneous belief that all four anthers in *A. salviifolia* are dithecous. In fact, all *Anisomeles* species have the same pattern of two dithecous anthers and two monothecous anthers in each flower.

Harley *et al.* (2004) accepted three species for the genus, but did not name them. Govaerts *et al.* (2013) have accepted five *Anisomeles* species, with four occurring in southern Asia and Malesia (*A. candicans* Benth., *A. heyneana* Benth., *A. indica* (L.) Kuntze, *A. malabarica*), and two occurring in Australia (*A. malabarica, A. salviifolia*). In the current paper, the four Asian/Malesian species accepted by Govaerts *et al.* (2013) are maintained, and two are added; *A. principis* A.R.Bean (found in Timor) and *A. papuana* A.R.Bean (found in New Guinea, the Moluccas and Torres Strait, Queensland). For Australia, 23 species are recognised, being *A. salviifolia* and 22 other species, including 18 species newly named. The present study clearly demonstrates that *A. malabarica* does not occur in Australia. The taxonomic 'lumping' currently applied to Australian *Anisomeles* is a legacy of the statements of Bentham (1870), reinforced by Keng (1978), to the effect that *Anisomeles* is a diffuse genus, where intergradation is rife and there are no discrete taxa. The current author has found that this is not the case. While there is certainly evidence of intergradation between some species, many are eminently discrete and separable from each other by discontinuities in readily observable morphological characters. The differences are often subtle, but they are at least as robust as differences used to separate species in other genera of Lamiaceae, and in other related families.

Rothmaler (1944) maintained that the generic name *Epimeredi* Adans. is synonymous with *Anisomeles*, and that the former should replace the latter. As a consequence, *Epimeredi* was taken up for a time by some Australian herbaria. An unsuccessful proposal to conserve *Anisomeles* against *Epimeredi* was made by Subramanyam & Henry (1969). In the meantime, Backer and Backhuisen van den Brink (1965) had decided that Adanson's original material of *Epimeredi* probably did not include any specimen referable to *Anisomeles*, and so they maintained *Anisomeles* as the accepted generic name. Parkinson (1987) considered that none of Adanson's unconserved generic names were validly published. However, this conclusion was refuted by Wilbur (1989), and the current consensus amongst the botanical community is that Adanson's genera are validly published.

I have examined high quality images of the four Lamiaceae specimens in the Adanson Herbarium (P-Ad.) that have *Epimeredi* written on the label; these four specimens comprise three different species. Only one of these specimens (P00680377) can be linked to the protologue, as one of its labels includes the notation "h. Reg Par 1754". This is a reference to the *Hortus Regius Parisiensis*, cited in the protologue. The date 1754 precedes the publication date for *Epimeredi*, and the specimen is therefore original material. This specimen is readily identifiable as *Anisomeles malabarica*. The inevitable conclusion is that *Epimeredi* Adans. (1763) and *Anisomeles* R.Br. (1810) are congeneric. A proposal to conserve *Anisomeles* against *Epimeredi* is currently under consideration by the Nomenclature Committee for Vascular Plants (Bean 2015).

Materials and methods

This revision is based mainly on a morphological examination of 1300 herbarium

specimens, including 370 specimens held at BRI. Specimen loans were obtained from A, BKF, BM, CANB, DNA, E, G, GH, K, L, MEL, NT, NY, P, PERTH, PR and SING. Specimen images from E, K, MH, P and W have either been received or viewed on the internet. In most cases, the delicate corolla has been examined after reconstitution in boiling water, although spirit material and photographic images were available for several species, especially those from Queensland. Close-up photographic images of flowers have assisted in assessing corolla characters. The author has made limited field studies in Queensland and Northern Territory.

Data on 72 morphological characters for the 26 species were entered into a matrix using the Delta editor (Dallwitz *et al.* 1999 onwards). INTKEY software (Dallwitz *et al.* 1995 onwards) facilitated the development of an interactive key, and the retrieval of diagnostic characters for each taxon. Natural language descriptions were also derived from the data stored in Delta format. Where sequential measurements are given as e.g. 5–7.5 or 8.3–10 this means that the 5 or 10 is equivalent to 5.0 or 10.0 respectively.

The distribution maps were compiled using DIVA-GIS Version 7.5.0, using localities or geocodes given on the labels of specimens and specimen images from the herbaria listed above.

Commonly used abbreviations in the specimen citations are HS (Homestead), NP (National Park), Mt (Mount or Mountain; some place or locality names are correctly Mountain in terms of official names [Geoscience Australia 2015]) and SF (State Forest). Species treatments are arranged alphabetically.

Conservation assessments are made using the IUCN (2012) criteria but are only recommendations as they have not been enacted into Legislation.

Phylogenetic relationships

Cantino (1992) hypothesised a close relationship between *Anisomeles* and *Pogostemon* Desf. based on the shared presence of minute leaf epidermal glands with a unicellular cap, 'bearded' staminal filaments and a lustrous pericarp. This close relationship was further supported by the pollen study of Abu-Asab & Cantino (1994), with both genera shown to have very similar pollen grains, with regular polygonal lumina and large perforations.

Phylogenetic reconstruction using molecular data has determined that *Anisomeles* belongs in the subfamily Lamioideae, tribe *Pogostemoneae* Briq. (Scheen *et al.* 2010; Bendiksby *et al.* 2011), and is sister to *Pogostemon*. Other genera in the 'Pogostemoneae a' clade are *Colebrookea* Sm., *Craniotome* Reichb. and *Microtoena* Prain; these three genera are endemic to south-east Asia. *Pogostemon* has a similar distribution to *Anisomeles*, but with its species diversity centred in India.

Uses and chemical properties

Indian people have used both *Anisomeles malabarica* (Malabar catmint) and *A. indica* (Indian catmint) as medicinal herbs for centuries. *A. malabarica* has been traditionally used to treat amentia, anoxeria, fevers, halitosis, intestinal worms, swellings and rheumatism (Chopra *et al.* 1956; Warrier *et al.* 1994). In recent years, chemical investigations have sought to discover the reasons for the perceived efficacy of *Anisomeles* spp. Jeyachandran *et al.* (2007) claimed that an extract from *A. malabarica* has anti-cancer properties based on a study of liver disease in mice. Kavitha *et al.* (2012) reported that ethanolic extracts and diethyl ether extracts of *A. malabarica* had a statistically significant inhibitory effect against a range of bacteria, including *Staphylococcus aureus* and *Escherischia coli*. Similarly, Mohanraj *et al.* (2012) found an inhibitory effect against four pathogenic bacteria, using a methanol extract from *A. malabarica*.

Baranwal *et al.* (2012) stated that *A. indica* is a source of medically active compounds having various positive pharmacological effects. They made reference to more than a dozen scientific papers that document the bioactivity of *A. indica*, as an analgesic, a

natural herbicide, an antioxidant, an anti-microbial agent, an anti-inflammatory, an inhibitor of the HIV virus, and an inhibitor of tumour cell proliferation.

Chemical analysis of *Anisomeles indica* has revealed the presence of numerous terpenoid compounds, including Anisomelic Acid (Arisawa *et al.* 1986), and 15 essential oil constituents (Yadava & Barsainya 1998). *Anisomeles malabarica* has been shown to possess Anisomelic Acid, as well as Anisomelolide, Malabaric Acid, 2-Acetoxymalabaric Acid, Anisomelyl Acetate and Anisomelol (Preethy *et al.* 2013), and essential oils.

Surprisingly, the available literature on Australian Aboriginal ethnobotany makes no mention of *Anisomeles* spp. Nor have there been any chemical analyses performed on Australian *Anisomeles* spp.

Ecology and phytogeography

All *Anisomeles* species are short-lived perennial shrubs. In areas where the climate is mesic, there may be continual growth for some years. In places that are very dry for part of the year, the leaves abscise and the stems die back to ground level, then new stems sprout from a woody rootstock upon the arrival of the wet season. The same response occurs after a fire. *Anisomeles* spp. do not seem to be pioneer plants that colonise newly burnt ground, but they are certainly fire-adapted.

The present author was unable to germinate any *Anisomeles* seeds. I tried fresh field-collected seeds, as well as seeds extracted from recently collected herbarium specimens. A few seeds from each seedlot were dissected to confirm the presence of a plump embryo. Seedlots were variously untreated, hot-water treated, or scarified. All seeds were placed in petri dishes on blotting paper and kept moist for five weeks, with temperatures ranging from 17° to 27° C. No germination was recorded for any treatment or seedlot. Aluri (1992) similarly reported failure in germinating seeds of *A. indica*, using different unspecified treatments in a greenhouse, and he concluded that there are unknown barriers for breaking dormancy and subsequent germination. In contrast, Fryer (2006) recorded that *Anisomeles* seeds germinated at Kings Park, Perth, in 9–42 days with no special treatment.

Anisomeles species inhabit a wide range of soil types, from sands to clays, but in all cases freely draining. In some instances, the soil is skeletal in rocky gorges and escarpments. The parent material can be sandstone, granite, limestone or basalt. The distribution of some species extends into littoral areas including continental islands, but they usually occur away from the direct influence of salt-laden winds.

Aluri (1992) reported that *Anisomeles malabarica* and *A. indica* are pollinated mainly by sunbirds (*Nectarinia* sp.) and carpenter bees (*Xylocopa* spp.). The bees land on the lower corolla lip and insert their proboscis into the base of the flower, and in so doing the stigma brushes against the back of its head and its thorax. The sunbird lands on the inflorescence rachis and probes several flowers in the vicinity, contacting the stigma with its pollen-laden bill and forehead.

No hybrids between *Anisomeles* spp. have been reported in Australian literature, nor indicated on specimen labels, nor observed by the current author. However, Aluri (1992) has reported the existence of a single individual with morphological characteristics intermediate between *A. malabarica* and *A. indica*, naturally occurring at Turimella, India. Aluri & Subba Reddi (1989) bagged unmanipulated flowers of *A. malabarica* and *A. indica*, and found that the plants were self- and cross-compatible and self- and cross-pollinating. Fruit and seed production was higher in cross-pollinated plants, but plants can produce limited seed in the absence of pollinators.

Anisomeles is distributed in northern Australia, Malesia and southern Asia. It extends west as far as Pakistan, north to the Himalayan Range, and east to the Ryukyu Islands of Japan. It is widespread in India and south-east Asia, and occurs, somewhat sporadically, in the islands of Malesia. It

is found in Australia as far south as the Queensland-New South Wales border. Most members of the genus are confined to the tropics; only *A. moschata* extends south of the Tropic of Capricorn, while only *A. indica* extends north of the Tropic of Cancer. The species diversity is greatest in tropical Australia, especially the 'Top End' of Northern Territory and in northern Queensland. The genus has not been recorded on any of the islands of the southern Pacific Ocean, except as a naturalised alien.

Ctyology

Krishnappa & Basavaraj (1982) reported $2n = 34$ for *Anisomeles indica*, and several other studies have confirmed this. The same authors reported $2n = 34$ for *A. malabarica*; this is supported by most other studies, but Thoppil & Jose (1998) recorded $2n = 32$. No chromosome counts have been published for Australian *Anisomeles* spp.

Discussion of morphological characters

1. Habit

Anisomeles species may be prostrate (**Fig. 1B**) or may reach three metres in height, according to labels of specimens from both Asia and Australia, but more usually they are in the height range 0.6–1.5 m (**Fig. 1C**). Upright plants may become top-heavy and lean over with large stems resting on the ground, but continuing to grow; such plants have here been termed procumbent.

2. Stem indumentum

Anisomeles species display a range of hair types, and the structure, direction, density and size of hairs are all diagnostic. The three common hair types are 1. the hispid hair (**Fig. 2A**). This hair type is erect (± perpendicular to the stem), relatively straight, eglandular, multicellular and longer than 1 mm. The presence of this hair type is partly related to ontogeny. Most species have dense hispid hairs throughout the stem on young plants, but as the plant ages these are usually lost, at least from the upper portions of the plant. From the small proportion of herbarium specimens that include the entire plant, it is evident that in the majority of species, hispid hairs persist at the basal part of the stem on mature plants. They are apparently absent in *A. farinacea* and *A. ornans*. In this study, comparisons between taxa involving this hair type were made only from the upper stems, 1–3 nodes below the most proximal verticil. 2. the short, curved, eglandular hair (**Fig. 2B**). This type is found on the majority of taxa, and varies in density from very sparse to dense, though on any given taxon, the density is relatively uniform. On the stems of a few species, these hairs are antrorse; but in most species the hairs are retrorse. In some taxa with very densely tomentose stems, the hairs are somewhat variable in direction. 3. the stalked glandular hair (**Fig. 2C**). These are 0.1–0.3 mm long and erect. They are frequently present on the calyx and rachis, but on the stems they are usually (depending on the taxon) either abundant or absent.

The hair types present, in combination with their density, allows the partial identification of many species from sterile material.

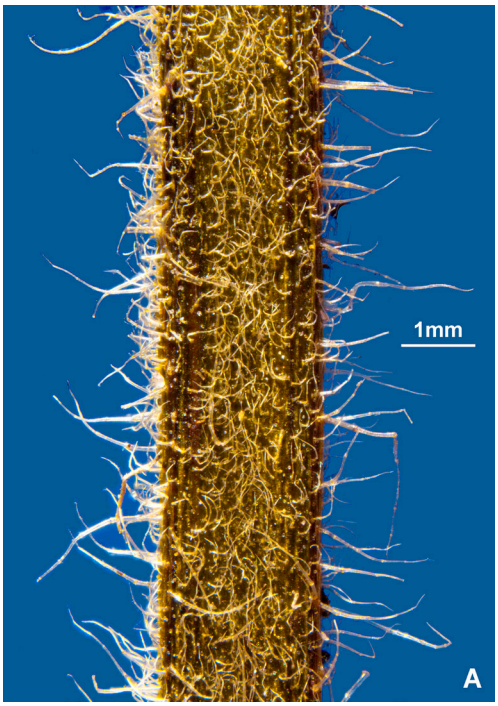
3. Leaf morphology and indumentum

Leaf shape is more or less consistent for any given taxon, and the leaf base may be attenuate, narrowly cuneate, broadly cuneate or obtuse (**Figs. 3, 4, 5**). The leaves of all species are lobed, with the margins being crenate, dentate or serrate. The shape, number and the depth of the lobes are diagnostic for some species. At the peak of each lobe is a prominent gland. The length of the petiole relative to the lamina is also a useful measure that discriminates some taxa.

For the purposes of this paper, the 'cauline leaves' are defined as those that are three or more nodes below the most proximal verticil. The 'upper leaves', i.e. those adjacent to or 1 or 2 nodes below the most proximal verticil, have been measured only when cauline leaves are not available. The 'leaves' or 'bracts' subtending a verticil (except the most proximal) are referred to as 'floral bracts'.

The indumentum types present on the leaves are often the same as on the stems, but the direction is never retrorse – they are either antrorse, erect, or flexuose with no fixed direction. The difference in density between

Fig. 1. ***Anisomeles*** spp. photographed in the wild. A. flower of ***A. languida***. B. habit of ***A. languida***. C. flowering plant of ***A. carpentarica***. D. flower of ***A. macdonaldii***. A & B from *McDonald KRM14297* (BRI); C from *Cowie 10489* (DNA); D from *McDonald KRM14083 & Guymer* (BRI).



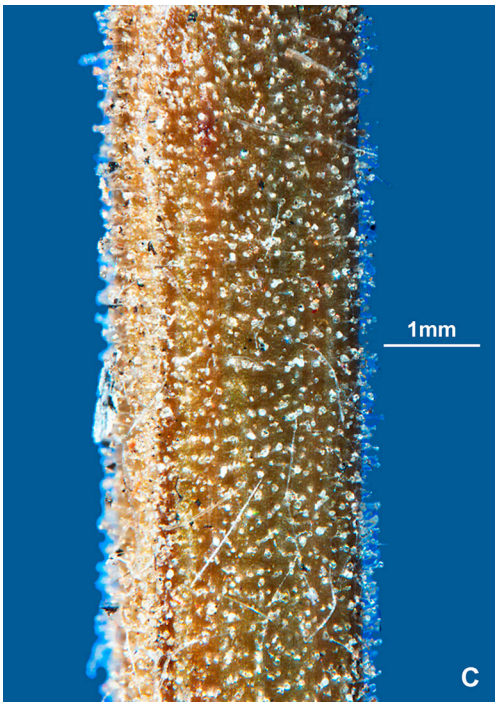


Fig. 2. Indumentum types of ***Anisomeles*** spp. A. stem of ***A. languida*** with hispid hairs and short curved eglandular hairs B. stem of ***A. moschata*** with short curved eglandular hairs only. C. stems of ***A. viscidula*** with stalked glandular hairs only. A from *McDonald KRM14297* (BRI), B from *Batianoff 940683 & Price* (BRI), C from *Egan 5038* (DNA).

the upper and lower surfaces is sometimes diagnostic, as is the length of the hairs on both surfaces.

4. Inflorescence structure

In all species, the inflorescence comprises few to many verticils arranged in a spike-like structure at the end of each branch. Each verticil comprises two cymose inflorescences on opposite sides of the stem. There is much variation in the branching pattern of the cymes, the number of flowers per cyme, and the distance between the individual flowers or fruits. The leaves or bracts subtending the verticil (except the lowest one) are referred to as 'floral bracts'. All other leaf-like structures within the cymes are termed 'bracteoles'. There are three cyme types (**Fig. 6**): 1. entirely monochasial, where every flower is borne on

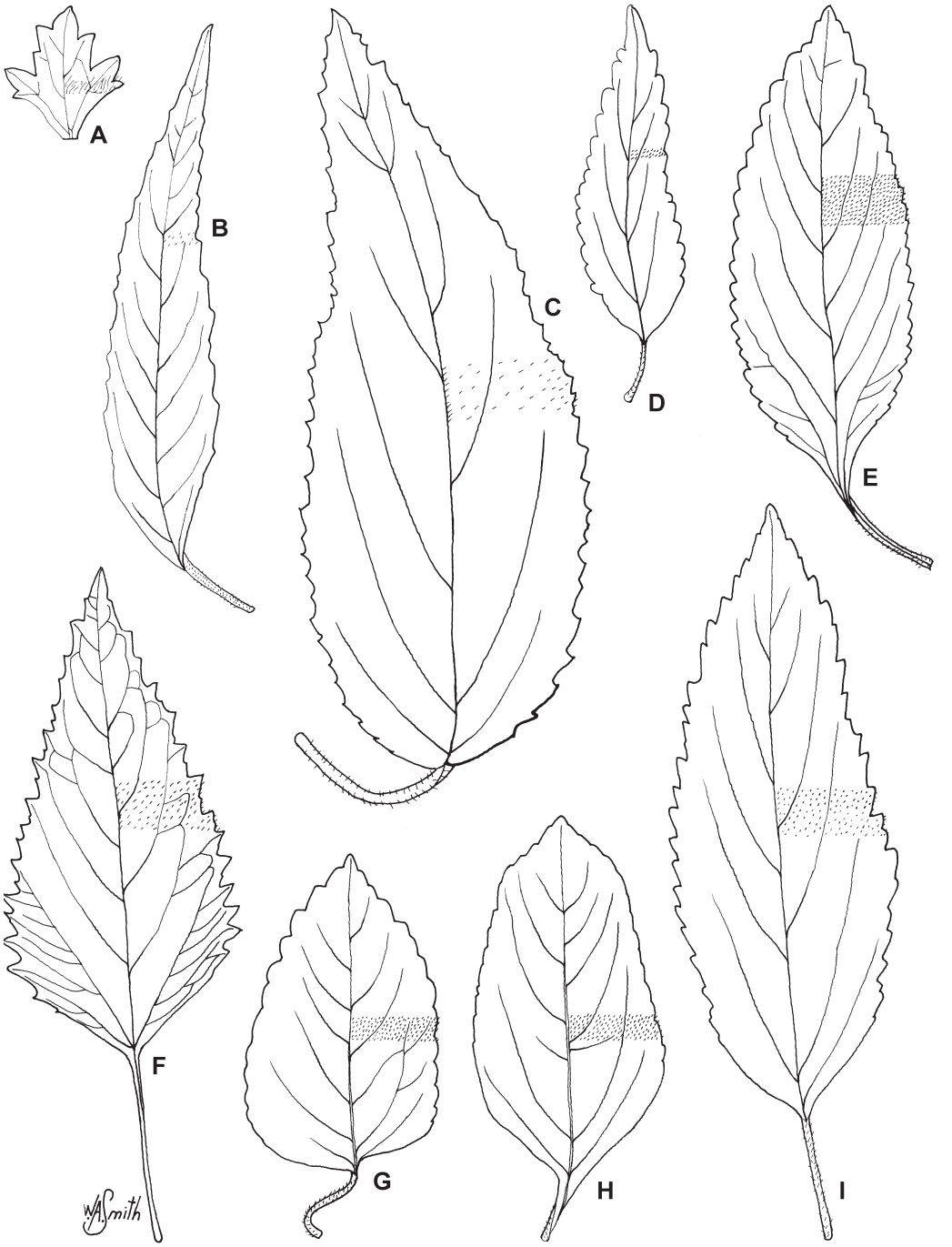


Fig. 3. Cauline leaves of ***Anisomeles*** spp. (all ×0.8): A. ***A. ajugacea*** (*Wannan 3568 & Verdec*, BRI). B. ***A. brevipilosa*** (*O'Neill 72*, DNA). C. ***A. bundeyensis*** (*Fensham 559*, DNA). D. ***A. candicans*** (*Mokim 586*, G). E. ***A. carpentarica*** (*Russell-Smith 2866 & Lucas*, DNA). F. ***A. dallachyi*** (*Dallachy s.n.,* MEL 1551746). G. ***A. grandibractea*** (*Dunlop 4438*, DNA). H. ***A. eriodes*** (*Forster PIF32572 & McDonald*, BRI). I. ***A. farinacea*** (*Edinger 496*, PERTH). Del. W. Smith.

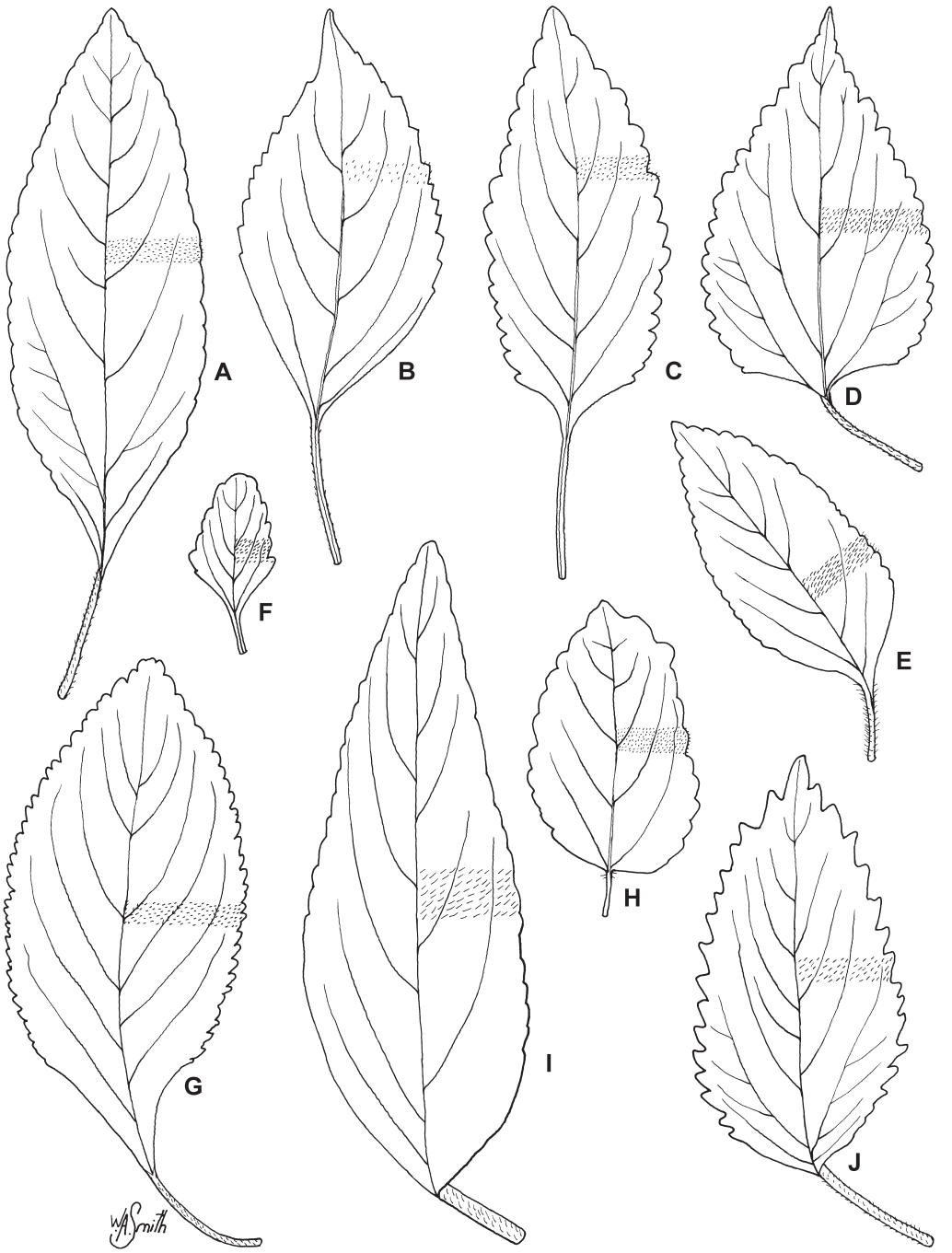


Fig. 4. Cauline leaves of ***Anisomeles*** spp. (all ×0.8): A. ***A. grandibractea*** (*Lazarides 9106*, DNA). B. ***A. heyneana*** (*Sinclair 4562*, E). C. ***A. inodora*** (*Forster PIF32933*, BRI). D. ***A. indica*** (*Lei 110*, NY). E. ***A. languida*** (*McDonald KRM14297*, BRI). F. ***A. lappa*** (*Forster PIF12777 & Bean*, BRI). G. ***A. leucotricha*** (*Michell & Risler 1520*, DNA). H. ***A. macdonaldii*** (*McDonald KRM3899 & Little*, BRI). I. ***A. malabarica*** (*Wight 2173*, NY). J. ***A. moschata*** (*Bean 26462*, BRI). Del. W. Smith.

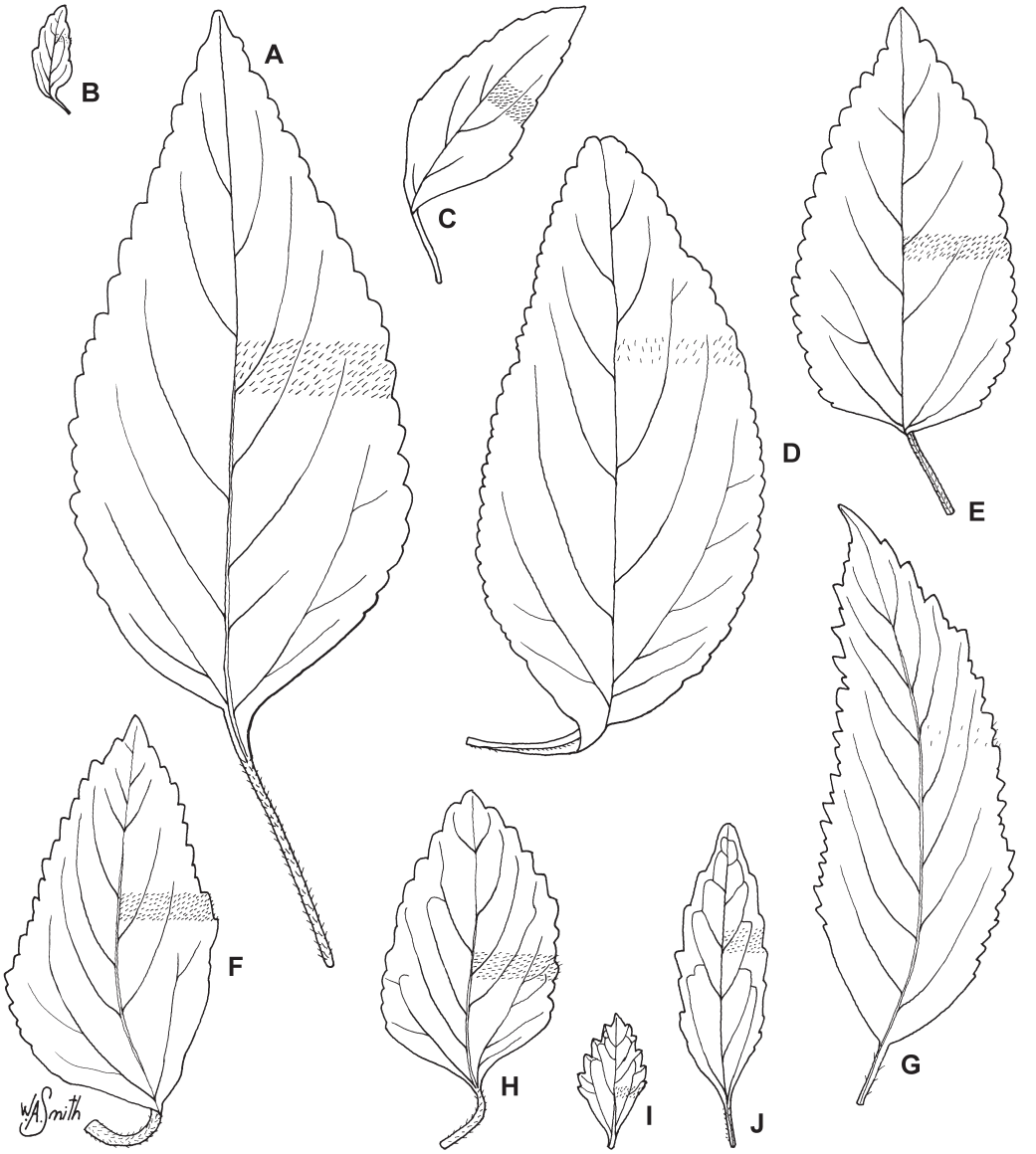


Fig. 5. Cauline leaves of ***Anisomeles*** spp. (all ×0.8): A. ***A. moschata*** (*McDonald KRM938*, BRI). B. ***A. moschata*** (*Fensham 5361 & Butler*, BRI). C. ***A. ornans*** (*Hubbard & Winders 7710*, BRI). D. ***A. papuana*** (*Pullen 7199*, BRI). E. ***A. principis*** (*Kenneally 8922*, PERTH). F. ***A. salviifolia*** (*Randell 821*, DNA). G. ***A. viscidula*** (*Eichler 22501*, DNA). **H. *A. vulpina*** (*Jensen 3350 & Kemp*, BRI). I. ***A. antrorsa*** (*Bean 13601*, BRI). J. ***A. xerophila*** (*Albrecht 7633 & Latz*, NT). Del. W. Smith.

a single zig-zag rachis (i.e. two monochasia per verticil); 2. once-dichasial, where the first branch of the cyme is dichasial, and thereafter monochasial (i.e. four monochasia per verticil); and 3. twice-dichasial, where the first two basal branches of the cyme are dichasial, and thereafter monochasial (i.e. eight monochasia per verticil). The cyme type has a direct influence on the overall shape of the verticil. The ‘entirely monochasial’

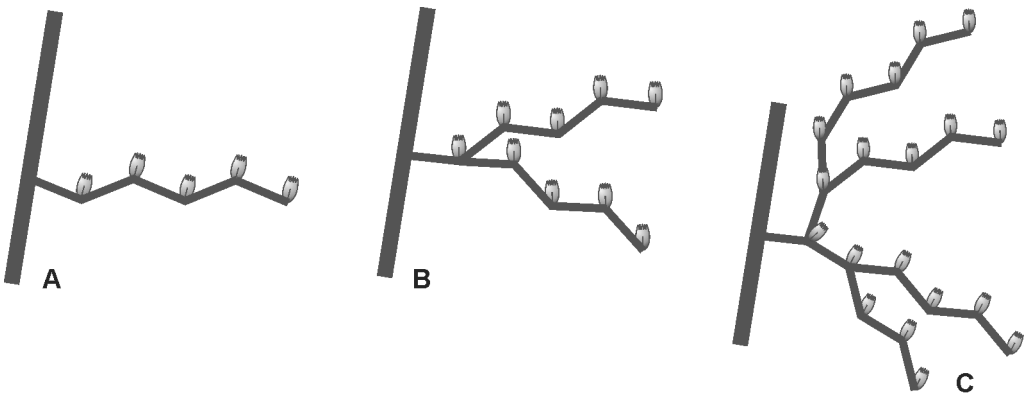


Fig. 6. Diagrams of infloresence types in ***Anisomeles***. A. entirely monochasial. B. once dichasial at base. C. twice dichasial at base.

cyme results in a lax slender inflorescence where each flower or fruit is clearly visible. The 'twice-dichasial' cyme results in a compact sub-globose inflorescence where the branching pattern is difficult to see and many of the flowers or fruits are obscured. The 'once-dichasial' cyme is of an intermediate form. Inflorescence characters have been assessed using fruiting material, where the internodes are fully expanded, and it is easier to detect the patterns involved. The number of flowers per monochasium is typically quite variable within species, but is of some diagnostic value. The distance between the individual flowers or fruits (it is the fruiting distance that is measured in this paper) is diagnostic for some species. Adjacent fruits can be as much as 12 mm apart, giving rise to a very lax cyme, or as little as 0.7 mm apart, resulting in a congested cyme.

5. Corolla colour, shape and indumentum (Figs. 1A, 1D, 7A–C).

The corolla is predominantly pink or mauve to purple for most species with areas of white usually present. In *Anisomeles heyneana*, the corolla is often pure white. The descriptions of flower colour given on herbarium labels are so varied or generalised that it makes any analysis of the character quite pointless. The corolla shape is remarkably consistent throughout the genus; it consists of a small entire upper lip, adjacent to or in contact with the stamens; and a large lower lip, generally somewhat recurved. The two terminal lobes are obtuse and mostly fused, with an emarginate apex indicating their fusion; the lateral lobes are similarly obtuse and scarcely extend past the base of the lateral lobes. Between the lateral lobes is an area here dubbed the 'platform', a roughly rectangular area bounded by the lateral lobes, terminal lobes, and the throat. The platform is sometimes flat, but often somewhat raised or puckered, and in some species, it bears relatively long stiff hairs. The number of these hairs is of diagnostic value. Within the corolla tube is the annulus, which is surmounted by many tiny stiff erect hairs.

6. Fruiting calyx morphology

The calyx in *Anisomeles* grows in size from the budding stage to anthesis and through to fruiting, and measurements of the calyx near anthesis will vary greatly depending on the exact stage of floral development. All of the features of the flowering calyx are also present on the fruiting calyx, and are more easily seen and assessed on the latter, and measurements are more reliable as the calyx has by then stopped growing.

The fruiting calyx offers a number of very diagnostic morphological characters, which have been assessed and measured from dried pressed material at the fruiting stage, where the nutlets (**Fig. 7H**) are mature or nearly so.

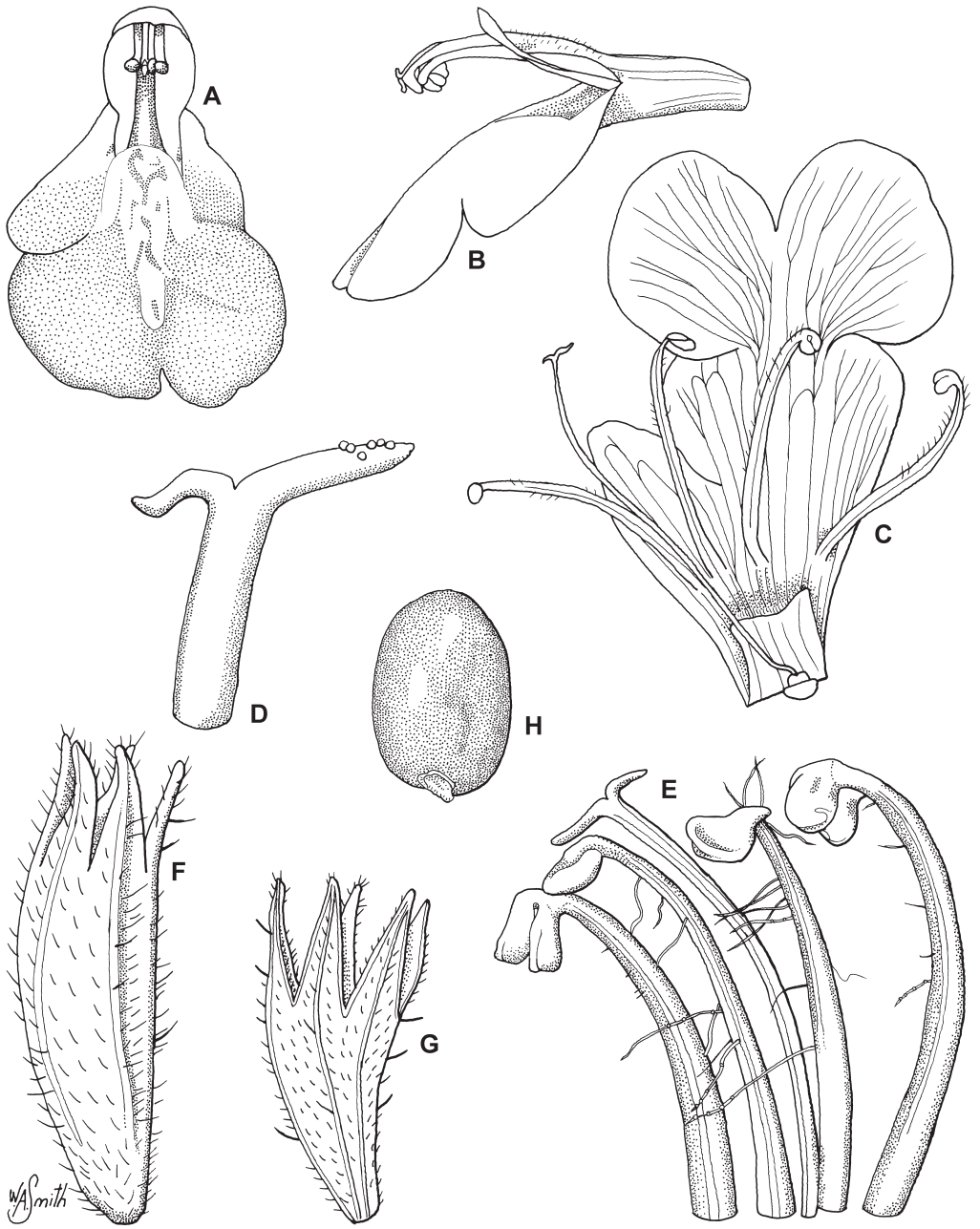


Fig. 7. ***Anisomeles*** floral morphology. A. face-on view of corolla, showing lateral and terminal lobes of the lower lip, the corolla platform (dappled light and dark area) and the upper lip enclosing the stamens ×4. B. lateral view of the corolla and stamens ×4. C. opened out flower showing the corolla lobes, the annulus (near base of stamens) and the hairy filaments ×8. D. stigma, showing unequal lobes ×40. E. upper part of stamens and style showing hairy filaments, monothecous anthers and dithecous anthers ×12. F. cylindrical calyx ×8. G. obconical calyx ×4. H. nutlet ×16. A–D from ***A. moschata*** (*Forster PIF28444*, BRI); E from ***A. lappa*** (*Forster PIF12777*, BRI); F from ***A. moschata*** (*Elsol 9*, BRI); G from ***A. indica*** (*Newman et al. LAO486*, E); H from ***A. moschata*** (*Stanley 592*, BRI). Del. W. Smith.

The overall shape of the fruiting calyx is very often cylindrical (**Fig. 7F**), or at times narrowly campanulate, but in the Asian species, *A. indica*, it is obconical (**Fig. 7G**). The shape may be quantified by using the ratio of the length versus the width (measured as the maximum distance across calyx lobe apices on dried material). The external surface of the calyx is more or less smooth, apart from the 5 or 10 rather faint longitudinal ribs, and the external indumentum tends to reflect that of the stems and leaves, and is often diagnostic. The inner surface of the calyx is often glabrous, but there is frequently a zone of long dense hairs distal from the nutlets.

The calyx lobes are very often acute i.e. tapering evenly to the apex, but in a few species, most notably *A. malabarica*, they are acuminate to attenuate, and the lobes have a long and slender apex. The inner surface of the calyx lobes is notable for the network of anastomosing raised veins, including an intramarginal vein that runs close to the margin but not confluent with it. Between the margin and this intramarginal vein are found the calyx 'fringe' hairs; densely clustered erect eglandular multicellular hairs. The fringe hairs are highly diagnostic, because they are, with very few exceptions, consistent in length and pattern for any given species (**Figs. 8, 9, 10, 11**). In some species the length of the fringe hairs is ± constant from calyx lobe sinus to calyx lobe apex, while in other species the hair length decreases from sinus to apex.

Taxonomy

Anisomeles R.Br., *Prodr.* 503 (1810), *nom. cons. prop.*; Bean (2015). **Lectotype:** *A. moschata* R.Br., chosen by Subramanyam & Henry (1969).

Epimeredi Adans., *Fam. Pl. (Adanson)* 192 (1763), *nom. cons. rej.* **Lectotype:** *E. malabaricus* (R.Br.) Rothm., chosen by Subramanyam & Henry (1969).

Perennial herbs or shrubs, with erect, procumbent or prostrate stems arising from a woody rootstock, usually aromatic. Sessile glands present on nearly all plant parts. Stems square in cross-section; indumentum of unbranched multicellular, eglandular hairs (short or long, curved or straight) and/or short erect unicellular gland-tipped hairs. Leaves petiolate, opposite, decussate, margins crenate to dentate; the cauline leaves transforming abruptly or gradually to the floral bracts of the verticil. Inflorescences terminal, spicate, indeterminate, of several verticils at the apex of each branch; lowest verticil borne in axil of cauline leaves, all other verticils subtended by floral bracts. Verticils few to many flowered, congested or lax; branching of cymes initially often dichasial, then monochasial, with a single flower at each node, bracteoles persistent. Flowers bisexual. Calyx gamosepalous, symmetric, lengthening after anthesis, then somewhat swollen at the proximal end; tube obconical to narrowly campanulate or cylindrical, outer surface with 5 or 10 longitudinal ribs, inner surface frequently with dense multicellular hairs on medial section; lobes 5, acute, acuminate or attenuate, equal; outer surface more or less smooth, inner surface with several raised anastomosing veins, including an intramarginal vein, and with a fringe of straight multicellular hairs between the intramarginal vein and the inner margin. Corolla zygomorphic, 2-lipped, upper lip entire, hooded, white; lower lip 3-lobed, median lobe large, reflexed, broadening distally and usually emarginate or bipartite. Stamens 4, all fertile; staminal filaments raised, adjacent to upper corolla lip, coherent near apex, with many spreading multicellular hairs distally or medially. Anterior anthers transversely 2-celled, cells parallel; posterior anthers transversely 1-celled. Style gynobasic, glabrous; stigma branches 2, unequal. Nutlets brown to black, smooth, glossy, with a small basal scar.

26 species in southern Asia, Malesia and Australia, 23 species occurring in Australia (20 endemic).

Etymology

From the Greek *anisos* meaning unequal, and *melos* meaning 'a limb, or a part', presumably in reference to the corolla, in which the upper lip is far smaller than the lower lip.

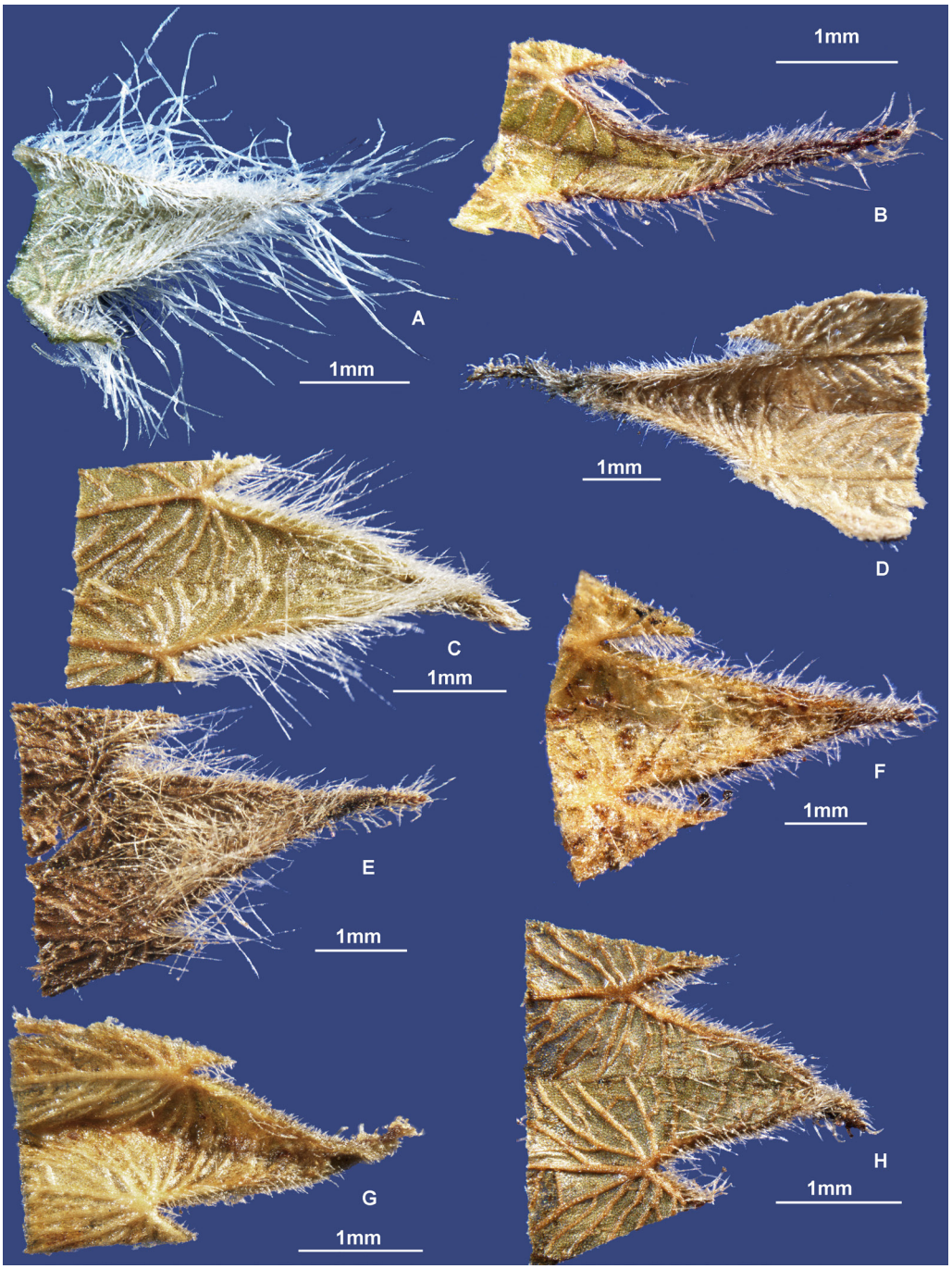


Fig. 8. Inner surface of fruiting calyx lobes, showing fringe hairs. A. ***A. ajugacea*** (*Wannan 3568 & Verdec*, BRI). B. ***A. antrorsa*** (*Bean 13601*, BRI). C. ***A. brevipilosa*** (*O'Neill 72*, DNA). D. ***A. bundeyensis*** (*Fensham 559*, DNA). E. ***A. candicans*** (*Mokim 586*, G). F. ***A. carpentarica*** (*Russell-Smith 2866 & Lucas*, DNA). G. ***A. dallachyi*** (*Dallachy s.n.*, MEL 684770). H. ***A. grandibractea*** (*Dunlop 4438*, DNA).

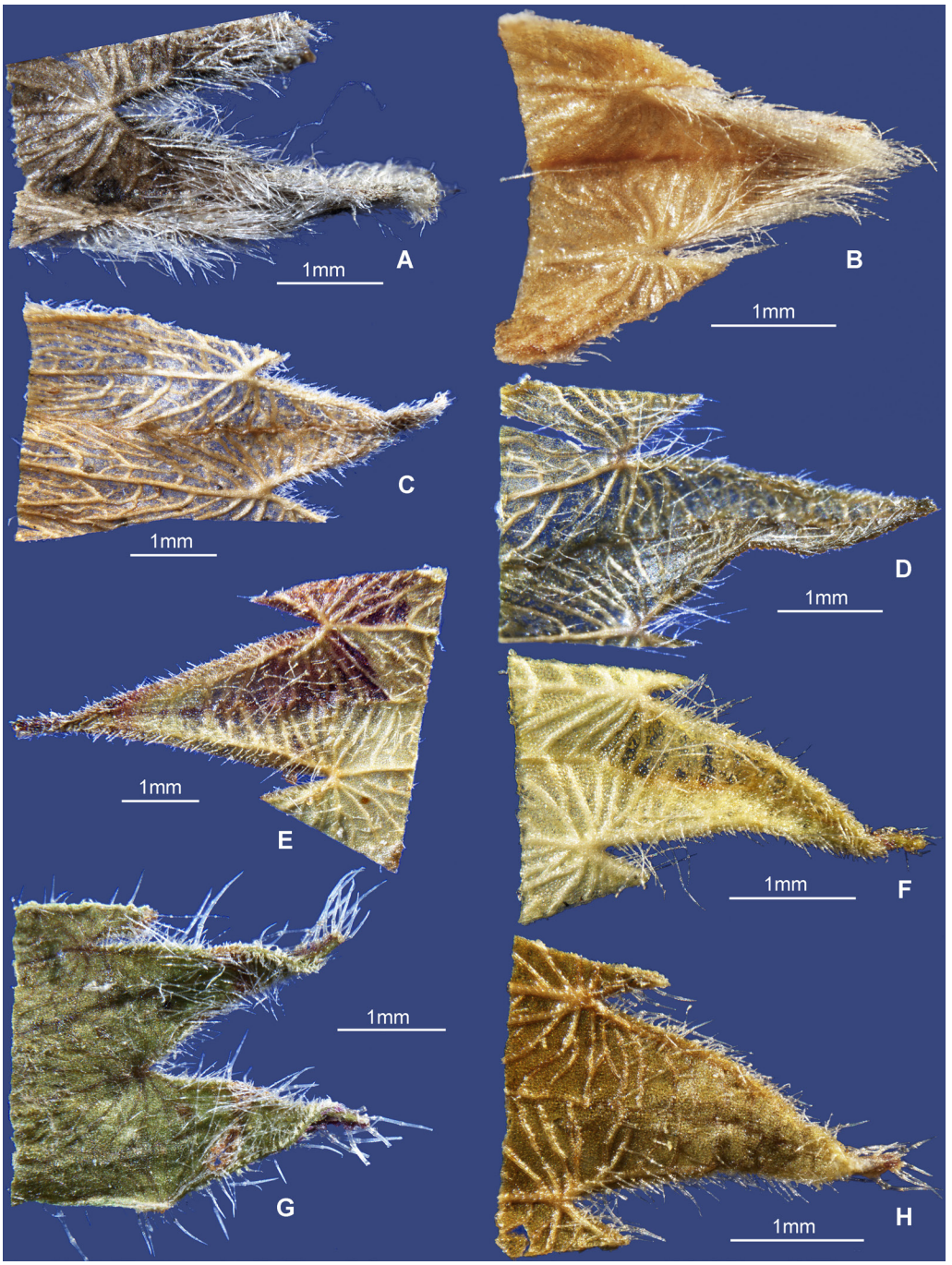


Fig. 9. Inner surface of fruiting calyx lobes, showing fringe hairs. A. ***A. eriodes*** (*Forster PIF32572 & McDonald*, BRI). B. ***A. farinacea*** (*Edinger 496*, PERTH). C. ***A. grandibractea*** (*Lazarides 9106*, DNA). D. ***A. heyneana*** (*Sinclair 4562*, E). E. ***A. indica*** (*Singh 287*, NY). F. ***A. inodora*** (*Forster PIF32933*, BRI). G. ***A. languida*** (*McDonald KRM14297*, BRI). H. ***A. lappa*** (*Forster PIF30742 & McDonald*, BRI).

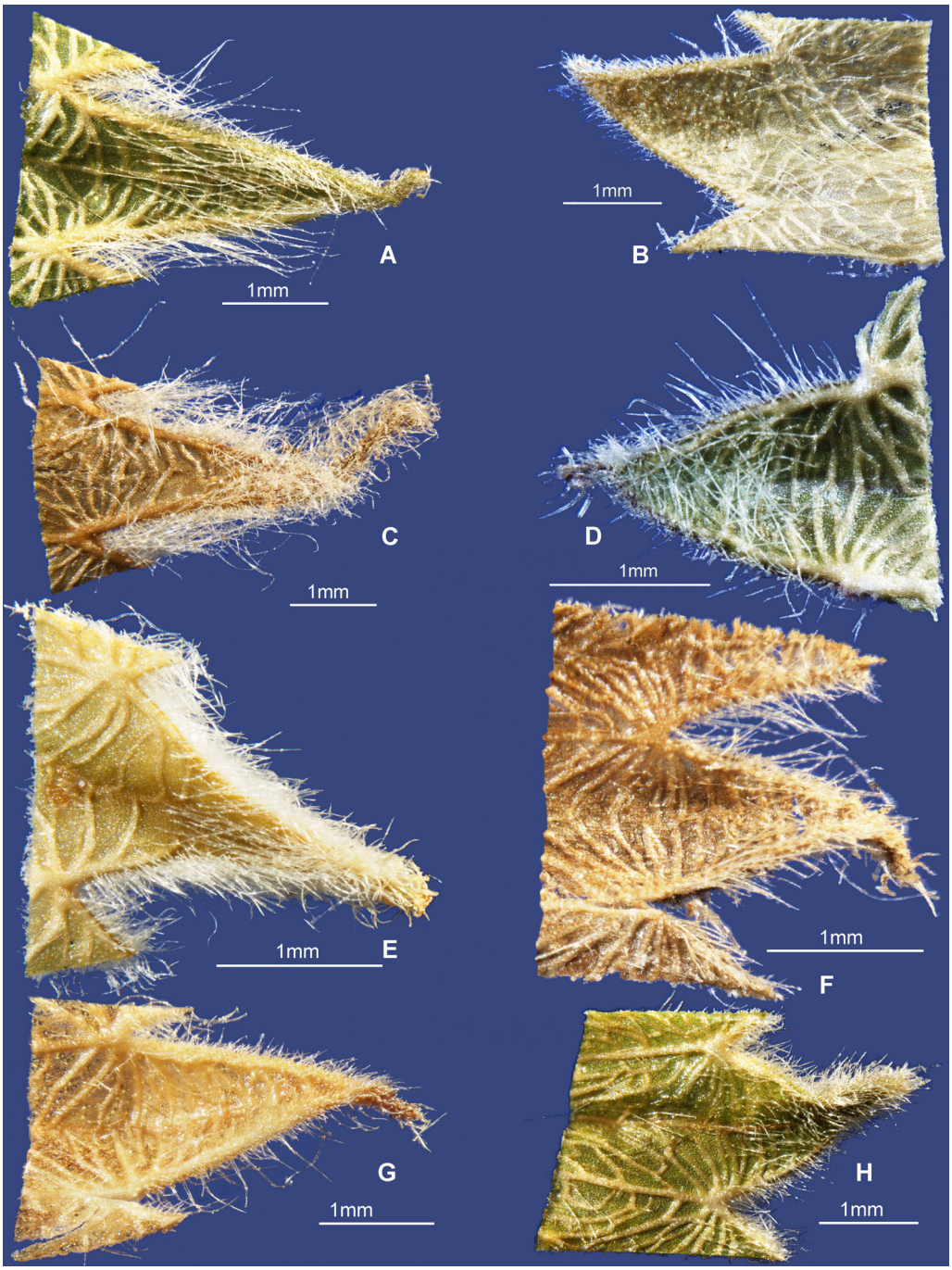


Fig. 10. Inner surface of fruiting calyx lobes, showing fringe hairs. A. ***A. leucotricha*** (*Michell & Risler 1520*, DNA). B. ***A. macdonaldii*** (*McDonald KRM3899 & Little*, BRI). C. ***A. malabarica*** (*Wight 2173*, NY). D. ***A. moschata*** (*Bean 26462*, BRI). E. ***A. ornans*** (*Bean 18853*, BRI). F. ***A. papuana*** (*Pullen 7199*, BRI). G. ***A. principis*** (*Kenneally 8922*, PERTH). H. ***A. salviifolia*** (*Randell 821*, DNA).

Fig. 11. Inner surface of fruiting calyx lobes, showing fringe hairs. A. ***A. viscidula*** (*Eichler 22501*, DNA). B. ***A. vulpina*** (*Jensen 3350 & Kemp*, BRI). C. ***A. xerophila*** (*Albrecht 7633 & Latz*, NT).

Key to species of *Anisomeles*

1 Upper stems white, indumentum very dense, hairs completely obscuring stem at ×40 magnification **2**
1. Upper stems not white, indumentum very sparse to dense, stem surface visible at ×40 magnification **7**

2 Leaf and stem indumentum appressed, retrorse, hairs 0.05–0.2 mm long **3**
2. Leaf and stem indumentum woolly, hairs without fixed direction, 0.4–1.2 mm long **4**

3 External calyx hairs moderately dense to dense, spreading, 0.3–0.8 mm long; style 12–13 mm long; leaves often narrow (3–6.6 times longer than wide). . . . . **3. A. brevipilosa**
3. External calyx hairs very dense, appressed, 0.15–0.25 mm long; style 9.5–10.5 mm long; leaves often broader (2.8–3.5 times longer than wide). . . . . **9. A. farinacea**

4 Fruiting calyx lobes attenuate, 3.1–5.3 mm long; external calyx hairs 1.2–1.5 mm long . . . . . **18. A. malabarica**
4. Fruiting calyx lobes acute, 1.8–3.3 mm long; external calyx hairs 0.5–1 mm long **5**

5 Cauline leaves with 7–14 pairs of marginal lobes; low shrub 30 to 60 cm; verticils widely separated . . . . . **20. A. ornans**
5. Cauline leaves with 12–20 pairs of marginal lobes; shrub (40–) 60–200 cm; verticils not widely separated, sometimes overlapping **6**

6 Bracteoles 0.3–0.8 mm wide; corolla platform glabrous; calyx fringe hairs 0.2–0.35 mm long at apical end . . . . . **8. A. eriodes**
6. Bracteoles 0.9–1.2 mm wide; corolla platform with 20–100 hairs; calyx fringe hairs 0.5–1 mm long at apical end . . . . . **23. A. salviifolia**

7 Erect glandular hairs (0.1–0.3 mm long) frequent to abundant on upper stems and inflorescence rachis **8**
7. Erect glandular hairs absent from upper stems and rachises, although sessile glands usually present **11**

8 Patent hispid hairs absent from upper stems; cymes twice dichasial at base; cauline leaves 120–150 mm long; bracteoles 6.4–11 mm long . . . **4. A. bundeyensis**

8. Patent hispid hairs present (often frequent) on upper stems; cymes monochasial or once dichasial at base; cauline leaves 51–110 mm long; bracteoles 2.5–7.5 mm long **9**

9 Cauline leaves 1.2–1.9 times longer than wide, base obtuse; corolla upper lip 5.8–6.7 mm long . . . . . **17. A. macdonaldii**
9. Cauline leaves 2–3.8 times longer than wide, base cuneate; corolla upper lip 3.5–5.7 mm long **10**

10 Glandular hairs not extending to lower stems; hairs sparse on upper leaf surface; corolla platform glabrous; nutlets 1.7–1.9 mm long . . . . . **7. A. dallachyi**
10. Glandular hairs extending to lower stems; hairs moderately dense to dense on upper leaf surface; corolla platform with 1–20 hairs; nutlets 1.9–2.2 mm long . . . . . **24. A. viscidula**

11 All calyx fringe hairs < 0.4 mm long **12**
11. Calyx fringe hairs > 0.4 mm long, at least at the sinus end **19**

12 Floral bracts consistently longer than verticils **13**
12. Floral bracts not consistently longer than verticils **14**

13 Hispid hairs frequent on upper stems; 4–10 pairs of marginal lobes on cauline leaves; plants prostrate or procumbent; Qld . . . . . **15. A. lappa**
13. Hispid hairs absent from upper stems; 12–27 pairs of marginal lobes on cauline leaves; plants erect; N.T. . . . . **10. A. grandibractea**

14 Fruiting calyces obconical, 5–7.5 mm wide at lobe apices; corolla platform with > 100 hairs . . . . . **12. A. indica**
14. Fruiting calyces cylindrical to narrowly campanulate, 2–5 mm wide at lobe apices; corolla platform glabrous or with many fewer than 100 hairs **15**

15 Petioles 0–3 mm long; plants prostrate **16**
15. Petioles 3.5–31 mm long; plants erect **17**

16 Marginal lobes of cauline leaves 2.5–5.1 mm deep; longest leaf hairs 1–2.5 mm long; corolla annulus hairs 0.4–0.5 mm long; corolla platform glabrous . . . . . **1. A. ajugacea**
16. Marginal lobes of cauline leaves 0.8–1.7 mm deep; longest leaf hairs 0.6–0.9 mm long; corolla annulus hairs 0.15–0.2 mm long; corolla platform with 1–20 hairs . . . . . **2. A. antrorsa**

17 Hairs on upper leaf surface 0.9–1.3 mm long; leaves 27–50 mm long; peduncles on lowermost verticil 0–1 mm long . . . . . **25. A. vulpina**
17. Hairs on upper leaf surface 0.2–0.8 mm long; leaves 44–152 mm long; peduncles on lowermost verticil (0–)1–15 mm long **18**

18 Corolla platform with 20–100 hairs; style 10–12 mm long; fruiting calyces 7–8.9 mm long . . . . . **6. A. carpentarica**
18. Corolla platform with 1–20 hairs; style 12–14 mm long; fruiting calyces 8.2–11.0 mm long . . . . . **22. A. principis**

19 Longest hairs on the upper leaf surface 0.1–0.25 mm long. **20**
19. Longest hairs on the upper leaf surface 0.25–2 mm long **22**

20 Leaves and stems green, indumentum sparse to moderately dense; corolla platform glabrous . . . . . **13. A. inodora**
20. Leaves and stems grey or grey-green, indumentum moderately dense to dense; corolla platform with at least some hairs **21**

21 Marginal lobes of cauline leaves 4–16 pairs, lobes serrate; calyx fringe hairs 0.15–0.3 mm long at apical end . . . . . **3. A. brevipilosa**
21. Marginal lobes of cauline leaves 15–37 pairs, lobes crenate; calyx fringe hairs 0.7–1.4 mm long at apical end. . . . . **16. A. leucotricha**

22 Longest hairs on leaves 0.9–2 mm long. **23**
22. Longest hairs on leaves 0.25–0.7 mm long **24**

23 Stems with patent hispid hairs; plants procumbent; external hairs on fruiting calyx 1.1–2.4 mm long . . . . . **14. A. languida**
23. Stems without patent hispid hairs; plants erect; external hairs on fruiting calyx 0.6–1 mm long . . . . . **25. A. vulpina**

24 Lower leaf surface glabrous or with sparse hairs (> 0.2 mm apart); outside of fruiting calyx with a mix of glandular and eglandular hairs . . . . . **11. A. heyneana**
24. Lower leaf surface with moderately dense to dense hairs (< 0.2 mm apart); outside of fruiting calyx with eglandular hairs only **25**

25 Nutlets 1.5–1.7 mm long; cauline leaves with 19–33 pairs of marginal lobes . . . . . **21. A. papuana**
25. Nutlets 1.8–2.2 mm long; cauline leaves with 3–18 pairs of marginal lobes **26**

26 Fruiting calyces 8.9–10.2 mm long; fruiting calyx lobes 3–3.5 mm long . . **5. A. candicans**
26. Fruiting calyces 5.8–8.6 mm long; fruiting calyx lobes 1.5–2.5 mm long **27**

27 Corolla platform glabrous; petioles 21–38% of lamina length . . . . . **19. A. moschata**
27. Corolla platform with 20–100 hairs; petioles 13–22% of lamina length . . **26. A. xerophila**

Key to the Asian and Malesian species of *Anisomeles*

1 Upper stems white, indumentum very dense, hairs completely obscuring stem at ×40 magnification . . . . . **18. A. malabarica**
1. Upper stems not white, indumentum very sparse to dense, stem surface visible at ×40 magnification **2**

2 All calyx fringe-hairs < 0.4 mm long **3**
2. Calyx fringe-hairs > 0.4 mm long, at least at the sinus end **4**

3 Fruiting calyces obconical, 5–7.5 mm wide at lobe apices; corolla platform with more than 100 hairs . . . . . **12. A. indica**
3. Fruiting calyces cylindrical to narrowly campanulate, 2.0–5 mm wide at lobe apices; corolla platform glabrous or with fewer than 20 hairs . . . . **22. A. principis**

4 Lower leaf surface glabrous or with sparse hairs (> 0.2 mm apart); outside of fruiting calyx with a mix of glandular and eglandular hairs . . **11. A. heyneana**
4. Lower leaf surface with moderately dense to dense hairs (< 0.2 mm apart); outside of fruiting calyx with eglandular hairs only **5**

5 Nutlets 1.5–1.7 mm long; fruiting calyx 6.2–8.3 mm long; cauline leaves with 19–33 pairs of marginal lobes . . . . . **21. A. papuana**
5. Nutlets 1.8–2.2 mm long; fruiting calyx 8.9–10.2 mm long; cauline leaves with 3–18 pairs of marginal lobes . . . . . **5. A. candicans**

Key to the Western Australian species of *Anisomeles*

1 Upper stems white, indumentum very dense, hairs completely obscuring stem at ×40 magnification **2**
1. Upper stems not white, indumentum very sparse to dense, stem surface visible at ×40 magnification **3**

2 External calyx hairs moderately dense to dense, spreading, 0.3–0.8 mm long; style 12–13 mm long; leaves often narrow (3–6.6 times longer than wide). . . . . **3. A. brevipilosa**
2. External calyx hairs very dense, appressed, 0.15–0.25 mm long; style 9.5–10.5 mm long; leaves often broader (2.8–3.5 times longer than wide). . . . . **9. A. farinacea**

3 Erect glandular hairs (0.1–0.3 mm long) frequent to abundant on upper stems and inflorescence rachis . . . . . **24. A. viscidula**
3. Erect glandular hairs absent from upper stems and rachises, although sessile glands usually present. **4**

4 Corolla platform with 1–20 hairs; hairs on the leaves 0.25–0.8 mm long . . **22. A. principis**
4. Corolla platform glabrous; hairs on the leaves 0.15–0.25 mm long . . . . . **13. A. inodora**

Key to the Northern Territory species of *Anisomeles*

1 Upper stems white, indumentum very dense, hairs completely obscuring stem at ×40 magnification **2**
1. Upper stems not white, indumentum very sparse to dense, stem surface visible at ×40 magnification **4**

2 Leaf and stem indumentum appressed, retrorse, hairs 0.05–0.2 mm long **3**
2. Leaf and stem indumentum woolly, hairs without fixed direction, 0.4–1.2 mm long . . . . . **23. A. salviifolia**

3 External calyx hairs moderately dense to dense, spreading, 0.3–0.8 mm long; style 12–13 mm long; leaves often narrow (3–6.6 times longer than wide). . . . . **3. A. brevipilosa**
3. External calyx hairs very dense, appressed, 0.15–0.25 mm long; style 9.5–10.5 mm long; leaves often broader (2.8–3.5 times longer than wide). . . . . **9. A. farinacea**

4 Erect glandular hairs (0.1–0.3 mm long) frequent to abundant on upper stems and inflorescence rachis **5**
4. Erect glandular hairs absent from upper stems and rachises, although sessile glands usually present. **6**

5 Patent hispid hairs absent from upper stems; cymes twice dichasial at base; cauline leaves 120–150 mm long; bracteoles 6.4–11 mm long. . . **4. A. bundeyensis**
5. Patent hispid hairs present (often frequent) on upper stems; cymes monochasial or once dichasial at base; cauline leaves 51–110 mm long; bracteoles 2.5–7.5 mm long. . . . . **24. A. viscidula**

6 Fruiting calyx fringe-hairs < 0.4 mm long **7**
6. Fruiting calyx fringe-hairs > 0.4 mm long, at least at the sinus end **8**

7 Floral bracts consistently longer than verticils; fruiting calyx 8.7–11 mm long . . . . . **10. A. grandibractea**
7. Floral bracts not consistently longer than verticils; fruiting calyx 7–8.9 mm long . . . . . **6. A. carpentarica**

8 Longest hairs on the upper leaf surface 0.25–0.4 mm long . . . . . **26. A. xerophila**
8. Longest hairs on the upper leaf surface 0.1–0.25 mm long. **9**

9 Leaves and stems green, indumentum sparse to moderately dense; corolla platform glabrous . . . . . **13. A. inodora**
9. Leaves and stems grey or grey-green, indumentum moderately dense to dense; corolla platform with at least some hairs **10**

10 Marginal lobes of cauline leaves 4–16 pairs, lobes serrate; fruiting calyx fringe hairs 0.15–0.3 mm long at apical end . . . . . **3. A. brevipilosa**
10. Marginal lobes of cauline leaves 15–37 pairs, lobes crenate; fruiting calyx fringe hairs 0.7–1.4 mm long at apical end. . . . . **16. A. leucotricha**

Key to the Queensland species of *Anisomeles*

1 Upper stems white, indumentum very dense, hairs completely obscuring stem at ×40 magnification **2**
1. Upper stems not white, indumentum very sparse to dense, stem surface visible at ×40 magnification **3**

2 Cauline leaves with 7–14 pairs of marginal lobes; low shrub 30 to 60 cm tall; verticils widely separated . . . . . **20. A. ornans**
2. Cauline leaves with 12–20 pairs of marginal lobes; shrub (40–) 60–200 cm tall; verticils not widely separated, sometimes overlapping . . . . . **8. A. eriodes**

3 Erect glandular hairs (0.1–0.3 mm long) frequent to abundant on upper stems and inflorescence rachis **4**
3. Erect glandular hairs absent from upper stems and rachises, although sessile glands usually present **5**

4 Cauline leaves 1.2–1.9 times longer than wide, base obtuse; corolla upper lip 5.8–6.7 mm long; glandular hairs extending to lower stems . . . . **17. A. macdonaldii**
4. Cauline leaves 2.4–3.8 times longer than wide, base cuneate; corolla upper li 3.8–5.7 mm long; glandular hairs not extending to lower stems . . . . **7. A. dallachyi**

5 Fruiting calyx fringe-hairs < 0.4 mm long **6**
5. Fruiting calyx fringe-hairs > 0.4 mm long, at least at the sinus end **10**

6 Floral bracts consistently longer than verticils . . . . . **15. A. lappa**
6. Floral bracts not consistently longer than verticils **7**

7 Petioles 0–3 mm long; plants prostrate **8**
7. Petioles 3.5–31 mm long; plants erect. **9**

8 Marginal lobes of cauline leaves 2.5–5.1 mm deep; longest leaf hairs 1–2.5 mm long; corolla annulus hairs 0.4–0.5 mm long; corolla platform glabrous . . . . . **1. A. ajugacea**
8. Marginal lobes of cauline leaves 0.8–1.7 mm deep; longest leaf hairs 0.6–0.9 mm long; corolla annulus hairs 0.15–0.2 mm long; corolla platform with 1–20 hairs . . . . . **2. A. antrorsa**

9 Hairs on upper leaf surface 0.9–1.3 mm long; leaves 27–50 mm long; peduncles on lowermost verticil 0–1 mm long . . . . . **25. A. vulpina**
9. Hairs on upper leaf surface 0.2–0.8 mm long; leaves 44–152 mm long; peduncles on lowermost verticil (0–)1–15 mm long . . . . . **6. A. carpentarica**

10 Longest hairs on the upper leaf surface 0.1–0.25 mm long. **11**
10. Longest hairs on the upper leaf surface 0.25–2.0 mm long **12**

11 Leaves and stems green, indumentum sparse to moderately dense; corolla platform glabrous . . . . . **13. A. inodora**
11. Leaves and stems grey or grey-green, indumentum moderately dense to dense; corolla platform with at least some hairs . . . . . **3. A. brevipilosa**

12 Longest hairs on leaves 0.9–2 mm long. **13**
12. Longest hairs on leaves 0.25–0.7 mm long **14**

13 Stems with patent hispid hairs; plants procumbent; external hairs on fruiting calyx 1.1–2.4 mm long . . . . . **14. A. languida**
13. Stems without patent hispid hairs; plants erect; external hairs on fruiting calyx 0.6–1 mm long . . . . . **25. A. vulpina**

14 Nutlets 1.5–1.7 mm long; cauline leaves with 19–33 pairs of marginal lobes **21. A. papuana**
14. Nutlets 1.8–2.2 mm long; cauline leaves with 3–18 pairs of marginal lobes **15**

15 Corolla platform glabrous; petioles 21–38% of lamina length . . . . . **19. A. moschata**
15. Corolla platform with 20–100 hairs; petioles 13–22% of lamina length . . **26. A. xerophila**

1. Anisomeles ajugacea (F.M.Bailey & F.Muell.) A.R.Bean **comb. nov.**; *Teucrium ajugaceum* F.M.Bailey & F.Muell., *Synop. Queensl. Fl. Second Suppl*. 48 (1888). **Type:** Australia: Queensland. Cook District: Musgrave Electric Telegraph Station, undated, *T. Barclay-Millar s.n.* (holo: BRI [AQ340432], 2 sheets).

Anisomeles sp. (Big Coleman River J.R.Clarkson+ 7119); Henderson (2002).

Procumbent shrub, 0.05–0.2 m high. Upper stems and rachises with patent hispid hairs; short curved hairs absent or retrorse, sparse; stalked glandular hairs absent; sessile glands 8–32 mm². Cauline leaves 16–29 mm long, 14–24 mm wide, 1.1–1.4 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes dentate, irregular or regular, 2–4 on each side, acute, 2.5–5.1 mm deep; petioles 0–3 mm long, 0–13% of lamina length. Lamina upper surface indumentum appressed, eglandular, 1–2.2 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–112 mm²; lower surface indumentum appressed, eglandular, 1–2.5 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–96 mm²; transition from leaves to floral bracts gradual. Floral bracts ovate or broadly ovate, 5–13 mm long, 3–7 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial, with 3–5 flowers per monochasium, peduncles 0–3 mm long on lowermost cluster; bracteoles obovate or spathulate, 5–10 mm long, 1–3 mm wide. Corolla tube same length as calyx; annulus 3.3–5 mm from base of corolla, annulus hairs 0.4–0.5 mm long; upper lip elliptical, 4–6.6 mm long, with glandular hairs on outer surface or with eglandular hairs on outer surface; lower lip pink, 5.6–6.7 mm long to end of lateral lobes, 9.8–11.3 mm long overall, glabrous on platform. Longest stamens 12–14 mm long from base of corolla tube; filament hairs 0.35–0.5 mm long, mainly along middle part or mainly at distal end. Style 12.7–15.5 mm long; longer stigma lobe 0.85–1.2 mm long, shorter stigma lobe 0.4–0.65 mm long. Fruiting calyces 2–5 mm apart on rachilla; fruiting calyx narrowly campanulate, 7–8 mm long, 3.4–5 mm wide at lobe apices, 1.5–2.1 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 1.5–2.1 mm long, sessile glands 48–128 mm²; lobes acute, 2.6–3 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.2–0.35 mm long at apical end, 0.1–0.25 mm long at sinus end, sinus hairs absent, inner surface of tube glabrous. Nutlets 2.3–2.6 mm long. **Figs. 3A, 8A.**

***Additional selected specimens examined*: Australia: Queensland.** Cook District: Near Little Laura River, SSW of Laura, Jul 1990, *Bean 1906* (BRI); 28.3 km from the Kennedy River on the Jedda Creek track to King River Station, Jun 1981, *Clarkson 3717* (BRI, K, MO, PERTH); 2 km S of the Big Coleman River on the Coen to Musgrave Road, May 1987, *Clarkson 7119 & Simon* (BRI, NSW); 3.5 km N of South Five Mile Creek on the Peninsula Developmental Road, Apr 1991, *Clarkson 8929 & Neldner* (BRI, K); 27 km N of Musgrave, Cape York Peninsula, Jun 2004, *Foley s.n.* (BRI [AQ610577]); 21.4 km E of Musgrave, May 2004, *Gray 8910* (BRI, CANB, CNS, NSW); Musgrave Electric Telegraph Station, May 1891, *Jacobson s.n.* (BRI [AQ161262]); 25 km by road towards Jowalbinna from Peninsula Development Road, Jul 2007, *McDonald KRM6826 & Johnson* (BRI); 6.7 km along Pormpuraaw Road from Gulf Development Road junction near Musgrave, May 2010, *McDonald KRM9188* (BRI, CNS); N of Musgrave on Cape York Development Road, just S of Red Blanket Creek, May 2004, *Wannan BSW3496 & Graham* (BRI);

S of Musgrave, May 2004, *Wannan 3564 & Verdec* (BRI); N of Musgrave, May 2004, *Wannan 3568 & Verdec* (BRI); W of Musgrave, Jun 2004, *Wannan 3598* (BRI); 0.5 km S of Bamboo Creek, 6 km SW of Spion Kop, Jun 2005, *Wannan 4018 & Beasley* (BRI); Telegraph Track, 'Bamboo', Cape York Peninsula, Jun 2008, *Wannan 5223* (BRI).

***Distribution and habitat*:** *Anisomeles ajugacea* is endemic to Queensland. Most records are within a 40 km radius of Musgrave, Cape York Peninsula, and there are a couple of records further south near Laura (**Map 1**). It inhabits low rises or flats in woodland of *Eucalyptus tetrodonta* F.Muell. and *Corymbia* spp. on white sandy soils.

***Phenology*:** Flowers are recorded from April to July; fruits between May and August.

***Notes*:** *Anisomeles ajugacea* is a highly distinctive species because of its short truncate leaves with just 2–4 pairs of lobes, the petioles 0–3 mm long, the exterior calyx hairs to 2.0 mm long, and the abundant antrorse to erect hispid hairs on the stems and leaves. It can produce prostrate stems up to 3 metres long (*Wannan 3564 & Verdec*).

This species was placed in the genus *Teucrium* by F.M. Bailey and F. Mueller, but it clearly belongs in *Anisomeles*, due to its gynobasic style, 2-lipped corolla, 2-celled anterior anthers, and the nutlets with a very small, basal areole.

***Conservation status*: Least Concern**.

2. Anisomeles antrorsa A.R.Bean **sp. nov.** habitu prostrato serpente, pilis antrorsis insidentibus cauli, foliis parvis, cymis perfecte monochasialibus et nuculis 2.5–2.7 mm longis distinguitur. **Typus:** Australia: Queensland. Cook District: 13.7 km along New Pennefather River Road, N of Weipa, 11 July 1998, *A.R. Bean 13601* (holo: BRI).

Prostrate shrub, 0.1–0.4 m high. Upper stems and rachises without patent hispid hairs, or with patent hispid hairs; short curved hairs antrorse, moderately dense or dense; stalked glandular hairs absent. Cauline leaves 17–33 mm long, 9–21 mm wide, 1.4–2.4 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or dentate, regular, 3–8 on each side, acute or obtuse, 0.8–1.7 mm deep; petioles 1.5–4 mm long, 5–15% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.6–0.9 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 64–80 mm²; lower surface indumentum erect or curved, eglandular, 0.6–0.8 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 48–112 mm²; transition from leaves to floral bracts gradual. Floral bracts ovate or broadly ovate, 6–25 mm long, 5–18 mm wide, not consistently exceeding verticils or consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial, with 3–7 flowers per monochasium, peduncles 0–4 mm long on lowermost cluster; bracteoles spathulate or linear, 4–5.8 mm long, 0.4–1.1 mm wide. Corolla tube same length as calyx; annulus 1.9–2.5 mm from base of corolla, annulus hairs 0.15–0.2 mm long; upper lip ovate or elliptical, 5–5.6 mm long, with eglandular hairs on outer surface; lower lip 4.5–5.5 mm long to end of lateral lobes, 9–10 mm long overall, with 1–20 eglandular hairs on platform. Longest stamens 11.5–12 mm long from base of corolla tube; filament hairs 0.7–1.1 mm long, mainly at distal end. Style 11.5–12.5 mm long; longer stigma lobe 0.65–0.75 mm long, shorter stigma lobe 0.4–0.5 mm long. Fruiting calyces 2–3.5 mm apart on rachilla; fruiting calyx cylindrical, 7–7.3 mm long, 2–3.3 mm wide at lobe apices, 2–3 times longer than wide, exterior surface with hairs of different sizes or types or with all hairs same size and type, hairs glandular or hairs eglandular, 0.7–1.3 mm long, sessile glands 80–192 mm²; lobes acute, 2.3–3 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.4 mm long at apical end, 0.15–0.4 mm long at sinus end, inner surface of tube with sparse long hairs in medial section or glabrous. Nutlets 2.5–2.7 mm long. **Figs. 5I, 8B**.

***Additional specimens examined*: Australia: Queensland.** Cook District: 4.3 km NW of Beagle North Camp, *c.* 41 km NNE of Aurukun, May 1982, *Clarkson 4331* (BRI); Red Beach, Weipa area, in 1980, *Herrman s.n.* (CANB); Andoom, E of Botchitt Swamp, 17.5 km NW of Lorim Point, Jan 1981, *Morton AM1021*

(BRI); Community orchard and garden, Mapoon (Old Mapoon), Mar 2005, *Waterhouse BMW7207* (BRI, CANB); Mapoon, near dump, Jun 2008, *Wannan 5283 & Graham* (BRI, NSW).

***Distribution and habitat*:** *Anisomeles antrorsa* is endemic to Queensland. It is confined to the western coast of Cape York Peninsula between Old Mapoon and North Camp, over a distance of *c*. 120 km (**Map 2**). It grows in sandy soil in open forest dominated by *Eucalyptus tetrodonta* and *Corymbia nesophila* (Blakely) K.D.Hill & L.A.S.Johnson.

***Phenology*:** Flowers are recorded from January to July; fruits from May to July.

***Notes*:** *Anisomeles antrorsa* is distinguished by the antrorse hairs on the stems, the small leaves with short petioles, the prostrate trailing habit, the long nutlets (2.5–2.7 mm), and the short calyx fringe hairs. It is most closely related to *A. ajugacea*, but differs by the shallower leaf marginal lobes, the shorter hairs on the leaves and the exterior of the calyx, the corolla platform with 1–20 hairs (versus glabrous) and the hairs of the corolla tube annulus only 0.15–0.2 mm long (versus 0.4–0.5 mm long).

***Conservation status*: Least Concern**.

***Etymology*:** From the Latin *antrorsus*, meaning 'forward pointing', and given in reference to the antrorsely directed hairs on the stems in this species.

3. Anisomeles brevipilosa A.R.Bean **sp. nov.** pilis cauli et paginae inferiori foliorum insidentibus longitudine minus quam 0.2 mm, pilis exterioribus calycis fructificantis 0.3–0.7 mm longis, pedunculis longis cymarum imarum et foliis crebro lanceolatis distinguitur. **Typus:** Australia: Northern Territory. Limmen National Park, *c*. 1 km N of southern lost city turnoff, southern park boundary, 22 April 2008, *D.L. Lewis 733* (holo: DNA; iso: MO).

Erect or spreading shrub, 0.6–2 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, dense or very dense, obscuring stem surface at ×40 magnification; stalked glandular hairs absent; sessile glands 96–192 mm². Cauline leaves 57–93 mm long, 13–23 mm wide, 3–6.6 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes serrate, irregular or regular, 4–16 on each side, obtuse, 0.2–2 mm deep; petioles 8–20 mm long, 9–35% of lamina length. Lamina upper surface indumentum erect or curved, eglandular or appressed, eglandular 0.1–0.2 mm long, sparse (hairs > 0.2 mm apart), moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–112 mm²; lower surface indumentum erect or curved, eglandular or appressed, eglandular 0.1–0.2 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart) or very dense, obscuring surface at ×40 magnification, sessile glands 48–256 mm²; transition from leaves to floral bracts abrupt. Floral bracts linear or lanceolate, 4–28 mm long, 1–6 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) overlapping near apex or all separated on rachis, cymes entirely monochasial, or once dichasial at base then monochasial, or twice dichasial (±globose), with 3–12 flowers per monochasium, peduncles 1–20 mm long on lowermost cluster; bracteoles spathulate or linear, 2.5–7.5 mm long, 0.3–1 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 3.5–3.8 mm from base of corolla, annulus hairs 0.2–0.25 mm long; upper lip elliptical, 4.5–5.2 mm long, with glandular hairs on outer surface; lower lip 5.5–6.8 mm long to end of lateral lobes, 11.7–13.1 mm long overall, with 20–100 eglandular hairs on platform. Longest stamens 12–13 mm long from base of corolla tube; filament hairs 0.7–1.2 mm long, mainly at distal end. Style 12–13 mm long; longer stigma lobe 0.6–0.7 mm long, shorter stigma lobe 0.4–0.5 mm long. Fruiting calyces 0.9–3 mm apart on rachilla; fruiting calyx cylindrical, 6.6–10 mm long, 2.9–4.2 mm wide at lobe apices, 2.3–2.8 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.3–0.8 mm long, moderately dense to dense, sessile glands 96–176 mm²; lobes acute, 1.7–3.9 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.15–0.3 mm long at apical end, 0.7–1.2 mm long at

sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section. Nutlets 2–2.3 mm long. **Figs. 3B, 8C.**

***Additional specimens examined*: Australia: Western Australia.** Nimbing Range, NNW of Kununurra, May 1996, *Keighery 15255* (PERTH); banks of Packsaddle Creek, near Kununurra, Aug 1974, *Kenneally 1938* (CANB, PERTH); The Gorge, Station Creek, 35 km NNE of Carlton Hill HS, Mar 1978, *Lazarides 8475* (CANB, PERTH); *c.* 97 km N of Kununurra on road to coast N of Ningbing, Jul 1995, *Mitchell 4005* (CANB, PERTH); Summit of Poompangala Hill, *c.* 8 km W of Kalumburu, Apr 1991, *Willing 265* (PERTH). **Northern Territory.** near Caranbirini Waterhole, SW of Borroloola, Jun 1999, *Bean 15048* (BRI); 33 km N of Victoria River Downs HS, Jun 2005, *Bean 24129* (BRI, DNA, MEL); 25 miles [41.7 km] E of Timber Creek, May 1968, *Byrnes NB743* (BRI); 35 miles [56 km] SW of Borroloola, Mar 1959, *Chippendale 5553* (BRI, CANB, L, MEL, PERTH); *c.* 1.9 km NNE of Pungalina HS on Calvert River Road, Pungalina Wildlife Sanctuary, Jun 2011, *Jensen 2375* (BRI, DNA); 17 km SW of Kalkarindji, May 2010, *Latz 25553* (DNA, NT); Nicholson River area, Jun 1974, *Maconochie* 1992 (AD, BRI, CANB, K, MO, NT); Site 141, Kidman Springs Research Station, Aug 1990, *Manning V627* (DNA); 50 km SW of Borroloola, Jun 1977, *Must 1551* (BRI, CANB, DNA, NT); 7.5 km S of Timber Creek racecourse, Jul 1977, *Must 1564* (DNA, CANB, NT); Gregory NP, beside tributary of Bullock Paddock Creek, Apr 1996, *O'Neill 72* (DNA, MO); 4 miles [6 km] SSE of Coolibah Station, Jun 1952, *Perry 2865* (BRI, CANB, NT); 14 km from Settlement Creek on road to Calvert Hills, 1 km E of jump-up, May 1978, *Simon 3124 & Farrell* (BRI); Daly River Aboriginal Reserve, *c.* 95 km SE from Port Keats Mission, May 1994, *Walsh 3727* (DNA, MEL); 5 km W of Robinson River, Gulf of Carpentaria, May 1985, *Wightman 1886 & Leach* (BRI, CANB, DNA, K, PERTH); Fish River station, Apr 2012, *Wirf 710* (CANB, DNA). **Queensland.** Burke District: Settlement Creek, 25 miles [40 km] from coast, Gulf of Carpentaria, Jun 1948, *Perry 1201* (BRI, CANB, PERTH); Gregory River crossing near Riversleigh Station, Jun 1989, *Purdie 3585* (CANB); Bowthorn Station, 33.5 km NNW of HS, Jun 2006, *Thompson WES796 & Morgan* (BRI, NSW); 100 km WSW of Burketown, May 2008, *Thompson WES1484 & Wilson* (BRI, DNA).

***Distribution and habitat*:** *Anisomeles brevipilosa* is widespread in the Northern Territory, and extends to near Kununurra in Western Australia, and the extreme north-west of Queensland (**Map 3**). It grows in dry watercourses or on sandy colluvium, over sandstone or limestone substrates.

***Phenology*:** Flowers are recorded from March to June; fruits from April to June.

***Notes*:** *Anisomeles brevipilosa* can often be distinguished solely by its narrow leaves, up to 6.6 times longer than broad. However, populations from the Victoria River Downs area have broader leaves than usual, i.e. 3–4 times longer than broad. Very often, the stem indumentum is extremely dense, obscuring the stem surface at ×40 magnification, but in some localities the stem indumentum is dense or moderately dense.

Anisomeles brevipilosa is closely allied to *A. farinacea*; they both have extremely short hairs (< 0.2 mm) on their leaves and upper stems. *A. brevipilosa* is distinguished from *A. farinacea* by the presence of hispid hairs at the base of the plant, hairs 0.3–0.8 mm long on the outside of the calyx (versus 0.15–0.25 mm long), and not obscuring the calyx surface (surface obscured in *A. farinacea*), the lower corolla lip 11.7–13.1 mm long (versus 6.4–10 mm long), and style 12–13 mm long (versus 9.5–10.5 mm long).

***Conservation status*: Least Concern**.

***Etymology*:** From the Latin *brevis* meaning short and *pilosus* hairy. This is in reference to the very short hairs on the stems and leaves of this species.

4. Anisomeles bundeyensis A.R.Bean **sp. nov.** pilis glandularibus abundantibus caulibus insidentibus, foliis basalibus 125–145 mm longis, bracteolis longissimis, cymis bis dichasialibus in verticillis et calycibus fructificantibus 11.4–12.6 mm longitudine distinguitur. **Typus:** Australia: Northern Territory. Mt Bundey East, 14 May 1987, *R. Fensham 559* (holo: DNA).

Erect or spreading shrub, 1–1.5 m high. Upper stems and rachises without patent hispid hairs; short curved hairs absent; stalked glandular hairs abundant; glandular hairs extending to lower stems; sessile glands 8–48 mm². Cauline leaves 120–150 mm long, 55–67 mm wide, 2–2.4 times longer than wide, base obtuse or broadly cuneate (> 60°); marginal lobes dentate or serrate, regular, 26–35 on each side, acute, 1.5–2.2 mm deep; petioles 23–30 mm long, 18–21% of lamina length. Lamina upper surface indumentum of erect glandular hairs and curved eglandular hairs

0.25–0.3 mm long, moderately dense (hairs 0.1–0.2 mm apart), sessile glands 8–48 mm²; lower surface indumentum of erect glandular hairs 0.25–0.3 mm long, moderately dense (hairs 0.1–0.2 mm apart), sessile glands 32–80 mm²; transition from leaves to floral bracts abrupt. Floral bracts elliptical or ovate, 5–15 mm long, 2–4.5 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) overlapping near apex, cymes twice dichasial (± globose), with 4–7 flowers per monochasium, peduncles 0–1 mm long on lowermost cluster; bracteoles spathulate or linear, 6.4–11 mm long, 0.8–1.6 mm wide. Corolla tube shorter than calyx; annulus 3.4–4 mm from base of corolla, annulus hairs 0.25–0.35 mm long; upper lip ovate or elliptical, 4.5–4.8 mm long, with glandular hairs on outer surface; lower lip 7–7.2 mm long to end of lateral lobes, 12–13.4 mm long overall, with more than 100 eglandular hairs on platform. Longest stamens 12–13 mm long from base of corolla tube; filament hairs 1.2–1.3 mm long, mainly at distal end. Style 12.5–13.5 mm long; longer stigma lobe 0.65–0.75 mm long, shorter stigma lobe 0.55–0.7 mm long. Fruiting calyces 0.7–1.1 mm apart on rachilla; fruiting calyx cylindrical, 11.4–12.6 mm long, 3.2–4 mm wide at lobe apices, 3.1–3.6 times longer than wide, exterior surface with all hairs same size and type, hairs glandular, 0.25–0.35 mm long, sessile glands 8–32 mm²; lobes acute, 3.3–4.4 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.25 mm long at apical end, 0.15–0.25 mm long at sinus end, sinus hairs absent, inner surface of tube with sparse long hairs in medial section or glabrous. Nutlets 2.3–2.4 mm long. **Figs. 3C, 8D**.

***Additional specimens examined*: Australia: Northern Territory.** Mt Bundey, Arnhem Highway, Mar 1987, *Dunlop 6884 & Wightman* (DNA).

***Distribution and habitat*:** *Anisomeles bundeyensis* is endemic to the Northern Territory. It is known only from Mt Bundey and nearby Mt Bundey East, SE of Darwin (**Map 2**). It grows on granite outcrops.

***Phenology*:** Flowers are recorded for March and May; fruits recorded in May.

***Notes*:** *Anisomeles bundeyensis* is distinguished by the abundant glandular hairs on the stems, the very long bracteoles, the twice-dichasial cymes on the verticils, and the long fruiting calyces. It is closely related to *A. viscidula*, but differs by the lack of retrorse eglandular hairs and hispid hairs on the stems, the considerably larger corolla, the twice-dischasially branched cymes and the fruiting calyces only 1–1.5 mm apart.

***Conservation status*:** This species has a very restricted Area of Occupancy (<20 km²), and is known from just two locations. A status of **Vulnerable**, criterion D2, is recommended.

***Etymology*:** Named for the location of Mount Bundey.

5. Anisomeles candicans Benth. in Wall., *Pl. Asiat. Rar.* 1: 59 (1830); *Epimeredi candicans* (Benth.) Rothm., *Repert. Spec. Nov. Regni Veg.* 53: 12 (1944). **Type citation:** Yenangheun, ripae Irawaddi. **Type:** Burma. Yenanghuen [Yenangyaung], ripae Irawaddi, in 1826, *[Wallich Cat. No. 2038]* (lecto [here designated]: K 000846316, image!).

Anisomeles malabarica var. *nigrescens* Benth. in Wall., *Pl. Asiat. Rar.* 1: 59 (1830). **Type citation:** ad ripas Irawaddi. **Types:** Burma. Prome, in 1826, *[Wallich Cat. No. 2037]* (syn: K); Irawaddi River, [1826], *[Wallich Cat. No. 2037/4]* (syn: K; syn: BM 000984304).

Shrub, height unknown. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, moderately dense; stalked glandular hairs absent; sessile glands 8–32 mm². Cauline leaves 65–91 mm long, 15–32 mm wide, 2.6–4.3 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or dentate, irregular or regular, 11–18 on each side, acute or obtuse, 0.6–2.1 mm deep; petioles 9–17 mm long, 13–20% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.3–0.4 mm long, moderately dense (hairs 0.1–0.2 mm apart), sessile glands 48–80 mm²; lower surface indumentum erect or curved, eglandular, 0.4–0.6 mm long, dense (hairs < 0.1 mm apart), sessile glands 8–32 mm²; transition from leaves to floral bracts abrupt. Floral bracts lanceolate or elliptical, 6–45

mm long, 2–16 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes once dichasial at base then monochasial, with 6–9 flowers per monochasium, peduncles 4–24 mm long on lowermost cluster; bracteoles spathulate or linear, 3.8–8.5 mm long, 0.4–1.3 mm wide. Corolla unknown. Fruiting calyces 1.5–1.8 mm apart on rachilla; fruiting calyx narrowly campanulate or cylindrical, 8.9–10.2 mm long, 3.6–5 mm wide at lobe apices, 1.9–2.5 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.4–0.6 mm long, sessile glands 48–96 mm²; lobes acute, 3–3.5 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.2–0.5 mm long at apical end, 1–1.4 mm long at sinus end, sinus hairs present, inner surface of tube with dense ring of long hairs in medial section. Nutlets 2–2.1 mm long. **Figs. 3D, 8E.**

***Additional specimens examined*: Burma.** Shingaung road, Minbu, Nov 1902, *Mokim 575* (G); Minbu district, Nov 1902, *Mokim 586* (G).

***Distribution and habitat*:** The only specimens or specimen images I have seen are from central Burma, all close to the Irrawaddy River (**Map 4**). Murata (1971) recorded this species from Thailand, citing several specimens held at TI or KYO, but I have not had the opportunity to view these. The habitat is unknown.

***Phenology*:** Unknown.

***Notes*:** *Anisomeles candicans* is probably most closely related to *A. malabarica*, but differs from the latter by the stem indumentum being only moderately dense; the shorter hairs on the leaves and outside of the calyx; the calyx fringe hairs 1–1.4 mm long at the sinus end (0.5–0.7 mm for *A. malabarica*); the lower verticils with long peduncles; and the leaves more deeply toothed. Wallich's specimen from Prome has shorter petioles than the other specimens, but is otherwise typical.

***Conservation status*: Data Deficient**.

6. Anisomeles carpentarica A.R.Bean **sp. nov.** affinis *A. moschatae* sed foliis angustioribus, pilis marginalibus loborum calycis brevioribus, numero maximo pilorum labio inferiori corollae insidentibus differens**. Typus:** Australia: Northern Territory. Gray's Bay, in Caledon Bay, 21 June 1972, *D.E. Symon 7804* (holo: BRI; iso: AD, DNA, NT).

Erect or spreading shrub, 0.45–2.5 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, sparse to dense; stalked glandular hairs absent; sessile glands 8–128 mm². Cauline leaves 44–152 mm long, 20–53 mm wide, 1.6–4.1 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or serrate, irregular or regular, 12–30 on each side, acute or obtuse, 0.5–1.5 mm deep; petioles 10–31 mm long, 15–31% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.2–0.5 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 8–112 mm²; lower surface indumentum erect or curved, eglandular, 0.2–0.5 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–128 mm²; transition from leaves to floral bracts abrupt. Floral bracts elliptical or ovate, 6–13 mm long, 2.5–7 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) overlapping near apex or all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial or twice dichasial (± globose), with 4–12 flowers per monochasium, peduncles 1–12 mm long on lowermost cluster; bracteoles spathulate or linear, 3.5–6.5 mm long, 0.3–1.2 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 3.3–3.6 mm from base of corolla, annulus hairs 0.15–0.2 mm long; upper lip ovate or elliptical, 2.6–4.4 mm long, with glandular hairs on outer surface or with eglandular hairs on outer surface; lower lip 4–5.5 mm long to end of lateral lobes, 8.5–11.7 mm long overall, with 20–100 eglandular hairs on platform. Longest stamens 10–11.5 mm long from base of corolla tube; filament hairs 0.7–1.2 mm long, mainly at distal end. Style 10–12 mm long; longer stigma lobe 0.5–0.65 mm long, shorter stigma lobe 0.3–0.4 mm long. Fruiting calyces 1–2.3 mm apart on rachilla; fruiting calyx cylindrical, 7–8.9 mm long, 3.3–3.8 mm wide at lobe apices, 2.1–2.4

times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.2–0.6 mm long, sessile glands 32–160 mm²; lobes acute, 1.9–2.8 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.35 mm long at apical end, 0.15–0.35 mm long at sinus end, sinus hairs absent or present, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 1.9–2.2 mm long. **Figs. 1C, 3E, 8F.**

***Additional specimens examined*: Australia: Northern Territory.** Groote Eylandt, 6.5 km SSE of Alyangula, Apr 1992, *Cowie 2557* (CANB, DNA); Arnhem Bay, mouth of Cato River, May 1992, *Cowie 2879* (DNA); South Bay, Bickerton Island, Apr 1993, *Cowie 3883 & Leach* (DNA); Stevens Island, southern end, Apr 1996, *Cowie 6769* (DNA, MEL); Groote Eylandt, near Malkiyangwa Beach, Mar 2005, *Cowie 10489* (DNA, L); Walker River, May 1993, *Dunlop 9531 & Leach* (DNA); Cape Arnhem, Sep 1993, *Dunlop 9734 & Wightman* (DNA); N of Nhulunbuy, Oct 1993, *Egan 2719* (DNA); track to Cape Arnhem, Oct 1993, *Egan 2772* (DNA); Wessel Island, Sep 1972, *Latz 3283* (CANB, DNA); Wigram Island, English Company Islands, Jul 1992, *Leach 3061* (DNA, NT); South side of Rimbija Island, Wessel Islands, Nov 2007, *Roberts 1026* (BRI, CANB); 4 Mile Jungle, Umbakumba, Groote Eylandt, Jul 1987, *Russell-Smith 2866 & Lucas* (DNA); 10 km N of Harris Creek, Blue Mud Bay, Sep 1987, *Russell-Smith 3116 & Lucas* (BRI, DNA); Warangaya, Elcho Island, Sep 1987, *Russell-Smith 3278 & Lucas* (DNA, PERTH); Hemple Bay, Groote Eylandt, Apr 1948, *Specht 276* (BRI, CANB, L, MEL, PERTH); Port Bradshaw, Jul 1948, *Specht 781* (BRI); 63 miles [101 km] west of Giddy River crossing, Jun 1972, *Symon 7748* (DNA, NT); mouth of Bing Bong Creek, Bing Bong Station, May 1984, *Thomson 643* (DNA, NT). **Queensland.** Burke District. North Bountiful Island, South Wellesley Group, Nov 2002, *Thomas BOI37 & Pedley* (BRI); 178 km NW of Burketown on Wollogorang Station (Gulf site 392), May 2008, *Thompson MORN058 & Wilson* (BRI); Karumba, Jul 1960, *Trapnell 186* (BRI); Bountiful Islands, Wellesley Island Group, Mar 2008, *Waterhouse BMW7648* (BRI, CANB).

***Distribution and habitat*:** *Anisomeles carpentarica* is distributed from Karumba in Queensland to Elcho Island in the Northern Territory (**Map 5**). It mainly occurs in littoral areas on old beach dunes, but it does occasionally grow further inland on sandy substrate.

***Phenology*:** Flowers are recorded from February to November; fruits are recorded from April to November.

***Notes*:** *Anisomeles carpentarica* is close to *A. moschata*, but differs by the narrower leaves (L/B ratio 2.7–4.1 times, compared to 2.1–2.8 times for *A. moschata*), the longer bracteoles, the calyx fringe hairs of uniform length throughout, 0.15–0.35 mm long (longer towards the sinus in *A. moschata*; 0.5–1 mm long), and the numerous (20–100) trichomes on the platform of the corolla (glabrous or < 20 hairs for *A. moschata*).

***Conservation status*: Least Concern**.

***Etymology*:** The epithet refers to the distribution of this species which predominantly fringes the Gulf of Carpentaria.

7. Anisomeles dallachyi A.R.Bean **sp. nov.** pilis glandularibus abundantibus rachibus calycibus insidentibus, foliis indumento sparso in pagina superiore praeditis, pilis marginalibus brevissimis loborum calycis et nuculis 1.7–1.9 mm longis distinguitur. **Typus:** Queensland. [North Kennedy District]: Rockingham Bay, 27 April 1866, *J. Dallachy s.n.* (holo: MEL 684769; iso: MEL 684766, MEL 684768, MEL 684770, MEL 684773, MEL 684774, MEL 684775, MEL 684776, MEL 684777, MEL 684778, MEL 684788).

Anisomeles salviifolia var. *subtomentosa* Domin, *Biblioth. Bot.* 89: 567 (1928), *pro parte*. **Type:** Queensland. [North Kennedy District]: Rockingham Bay, undated, *J. Dallachy s.n.* (syn: K).

Erect or spreading shrub, height unknown. Upper stems and rachises without patent hispid hairs, or with patent hispid hairs; short curved hairs retrorse, sparse or moderately dense; stalked glandular hairs abundant; sessile glands 16–80 mm². Cauline leaves 46–96 mm long, 16–44 mm wide, 2–3.3 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or dentate, irregular or regular, 14–23 on each side, acute or obtuse, 0.5–2.4 mm deep; petioles 12–33 mm long, 26–45% of lamina length. Lamina upper surface indumentum of erect or appressed, curved eglandular hairs, 0.2–0.55 mm long, sparse (hairs > 0.2 mm apart), sessile glands 8–48 mm²; lower surface indumentum of erect or curved,

eglandular hairs, 0.15–0.3 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 48–96 mm²; transition from leaves to floral bracts abrupt or gradual. Floral bracts lanceolate or elliptical, 4–27 mm long, 1.5–8 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 4–7 flowers per monochasium, peduncles 0–11 mm long on lowermost cluster; bracteoles linear, 3.2–4.5 mm long, 0.3–0.6 mm wide. Corolla tube same length as calyx; annulus 3.8–4.2 mm from base of corolla, annulus hairs 0.25–0.3 mm long; upper lip elliptical, 3.5–4.7 mm long, with eglandular hairs on outer surface or glabrous; lower lip 5.5–6.5 mm long to end of lateral lobes, 12–14 mm long overall, glabrous on platform. Longest stamens 13–13.5 mm long from base of corolla tube; filament hairs 0.3–1.5 mm long, mainly at distal end. Style 13.5–14 mm long; longer stigma lobe 0.8–0.9 mm long, shorter stigma lobe 0.4–0.6 mm long. Fruiting calyces 1.8–4 mm apart on rachilla; fruiting calyx cylindrical, 7.1–9 mm long, 2.7–3.8 mm wide at lobe apices, 1.9–2.8 times longer than wide, exterior surface with hairs all glandular, or with some curved eglandular hairs 0.2–0.4 mm long also present, sessile glands 32–96 mm²; lobes acute, 2.2–3 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.1–0.15 mm long at apical end, 0.1–0.2 mm long at sinus end, sinus hairs absent, inner surface of tube with sparse long hairs in medial section or glabrous. Nutlets 1.7–1.9 mm long. **Figs. 3F, 8G.**

***Additional specimens examined*: Australia: Queensland.** North Kennedy District. Beside Old Dalrymple Track near Cardwell, May 1975, *Andrews 158 & Simon* (BRI); Rockingham Bay, in 1870, *Dallachy s.n.* (MEL 1551746, MEL 1551726).

***Distribution and habitat*:** *Anisomeles dallachyi* is endemic to Queensland. It is known only from the Cardwell area on the north-eastern coast (**Map 1**). It inhabits eucalypt forest on sandy soils.

***Phenology*:** Flowers and fruits have been recorded in April and May.

***Typification*:** There are 13 sheets of this species at MEL that were collected by J. Dallachy from Rockingham Bay. A close examination of the 13 sheets of *A. dallachyi* reveals that they are separable into two "groups", based on details of their morphology and overall similarity. One group of 11 sheets has plant material so similar that I regard it as originating from a single gathering; one of the sheets has an original Dallachy label giving the date of collection as 27th April 1866; this sheet is selected as the holotype, and the other 10 sheets are regarded as isotypes. The labels of all 11 sheets have a "B" written on the corner indicating that they were seen by Bentham for *Flora Australiensis*.

The second group of two sheets has material closely matching, but different in leaf shape and indumentum to the first group; one of these sheets has the date '1870' on the label, and neither sheet has a "B" on the corner of its label.

The syntypes of *Anisomeles salviifolia* var. *subtomentosa* at K comprise a mixture of *A. moschata* and *A. dallachyi*. It is the K specimens that Domin examined before describing that variety (Orchard 1999); he did not see material at MEL or P.

***Notes*:** The location of Dallachy's type collection can be inferred. On the 26th April 1866, he collected *Ficus copiosa* Steud. at Meunga Creek (a few km north of Cardwell) (AVH 2015). On the 27th April 1866, he collected *Cyperus decompositus* (R.Br.) F.Muell. (AVH 2015). This species is known to occur on sand-ridges at the southern end of Edmund Kennedy NP, about 2 km north of Meunga Creek (specimen at BRI, *Bean 3893*). This is a likely place for Dallachy's collection of the *Anisomeles*.

Anisomeles dallachyi is probably most closely related to *A. viscidula*, but *A. dallachyi* differs by the lack of glandular hairs on the lower stems, the sparse hairs of the upper leaf surface, the glabrous corolla platform, the mostly shorter calyx fringe hairs, and the shorter nutlets. The only other *Anisomeles* species in the Cardwell area is *A. moschata*; *A. dallachyi* is distinguished from *A. moschata*

by the stalked glandular hairs on the upper stems, rachises and calyces; the sparsely hairy leaves; and the much shorter calyx fringe hairs.

***Conservation status*:** A status of **Vulnerable**, criterion D2, is recommended (IUCN 2012).

***Etymology*:** Named for John Dallachy (1808?–1871), collector of the type specimen. Dallachy was a very well-known botanical collector in Victoria, New South Wales and Queensland. In the latter state, most of his collections are from near Rockingham Bay (Cardwell), where he lived from 1864 until his death in 1871.

8. Anisomeles eriodes A.R.Bean **sp. nov.** indumentis densissimis in caulibus superioribus, folii indumentis lanatis intricatis, tubo corollae quam calyce breviore, labio inferiore corollae glabro et calycibus fructificantibus 8.3–9.7 mm longitudine distinguitur. **Typus:** Australia: Queensland. Cook District: Olive River Environmental Reserve, 0.5 km W by road of Bromley Homestead, 14 June 2007, *P.I. Forster PIF32572 & K.R. McDonald* (holo: BRI; iso: MEL, NSW).

Anisomeles sp. (Agnew J.R.Clarkson 4993); Bostock & Holland (2010, 2014).

Procumbent shrub, or erect or spreading shrub, 0.4–1 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse or no fixed direction, very dense, obscuring stem surface at ×40 magnification; stalked glandular hairs absent. Cauline leaves 50–100 mm long, 21–40 mm wide, 1.9–3.2 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes dentate or serrate, regular, 15–20 on each side, acute or obtuse, 0.3–1.7 mm deep; petioles 8–14 mm long, 13–19% of lamina length. Lamina upper surface indumentum lanate, tangled, 0.4–0.7 mm long, dense (hairs < 0.1 mm apart) or very dense (obscuring surface at ×40 magnification), sessile glands 32–96 mm²; lower surface indumentum lanate, tangled, 0.4–0.7 mm long, dense (hairs < 0.1 mm apart) or very dense, obscuring surface at ×40 magnification; transition from leaves to floral bracts abrupt, or gradual. Floral bracts elliptical, 8–34 mm long, 4–13 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) overlapping near apex or all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 6–13 flowers per monochasium, peduncles 0–3 mm long on lowermost cluster; bracteoles spathulate or linear, 3.5–6.1 mm long, 0.3–0.8 mm wide. Corolla tube shorter than calyx; annulus 2.4–3 mm from base of corolla, annulus hairs 0.15–0.25 mm long; upper lip elliptical, 4.5–5.5 mm long, with glandular hairs on outer surface; lower lip pink or white, 5.6–7.3 mm long to end of lateral lobes, 10.6–12.5 mm long overall, glabrous on platform. Longest stamens 11–12.5 mm long from base of corolla tube; filament hairs 0.5–0.9 mm long, mainly at distal end. Style 11–13 mm long; longer stigma lobe 0.7–0.9 mm long, shorter stigma lobe 0.4–0.5 mm long. Fruiting calyces 1–1.6 mm apart on rachilla; fruiting calyx narrowly campanulate or cylindrical, 8.3–9.7 mm long, 4–4.9 mm wide at lobe apices, 1.7–2.4 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.6–1 mm long; lobes acute, 2.5–3.3 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.2–0.35 mm long at apical end, 0.8–1.1 mm long at sinus end, sinus hairs absent, inner surface of tube with sparse long hairs in medial section or glabrous. Nutlets 2–2.4 mm long. **Figs. 3H, 9A**.

***Additional selected specimens examined*: Australia: Queensland.** Cook District: 23.2 km from Peninsula Development Road, towards Iron Range, Jul 1998, *Bean 13618* (BRI); Archer River, Wenlock – Coen Road, Aug 1948, *Brass 19773* (BRI, CANB, K); *c.* 60 km directly NE of Weipa, Jun 2008, *Byrd CA31* (BRI); 1 km N of Batavia Landing on the Weipa – Mapoon Road, Aug 1983, *Clarkson 4934* (BRI, CNS, K, MEL); Batavia Downs, Shilling paddock, *c.* 0.5 km W of HS, Apr 1990, *Clarkson 8574 & Neldner* (AD, BRI, DNA, L); 10.8 km east of Agnew airstrip on the track to Bertihaugh Station, Aug 1983, *Clarkson 4993* (BRI, PERTH); Merapah Holding, corridor between Rokeby and Archer Bend NP, 25 km NW of Ranger Station, Aug 1990, *Fell DF2154* (BRI); 2 km E of Mt Gibson, 16 km SSE of Lakeland Downs, West Normanby River catchment, May 1993, *Fell DGF3295 & Daunt* (BRI); slope of St George granites, 9.3 km E of Maitland Downs HS, Jul 2003, *Fox IDF2090* (BRI); Archer Bend NP, May 1988, *Godwin C3854* (BRI); 31.3 km along Pormpuraaw Road from Peninsula Development Road, Aug 2008, *McDonald KRM7879* (BRI); Oyala Thumotang NP, 23

km by road W of Peninsula Development Road, Geike Range, May 2013, *McDonald KRM14197 & Winter* (BRI, DNA, HO); Running Creek Nature Refuge, Jun 2013, *McDonald KRM14489* (BRI); Lama Lama NP, between Goose and Bull Lagoons, Jun 2013, *McDonald KRM14578* (BRI, MEL); 50 km N of Weipa airport, Little Scrub Creek, Feb 2009, *Mitchell 6-190 & Massey* (BRI, MEL, PERTH); E of Falls Creek crossing on Kennedy Road, Jun 1982, *Morton AM1732* (BRI); Nichol Creek, Kaanju nation, central Cape York, Aug 2007, *Smith 5236 & Nelson* (BRI, NSW); 30 km ESE of Weipa Mission, Sampling Point 19, Jul 1974, *Specht W377 & Salt* (BRI); E of Weipa on the Peninsula Development road, Feb 2000, *Wannan 1608 & Jago* (BRI); East of Musgrave, Jun 2004, *Wannan 3593* (BRI, CANB); Telegraph track, 'Bamboo', Cape York Peninsula, Jun 2008, *Wannan 5219 & Graham* (BRI).

***Distribution and habitat*:** *Anisomeles eriodes* is endemic to Queensland. It is widely distributed on Cape York Peninsula from NE of Weipa to Maitland Downs (**Map 5**). It commonly grows in woodland with *Eucalyptus tetrodonta*, *E. cullenii* or *Corymbia nesophila* on hillsides or low pebbly rises. The soil is sandy, often reddish in colour.

***Phenology*:** Flowers are recorded from February to August; fruits from June to August.

***Notes*:** Two poor quality specimens from hilly terrain south-west of Cooktown (*Fell DGF3295 & Daunt*; *Fox IDF2090*; cited above) are disjunct from the main area of *A. eriodes*, and are somewhat atypical in appearance, but are included here with it. *A. eriodes* is most likely to be confused with *A. ornans*. See notes under that species.

***Conservation status*: Least Concern**.

***Etymology*:** The epithet is from the Greek word *eriodes*, meaning 'like wool, woolly' (Brown 1956). It refers to the woolly tomentum of the leaves and stems in this species.

9. Anisomeles farinacea A.R.Bean **sp. nov.** tomento densissimo caulibus et paginae inferiori foliorum insidente, pilis 0.05–0.15 mm in paginae inferiori foliorum et pilis 20–100 labio inferiori corollae insidentibus distinguitur. **Typus:** Australia: Western Australia. Flint Creek Gorge, 9 km NW of homestead, 28 June 1987, *D.J. Edinger 496* (holo: BRI; iso: DNA, PERTH).

Erect or spreading shrub, 1–2 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, very dense, obscuring stem surface at ×40 magnification; stalked glandular hairs absent; sessile glands 96–240 mm². Cauline leaves 52–111 mm long, 15–42 mm wide, 2.8–3.5 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes dentate or serrate, irregular or regular, 8–24 on each side, acute or obtuse, 0.6–2 mm deep; petioles 13–23 mm long, 12–21% of lamina length. Lamina upper surface indumentum appressed, eglandular, 0.05–0.2 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 16–96 mm²; lower surface indumentum erect or curved, eglandular or appressed, eglandular 0.05–0.15 mm long, dense (hairs < 0.1 mm apart), sessile glands 48–192 mm²; transition from leaves to floral bracts abrupt. Floral bracts linear or lanceolate, 7–24 mm long, 1–5 mm wide, not consistently exceeding verticils or consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes once dichasial at base then monochasial or twice dichasial (± globose), with 2–9 flowers per monochasium, peduncles 2–7 mm long on lowermost cluster; bracteoles linear, 4–7.5 mm long, 0.35–0.6 mm wide. Corolla tube longer than calyx; annulus 2.5–3.2 mm from base of corolla, annulus hairs 0.2–0.25 mm long; upper lip ovate or elliptical, 2–3.6 mm long, with glandular and eglandular hairs on outer surface; lower lip 3–6.5 mm long to end of lateral lobes, 6.4–10 mm long overall, with 20–100 eglandular hairs on platform. Longest stamens 9.5–10 mm long from base of corolla tube; filament hairs 0.5–0.8 mm long, mainly at distal end. Style 9.5–10.5 mm long; longer stigma lobe 0.8–0.9 mm long, shorter stigma lobe 0.5–0.6 mm long. Fruiting calyces 1–2 mm apart on rachilla; fruiting calyx cylindrical, 8.2–9 mm long, 2.7–4.4 mm wide at lobe apices, 1.9–3 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.15–0.25 mm long, very dense, sessile glands 8–128 mm²; lobes acute, 2–3.1 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.2–0.3 mm long at apical

end, 0.8–1.1 mm long at sinus end, sinus hairs absent, inner surface of tube with sparse long hairs in medial section or glabrous. Nutlets 2–2.2 mm long. **Figs. 3I, 9B.**

***Additional specimens examined*: Australia: Western Australia.** King Leopold Range, Gibb River road, 42.7 km SW of turnoff to Mt House Station, May 1985, *Aplin 1020 et al.* (NSW, PERTH); near headwaters of King Creek, SSW of Mt Humbert, Yampi Peninsula, Yampi Sound Defence Training Area, Mar 2001, *Barrett RLB 2135* (PERTH); 13 miles [21 km] S of Halls Creek, Jul 1968, *Beard 5533* (PERTH); between Silent Grove and the Bell Gorge parking area, Aug 2005, *Byrne 1610* (PERTH); S side of Cockburn Range, *c.* 6.5 km W of King River, Jul 1974, *Carr 3359 & Beauglehole 47138* (MEL, NSW, PERTH); 1 km NNW of Barker River Gorge, Napier Range, Apr 1988, *Cranfield 6466* (CANB, K, PERTH); Fern Creek, King Leopold Range, Apr 1988, *Dunlop 7773 & Simon* (BRI, DNA, PERTH); Devil's Pass, Napier Range, May 1905, *Fitzgerald 606* (PERTH); near Mt Eliza, May 1905, *Fitzgerald 734* (PERTH); Silver Gull Creek at spring, *c.* 14 km SE of Cockatoo Island, Apr 1983, *Fryxell & Craven 3877* (CANB, MEL, PERTH); between McDonald Range and Glenelg River, Jul 1950, *Gardner 9583* (NSW, PERTH); Fossil Downs, Apr 1951, *Gardner 10074* (PERTH); Lower western slopes of Mt Bell, King Leopold Ranges, May 1988, *Goble-Garratt 617* (PERTH); Near Ord River, in 1884, *Johnston s.n.* (MEL); 14 km SE of Mt Kitchener, Jun 1987, *Kenneally 10549 & Hyland* (PERTH); Wulwuldji Spring, Bungle Bungle NP, Nov 1989, *Menkhorst 907* (DNA, PERTH); Windjana Gorge NP, in immediate vicinity of Carpenters Gap rockshelter, Jul 1997, *Wallis LW97A/13* (PERTH); Napier Range, south side, Windjana Gorge NP, Jun 1988, *Wilson 12799* (BRI, PERTH); March Fly Creek, 85 km NE of Lennard River crossing, Jun 1988, *Wilson 12895* (PERTH). **Northern Territory.** Gregory NP, tributary of Upper East Baines River, 50 km from Bullita Outstation, Apr 1996, *Walsh 4502 & Jones* (DNA).

***Distribution and habitat*:** *Anisomeles farinacea* is widespread in the Kimberley region of Western Australia, from Cockatoo Island in the west to south-east of Kununnurra, and is known from a single collection in the Northern Territory (**Map 2**). It frequently inhabits watercourses or creek-banks, with genera such as *Pandanus*, *Terminalia* and *Livistona*, but it also grows on limestone hills or on sandstone (or even granite) scree slopes with closed-forest species or woodland species. Soil varies from sandy loam to black clay.

***Phenology*:** Flowers are recorded from March to August; fruits are recorded from April to October.

***Notes*:** The colour of the corolla has been variously described on herbarium labels as mauve, purple, purple and white, blue, or violet.

Anisomeles farinacea is closely related to *A. brevipilosa*. Distinguishing features are given under that species.

***Conservation status*: Least Concern**.

***Etymology*:** The epithet is from the Latin *farina*, meaning flour, given in reference to the very pale colour of the stems and lower leaf surfaces.

10. Anisomeles grandibractea A.R.Bean **sp. nov.** bracteis floralibus maximis, pilis brevibus in pagina superiore, monochasiis paucifloris et pilis marginalibus brevibus insidentibus lobis calycis distinguitur. **Typus:** Australia: Northern Territory. Deaf Adder Gorge, 23 February 1977, *C.R. Dunlop 4438* (holo: DNA; iso: MEL).

Erect or spreading shrub, 0.5–1.5 m high. Upper stems and rachises without patent hispid hairs, or with patent hispid hairs; short curved hairs retrorse or antrorse, sparse or moderately dense; stalked glandular hairs absent; sessile glands 8–96 mm². Cauline leaves 44–116 mm long, 27–62 mm wide, 1.5–3.5 times longer than wide, base obtuse, broadly cuneate or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate, dentate or serrate, regular, 12–27 on each side, acute or obtuse, 0.3–2.2 mm deep; petioles 12–31 mm long, 16–40% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.2–0.7 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 8–48 mm²; lower surface indumentum erect or curved, eglandular, 0.3–0.6 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–112 mm²; transition from leaves to floral bracts gradual. Floral bracts elliptical, ovate or broadly-ovate, 12–78 mm long, 9–30 mm wide, consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes once dichasial at base then monochasial, or twice dichasial, with 2–8 flowers per monochasium, peduncles 0–7 mm long on lowermost cluster;

bracteoles spathulate or linear, 4.3–9.5 mm long, 0.5–1.3 mm wide. Corolla tube longer than calyx or the same length as calyx; annulus 3.1–4 mm from base of corolla, annulus hairs 0.2–0.3 mm long; upper lip elliptical, 3.7–5.9 mm long, with eglandular hairs on outer surface; lower lip 4.8–7.6 mm long to end of lateral lobes, 8.5–14.5 mm long overall, platform glabrous or with 1–20 eglandular hairs. Longest stamens 12.5–14.5 mm long from base of corolla tube; filament hairs 0.5–1.4 mm long, mainly at distal end. Style 13–15 mm long; longer stigma lobe 0.4–0.7 mm long, shorter stigma lobe 0.3–0.55 mm long. Fruiting calyces 1–1.5 mm apart on rachilla; fruiting calyx cylindrical, 8.7–11 mm long, 2.8–4.3 mm wide at lobe apices, 2.3–3.7 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, longest ones 0.25–0.6 mm long, sessile glands 8–112 mm²; lobes acute, 1.8–3.3 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.35 mm long at apical end, 0.15–0.4 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 1.8–2.1 mm long. **Figs. 3G, 4A, 8H, 9C**.

***Additional specimens examined*: Australia: Northern Territory.** Koolpin Gorge, Mar 1990, *Brennan Bre190* (DNA); 20 km SE of Twin Falls, May 1980, *Craven 5880* (CANB); Mt Brockman, Feb 1973, *Dunlop 3323* (BRI, CANB, DNA, NT); SE of Mt Howship, Arnhem land, Feb 1984, *Dunlop 6628 & Russell-Smith* (DNA); Nourlangie Rock, along path to lookout, Feb 1987, *Gartrell & Cunliffe UNSW19974* (BRI, CANB, DNA); 14.5 km WNW of Twin Falls, May 1980, *Lazarides 9106* (DNA, CANB, DNA); walking trail, Obiri Rocks, Apr 1987, *Purdie 3175* (CANB); top of Twin Falls, Kakadu NP, Jun 1983, *Russell-Smith 711* (DNA); 5 km E of Winwuyurr Creek crossing, Kakadu NP, Feb 1984, *Russell-Smith 1102* (DNA); 6 km S of Oenpelli, Jul 1983, *Russell-Smith 1167* (DNA); 10 km SW of Oenpelli Aboriginal Settlement, May 1988, *Weber 9890* (AD, BRI, DNA).

***Distribution and habitat*:** *Anisomeles grandibractea* is endemic to the Northern Territory. It is confined to the eastern parts of Kakadu NP, and the Oenpelli area of Arnhem Land (**Map 7**). It inhabits sandstone plateaux and gorges, in eucalypt woodland or Acacia scrub, and is often recorded from the margins of monsoon vine forest in sandstone gorges, with at least some sites dominated by *Allosyncarpia ternata* S.T.Blake. Soils are skeletal or sandy.

***Phenology*:** Flowers are recorded between February and July; fruits from March to July.

***Notes*:** This species is characterised by seemingly axillary inflorescences, due to the floral bracts greatly exceeding the verticils. One collection (*Lazarides 9106*) has antrorse stem hairs, while other specimens have retrorse hairs on the stem.

Anisomeles grandibractea has two forms. The typical form has relatively shorter and broad floral bracts, often brown tomentum on new growth, long hairs (0.45–0.7 mm long) on the upper leaf surface, long petioles (27–40% of lamina length), and obtuse or broadly cuneate leaf bases. The other form (represented by e.g. *Lazarides 9106*, *Dunlop 6628 & Russell-Smith*) has very long floral bracts, no brownish tomentum, short hairs (0.2–0.35 mm long) on the upper leaf surface, shorter petioles (16–28% of lamina length), and narrowly cuneate leaf bases. Further study may reveal these forms to be separate species.

***Conservation status*: Least Concern**.

***Etymology*:** The epithet alludes to the floral bracts of this species, which consistently exceed the verticils.

11. Anisomeles heyneana Benth. in N.Wallich, *Pl. Asiat. Rar.* 1: 59 (1830); *Anisomeles secunda* O.Kuntze, *Revis. Gen. Pl.* 2: 512 (1891), *nom. illeg.*; *Epimeredi secundus* Rothm., *Repert. Spec. Nov. Regni Veg.* 53: 12 (1944), *nom. illeg.* **Type:** India, undated, *B. Heyne s.n. [Wallich Cat. No. 2028]* (lecto [here designated]: K 001057386, image!).

Teucrium secundum Heyne, In *Numer. List [Wallich]* n. 2028 (1829), *nom. nud.*

Erect or spreading shrub, 1.2–3 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, sparse; stalked glandular hairs absent; sessile glands 8–16 mm². Cauline leaves 72–116 mm long, 30–38 mm wide, 2.4–3.1 times longer

than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes dentate or serrate, irregular or regular, 12–22 on each side, acute, 0.5–2.3 mm deep; petioles 17–43 mm long, 24–37% of lamina length. Lamina upper surface indumentum appressed, eglandular, 0.6–0.7 mm long, sparse (hairs > 0.2 mm apart), sessile glands 8–48 mm²; lower surface indumentum erect or curved, eglandular, 0.6–0.8 mm long, confined to veins or sparse (hairs > 0.2 mm apart), sessile glands 48–128 mm²; transition from leaves to floral bracts abrupt. Floral bracts ovate, 3.5–14 mm long, 1.5–7.5 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes once dichasial at base then monochasial, with 4–8 flowers per monochasium, peduncles 8–39 mm long on lowermost cluster; bracteoles spathulate or linear, 2.5–4.8 mm long, 0.3–1.2 mm wide. Corolla tube same length as calyx; annulus 2.5–3.5 mm from base of corolla, annulus hairs 0.1–0.15 mm long; upper lip elliptical, 4.1–4.9 mm long, with eglandular hairs on outer surface; lower lip 5–5.5 mm long to end of lateral lobes, 9–10 mm long overall, glabrous on platform or with 1–20 eglandular hairs on platform. Longest stamens 11–12 mm long from base of corolla tube; filament hairs 0.7–1.1 mm long, mainly along middle part. Style 12–13 mm long; longer stigma lobe 0.6–0.8 mm long, shorter stigma lobe 0.15–0.5 mm long. Fruiting calyces 1.3–3 mm apart on rachilla; fruiting calyx cylindrical, 8–9.1 mm long, 3.7–4.5 mm wide at lobe apices, 1.9–2.2 times longer than wide, exterior surface with hairs of different sizes or types, hairs glandular and hairs eglandular, 0.4–0.9 mm long, sessile glands 48–112 mm²; lobes acute, 2.5–3 mm long. Fruiting calyx fringe hairs about the same length throughout or longer at sinus end than at apical end, 0.2–0.3 mm long at apical end, 0.2–0.8 mm long at sinus end, sinus hairs absent or present, inner surface of tube with sparse long hairs in medial section. Nutlets 1.8–2.1 mm long. **Figs. 4B, 9D.** *Western Hill catmint*.

***Additional specimens examined*: India.** Karjat, North Konkan, Jan 1949, *Fernandes 26* (A); near Dudh Sagor, Nov 1949, *Fernandes 5430* (K); Londa, Bombay Presidency, Jan 1950, *Fernandes 1012* (K); Nil-Gherries, 1857–58, *Perrottet* (G); Hosangadi, Karnataka State, Jan 1939, *Raja 6340* (MH); below Phonda Ghat, Jan 1853, *Ritchie 540* (E); near Kanheri Caves [between Thane & Borivali], Bombay presidency, Oct 1945, *Sinclair 4562* (E); Concan [Konkan], undated, *Stocks s.n.* (BRI, G, L, MH, NY, P).

***Distribution and habitat*:** *Anisomeles heyneana* is endemic to India. It occurs close to the west coast (Western Ghats), from Hosangadi to Mumbai (**Map 6**). None of the specimen labels include information on habitat; however, Efloraofindia (2007–2015) gives its habitat as "near forest clearing on hills and slopes".

***Phenology*:** Flowers are recorded for January, October, and November; fruits in January.

***Notes*:** Bentham, in the protologue, distinguished *Anisomeles heyneana* by the secund (one-sided) pedunculate inflorescences, the long ascending branches and the small leaves. It is true that in *A. heyneana*, one of the cymes at each verticil sometimes does not develop forming a secund inflorescence, but this is not a reliable difference.

Anisomeles heyneana is most likely to be confused with the sympatric *A. indica*, from which it differs by the narrower and often smaller leaves, the verticils all separated along the rachis, the long peduncle of the lower verticils, the white corolla, and the glabrous or sparsely hairy corolla platform.

***Conservation status*: Data Deficient**.

12. Anisomeles indica (L.) Kuntze, *Revis. Gen. Pl.* 2: 512 (1891); *Nepeta indica* L., *Sp. Pl.* 2: 571 (1753); *Epimeredi indicus* (L.) Rothm., *Repert. Spec. Nov. Regni Veg.* 53: 12 (1944). **Type:** Habitat in India (lecto: LINN 726.28, *fide* Cramer 1981).

Ballota disticha L., *Mant. Pl.* 1: 83 (1767); *Ajuga disticha* (L.) Roxb., *Hort. Bengal*. 44 (1814); *Anisomeles disticha* (L.) B.Heyne ex Roth, *Nov. Pl. Sp.*: 254 (1821); *Nepeta disticha* (L.) Blume, *Bijdr.* 823 (1826). **Type:** Habitat in India (lecto: LINN 737.7, *fide* Cramer 1981).

Monarda zeylanica Burm.f., *Fl. Ind. (N.L.Burman)* 12 (1768). **Type citation:** Habitat in Zeylona. **Types:** Ceylon, 1672–1677, *P. Hermann* (syn: BM 000621817); t. 71, J. Burman, *Thesaurus Zeylanica* (syn: the illustration).

Marrubium indicum Burm.f., *Fl. Ind. (N.L.Burman)* 127 (1768). **Type citation:** Habitat in Zeylona & Java. **Types:** Ceylon, 1672–1677, *P. Hermann* (syn: BM 000621817); t. 71, J. Burman, *Thesaurus Zeylanica* (syn: the illustration).

Nepeta amboinica L.f., *Suppl. Pl.* 273 (1782). **Type citation:** Habitat in Amboina. **Types:** Nepeta indica rotundiore folio, *Pl. Hist. Univ.*, pt. 3, p. 415 (1699) (syn: the illustration, *n.v.*).

Lamium garganicum Lour., *Fl. Cochinch.* 365 (1790), *nom. illeg.*, *non* L. (1763). **Type citation:** incultum in Cochinchina & China.

Ballota mauritiana Pers., *Syn. Pl. [Persoon]* 2: 126 (1806). **Type:** Isle de France, *P. Commerson s.n.* (syn: P, image!).

Anisomeles ovata R.Br. in W.T.Aiton, *Hortus Kew.* ed. 2, 3: 364 (1811), *nom. illeg.* [*Ballota disticha* L. cited in synonymy]. **Type:** probably a cultivated plant, *n.v.*

Anisomeles ovata var. *glabrata* Benth. in Wall., *Pl. Asiat. Rar.* 1: 59 (1830). **Types:** Nepal. Hetaundah, 13 December 1826, *N. Wallich s.n. [Wallich Cat. No. 2041]* (syn: K 000674248); India. Goalpara, 14 November 1808, *F. Buchanan-Hamilton s.n. [Wallich Cat. No. 2041]* (syn: K 000674247).

Anisomeles ovata var. *mollissima* Benth. in Wall., *Pl. Asiat. Rar.* 1: 59 (1830); *A. indica* var. *mollissima* (Benth.) Backer, *Fl. Java* 2: 624 (1965). **Type citation:** "Prome, Taong Dong et Sillet". **Type:** Bangladesh. Sylhet, *N. Wallich s.n. [Wallich Cat. No. 2039]* (syn: K [3 specimens]).

Phlomis alba Blanco, *Fl. Filip.* 474 (1837), *nom. illeg.*, *non* Forrsk. (1775).

Anisomeles cuneata J.Jacq. ex Fenzl, *Ecl. Pl. Rar.* 2: no. 27, t. 127 (1844). **Type:** the illustration, t. 127 (lectotype [here designated]).

Anisomeles malabarica var. *albiflora* Hassk., *Pl. Jav. Rar.:* 485 (1848); *Anisomeles albiflora* (Hassk.) Miq., *Fl. Ned. Ind.* 2: 976 (1859); *A. indica* var. *albiflora* (Hassk.) Backer, *Fl. Java* 2: 624 (1965). **Type:** not cited.

Anisomeles ovata var. *serratifolia* Miq., *Fl. Ind. Bat.* 2: 975 (1859). **Type:** Java, *C.L. Blume* (syn: ?L, *n.v.*); Borneo, *P.W. Korthals* (syn: ?L, *n.v.*).

Lophanthus argyi H.Lev., *Repert. Spec. Nov. Regni Veg.* 12: 181 (1913). **Type:** China. Kiang-sou [Jiangsu Sheng]: Zou-se, Vous-sie, Sou-Tcheou, undated, *P.C. d'Argy s.n.* (holo: E, fruiting material only).

Anisomeles tonkinensis Gand., *Bull. Soc. Bot. France* 65: 65 (1918). **Type:** Vietnam. Tonkin, ad Hanoi, August 1908, *A.C. D'Alleizette 184* (syn: P 04443001).

Erect or spreading shrub, 0.8–2 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, sparse to dense; stalked glandular hairs absent; sessile glands 8–64 mm². Cauline leaves 55–123 mm long, 27–76 mm wide, 1.3–2 times longer than wide, base obtuse or broadly cuneate (> 60°); marginal lobes crenate or dentate or serrate, irregular or regular, 11–22 on each side, acute or obtuse, 0.8–4 mm deep; petioles 12–40 mm long, 22–35% of lamina length. Lamina upper surface indumentum erect or curved, eglandular or appressed, eglandular 0.6–1.2 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–32 mm²; lower surface indumentum erect or curved, eglandular or appressed, eglandular 0.5–1.4 mm long, confined to veins or sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs <0.1 mm apart), sessile glands 8–64 mm²; transition from leaves to floral bracts abrupt or gradual. Floral bracts ovate, 7–15 mm long, 3–10 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all overlapping, forming continuous terminal inflorescence or overlapping near apex, cymes once dichasial at base then monochasial or twice dichasial (± globose), with 3–5 flowers per monochasium, peduncles 0–10 mm long

on lowermost cluster; bracteoles spathulate or linear, 2.7–4.2 mm long, 0.2–0.5 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 3–4 mm from base of corolla, annulus hairs 0.2–0.3 mm long; upper lip elliptical, 4.9–6.4 mm long, with eglandular hairs on outer surface or glabrous; lower lip 4.4–7.5 mm long to end of lateral lobes, 10.2–11.8 mm long overall, with more than 100 eglandular hairs on platform. Longest stamens 13.5–17 mm long from base of corolla tube; filament hairs 0.9–1.5 mm long, mainly along middle part. Style 14–18 mm long; longer stigma lobe 0.6–0.9 mm long, shorter stigma lobe 0.4–0.8 mm long. Fruiting calyces 1–2 mm apart on rachilla; fruiting calyx obconical, 7.2–10.8 mm long, 5–7.5 mm wide at lobe apices, 1.3–2 times longer than wide, exterior surface with hairs of different sizes or types or with all hairs same size and type, hairs glandular or hairs eglandular, 0.6–2 mm long, sessile glands 16–96 mm²; lobes attenuate or acute, 3–5 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.3 mm long at apical end, 0.15–0.3 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 1.7–1.9 mm long. **Figs. 4D, 7G, 9E.**

***Additional selected specimens examined*: Caribbean.** Seamens Valley, Portland, Jamaica, Feb 1920, *Maxon & Killip 72* (A). **Mauritius.** Ile de France, undated, *Commerson 263* (L). **Pakistan.** below the Lowari Pass, Sep 1895, *Gatacre 17411* (BM). **India.** Mawryngkneng, Khasi Hills, Assam, Oct 1951, *Chand 5035* (L); Dehra Dun and vicinity, Nov 1927, *Singh 287* (NY). **Sri Lanka.** Pitiduwa, Galle district, Oct 1971, *Cramer 3423* (L). **Maldives.** Hitaddu Islet, Sep 1964, *Sigee 116* (BM). **Nepal.** SE of Thagaon, above Bhotekoshi Nadi, Sep 2011, *Watson EKSIN14 et al.* (E). **Thailand.** Huay Bankau, Nov 1971, *Beusekom 3559 et al.* (L); Ban Bing Khong, Chiang Mai province, Oct 1987, *Maxwell 87-1309* (L). **Laos.** Along path to Ban Silia, Khammouan, Oct 2005, *Newman et al. LAO486* (E). **China.** Pak Shik Ling and vicinity, Oct 1932, *Lei 110* (NY); Dinghu Mountains, Oct 1963, *Ting & Shih 1078* (L). **Japan.** Miyako Island, Ryukyus, Jan 1940, *Naiko s.n.* (L). **Philippines.** Mindanao: Zamboanga, Feb 1904, *Hallier 4619* (L). **Fiji.** Levuka, May 1923, *Greenwood 583* (BRI). **Indonesia.** Java: Buitenzorg, Oct 1922, *Bakhuizen van den Brink 1939* (L). Sulawesi: Minanga, Dec 1895, *Koorders 17361B* (L). Lesser Sunda Islands: Kada, Timor, Jul 1970, *Kooy 751* (L); Komodo Island, Jun 1982, *Verheijen 4921* (L). Papua: N of Andjai village, Kebar Valley, Nov 1954, *van Royen 5023* (L). **Australia.** Christmas Island, Stubbings Point, W side of South Point, Jun 1984, *Mitchell 32* (AD, CANB).

***Distribution and habitat*:** *Anisomeles indica* is a widespread and common species. It is indigenous in southern Asia, including Pakistan, India, Sri Lanka, Maldives, Nepal, Bhutan, Bangladesh, Burma, Thailand, Laos, Malaysia, Vietnam, China, Taiwan, Japan, Philippines and Indonesia (including Papua). From its eastern extent, the Ryukyu Islands of southern Japan, it extends west to Pakistan, north to the foothills of the Himalayas, and south to Java and Christmas Island, the latter being an external territory of Australia (**Map 4**). It grows on a wide range of habitats from steep mountain slopes to alluvial flats, and on sandy or clayey soils.

The African Plants Database (APD 2013) states that *A. indica* is naturalized in Madagascar. Hedge (1998) cited two specimens for Madagascar, commenting that "Perhaps *A. indica* is present in Madagascar, but this has never been confirmed, even as an introduced species". Baker (1877) stated that the occurrences of *A. ovata* (=*A. indica*) on nearby Mauritius were naturalisations. Naturalised populations also occur at Fiji, Samoa, Trinidad and Jamaica.

***Phenology*:** Flowers and fruits have been recorded from every month of the year.

***Nomenclature*:** Govaerts *et al.* (2013) have listed *Anisomeles cuneata* as a synonym of *A. malabarica*. However, the very good illustration in the protologue undoubtedly depicts *A. indica*. The protologue states that the plant originated in India, and seeds (sent from England) were raised at Vienna botanical garden. No specimen matching the protologue is present at W (A. Löckher, pers. comm. July 2013). In the absence of a specimen, the illustration in the protologue is considered the type of the name. Fenzl's name appears after the descriptive paragraph, indicating that he wrote the validating description, though he credits Jacquin with the species epithet.

The Rheede syntype of *Nepeta amboinica* is referable to *Anisochilus carnosus* (L.f.) Wall. (Suddee & Paton 2009).

Notes*: *Anisomeles indica is a very widespread species and is accordingly very variable. It is most readily recognised by its obconical fruiting calyces, which are usually considerably less than twice as long as they are wide. All other species have fruiting calyces that are cylindrical or at most narrowly campanulate. The calyx fringe hairs of *A. indica* are very short throughout, in contrast to all other Asian species.

The syntypes of *A. indica* var. *mollissima* possess a much denser indumentum and more numerous leaf lobes than the type of *A. indica*, and on that basis it is tempting to recognise it as a distinct species, but it is possible to find *A. indica* specimens with a range of indumentum densities and leaf lobe numbers, so that recognition even at varietal rank seems unwise. Furthermore, the tomentose specimens seem to have no 'core' distribution; they occur in Nepal, eastern India and Sumatra.

From my study of herbarium specimens, I conclude that the variation in fruiting calyx size, leaf size and shape, flower size, and indumentum density for *A. indica* appears to be continuous, and hence no infraspecific taxa are proposed. However, a careful field-based study may yet find that distinct taxa exist.

***Conservation status*: Least Concern**.

13. Anisomeles inodora R.Br., *Prodr. Fl. Nov. Holl.* 503 (1810); *Anisomeles salviifolia* var. *denudata* Domin, *Repert. Spec. Nov. Regni Veg.* 12: 98 (1913), *nom. illeg.*; *A. salviifolia* var. *inodora* (R.Br.) Domin, *Biblioth. Bot.* 89: 567 (1928); *Epimeredi inodorus* (R.Br.) Rothm., *Repert. Spec. Nov. Regni Veg.* 53: 12 (1944). **Type:** [Australia: Northern Territory]. Arnhem North Bay [Melville Bay], 14 February 1803, *R. Brown s.n. [Bennett Number 2356]* (lecto: BM 001041066 [here designated]; isolecto: BM 001041067, E 00649578).

Procumbent or erect to spreading shrub, 0.6–2 m high. Upper stems and rachises without patent hispid hairs, or rarely with patent hispid hairs; short curved hairs retrorse, sparse or moderately dense; stalked glandular hairs absent; sessile glands 48–112 mm². Cauline leaves 38–115 mm long, 12–43 mm wide, 1.9–3.4 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or serrate, irregular or regular, 7–24 on each side, obtuse, 0.5–3 mm deep; petioles 7–42 mm long, 20–60% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.15–0.25 mm long, confined to midrib or sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 8–48 mm²; lower surface indumentum erect or curved, eglandular, 0.15–0.25 mm long, confined to veins or sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 80–144 mm²; transition from leaves to floral bracts abrupt. Floral bracts lanceolate or elliptical, 9–31 mm long, 3–11 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 3–14 flowers per monochasium, peduncles 0–19 mm long on lowermost cluster; bracteoles spathulate or linear, 2.7–5.8 mm long, 0.3–1.1 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 2.3–3.3 mm from base of corolla, annulus hairs 0.25–0.3 mm long; upper lip elliptical, 4.8–5.8 mm long, with glandular hairs on outer surface or with eglandular hairs on outer surface; lower lip purple or pink, 6.3–7.6 mm long to end of lateral lobes, 11.7–13.6 mm long overall, glabrous on platform. Longest stamens 11.5–12.5 mm long from base of corolla tube; filament hairs 0.8–1.5 mm long, mainly at distal end. Style 12.5–13.5 mm long; longer stigma lobe 0.7–0.8 mm long, shorter stigma lobe 0.45–0.55 mm long. Fruiting calyces 1.3–3.8(–12) mm apart on rachilla; fruiting calyx cylindrical, 7–9.3 mm long, 3.1–3.5 mm wide at lobe apices, 2.1–2.9 times longer than wide, exterior surface with hairs of different sizes or types or with all hairs same size and type, hairs glandular or hairs eglandular, 0.1–0.9 mm long, sessile glands 112–208 mm²; lobes acute, 1.5–2.8 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.15–0.3 mm long at apical end, 0.6–1.1 mm long at sinus end, sinus hairs absent, inner

surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 1.8–2.2 mm long. **Figs. 4C, 9F.**

***Additional selected specimens examined*: Australia: Western Australia**. Mitchell Plateau, N of mining camp, Aug 1978, *Beauglehole 59057 & Errey* (PERTH); Mt Barnett, Jun 1905, *Fitzgerald 1093* (PERTH); 17 km from camp towards Pt Warrender, Mitchell Plateau, Apr 1982, *Keighery 4824* (PERTH); Camp Creek, near bauxite crusher, Mitchell Plateau, Jan 1982, *Kenneally 7987* (PERTH); N end of Bougainville Peninsula separating Admiralty Gulf and Vansittart Bay, Apr 1982, *Kenneally 8091* (AD, K, PERTH); 21 km N of mining camp, Mitchell Plateau, May 1982, *Kenneally 8194* (PERTH); Cape Anjo, Jul 1973, *Wilson 11296* (PERTH). **Northern Territory**. Nhulunbuy, Gove Peninsula, Jun 1982, *Hinz 134* (DNA); Cape Arnhem, Mar 1995, *Barritt 1729* (DNA, MEL); 5 km NNE of Gwapilina Point, Port Bradshaw, Feb 1994, *Brennan 2478* (DNA); Truant Island, English Company Islands, Jul 1992, *Leach 3012* (BRI, DNA); Black Point, Cobourg Peninsula, May 1983, *Wightman 402* (BRI, CANB, DNA, MEL); Latram River, NE Arnhem Land, Feb 1988, *Wightman 4163* (BRI, DNA, MEL); Giddy River crossing, Nhulunbuy area, May 1989, *Wightman 4706* (BRI, DNA). **Queensland**. Cook District: near Little Laura River, SSW of Laura, Jul 1990, *Bean 1681* (BRI); Newcastle Bay, 2.5 miles [4 km] S of Somerset, May 1948, *Brass 18756* (A, BRI, L); 10.2 km S of Batavia Downs on the Peninsula Development Road, Apr 1990, *Clarkson 8432 & Neldner* (BRI); Cape Melville NP, 8 km SSW of Cape Melville, Jul 1993, *Fell DGF3364 & Stanton* (BRI, CANB); 102 km NW of Coen, boundary of Archer Bend NP and Merluna Holding, Jun 1994, *Fell DGF4413 & Buck* (BRI); Batavia Downs, 7.2 km W by road of Bromley HS, towards Moreton Telegraph Station, Jun 2007, *Forster PIF32757 & McDonald* (BRI, NSW); Normanby Holding, Duffers Creek catchment, N of Battle Camp Road, Jun 2007, *Forster PIF32933* (BRI); Snake Creek, Gulf of Carpentaria, 35 km NNW of Delta Downs HS, Jun 2003, *Fox IDF1791* (BRI); Hammond Island, Jul 1974, *Heatwole 207 & Cameron* (BRI); *c.* 18 km W of Cholmondeley Creek crossing, on Telegraph Line road, Mar 1992, *Johnson 5162* (BRI, NSW); Middle Creek ridge, Errk Oykangand NP, Jun 2010, *McDonald KRM9440 & Little* (BRI); Running Creek Nature Refuge. Scrubby Lagoon, Jun 2013, *McDonald KRM14501* (AD, BRI); Pormpuraaw, Chapman Point camping ground, 1.9 km S of township, May 2009, *McKenna SGM512* (BRI, CANB, CNS); Weipa, edge of Lake Patricia vine scrub, Mar 1980, *Morton AM680* (BRI); Chuula Outstation, Kaanju Nation, central Cape York, May 2005, *Smith 4862 & Claudie* (BRI); Roberts Creek, Squatter camp, Weipa, Apr 2008, *Stephensen KFS38* (BRI, CANB); Rutland Plains, near mouth of Mitchell River, Jun 1943, *Whitehouse s.n.* (BRI [AQ160159]).

***Distribution and habitat*:** *Anisomeles inodora* occurs in the northern Kimberley area of Western Australia, in coastal parts of the 'Top End', Northern Territory, and throughout Cape York Peninsula in Queensland (**Map 7**). It inhabits sandy soils in open eucalypt woodland and forest, and occasionally on sandstone outcrops.

***Phenology*:** Flowers from February to October; fruits from April to October.

***Notes*:** This species is allied to *Anisomeles moschata*, but differs by the shorter leaf hairs, the sparser indumentum on the lower leaf surface, the longer lower lip of the corolla, the glabrescent stems and calyces glabrous or with a few hairs along the ribs.

Specimens from the Laura region of Queensland have particularly widely spaced flowers and fruits and quite narrow leaves, but from herbarium study, I am unsure whether there is a discontinuity between this form and typical *A. inodora*. Specimens from the Kimberley region of Western Australia also have widely spaced flowers and fruits and narrow leaves, and they have shorter calyx fringe-hairs than the typical form. Further study may reveal that a taxonomic distinction is warranted for these populations.

***Conservation status*: Least Concern**.

14. Anisomeles languida A.R.Bean **sp. nov.** habitu prostrato, praesentia pilorum hispidorum patentium in caulibus superioribus, pilis 1–2.4 mm longitudine foliis calycibusque insidentibus, in pagina superiore folii appressis, calycibus fructificantibus late dispositis et labio inferiore corollae glabro distinguitur. **Typus:** Australia: Queensland. Cook District: Isabella Falls, Battlecamp Road, NW of Cooktown, 7 June 2013, *K.R. McDonald KRM14297* (holo: BRI; iso: MEL, NSW).

Prostrate shrub, 0.1–0.2 m high. Upper stems and rachises with patent hispid hairs; short curved hairs retrorse, sparse or moderately dense; stalked glandular hairs absent; sessile glands 8–64 mm². Cauline leaves 55–78 mm long, 27–37 mm wide, 1.9–2.4 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate, irregular or regular, 12–16 on each side, acute or obtuse, 0.6–1.8

mm deep; petioles 11–30 mm long, 18–45% of lamina length. Lamina upper surface indumentum appressed, eglandular, 1–2 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 32–96 mm²; lower surface indumentum erect or curved, eglandular or appressed, eglandular 1–1.6 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 64–128 mm²; transition from leaves to floral bracts abrupt. Floral bracts elliptical or ovate, 6–27 mm long, 2.5–10 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 4–9 flowers per monochasium, peduncles 0–5.5 mm long on lowermost cluster; bracteoles spathulate, 2.5–6.7 mm long, 0.3–0.8 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 2.5–3.2 mm from base of corolla, annulus hairs 0.15–0.2 mm long; upper lip elliptical, 4–5.1 mm long, with eglandular hairs on outer surface; lower lip purple or pink, 5.6–6.9 mm long to end of lateral lobes, 11–14.5 mm long overall, glabrous on platform. Longest stamens 11.5–13.5 mm long from base of corolla tube; filament hairs 1.1–1.5 mm long, mainly along middle part or mainly at distal end. Style 11.5–14 mm long; longer stigma lobe 0.6–0.8 mm long, shorter stigma lobe 0.4–0.45 mm long. Fruiting calyces 1.7–4.4 mm apart on rachilla; fruiting calyx narrowly campanulate or cylindrical, 6.9–9 mm long, 3.2–4.3 mm wide at lobe apices, 2.1–2.4 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 1.1–2.4 mm long, sessile glands 16–96 mm²; lobes acute, 1.8–3.1 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.25 mm long at apical end, 0.15–0.4 mm long at sinus end, sinus hairs absent, inner surface of tube with sparse long hairs in medial section or glabrous. Nutlets 2.1–2.4 mm long. **Figs. 1A, 1B, 2A, 4E, 9G**.

***Additional specimens examined*: Australia: Queensland.** Cook District: Isabella Falls, near Cooktown, May 1970, *Blake 23444* (BRI, CANB, L, MEL, PERTH); Lockerbie, 10 miles [16 km] WSW of Somerset, Apr 1948, *Brass 18404* (BRI, CANB, L); Bridge Creek Holding (proposed NP), upper Bridge Creek catchment, NW of Cooktown, Apr 2010, *Forster PIF36462 & Thomas* (BRI); Bridge Creek Holding (proposed NP), S of Battle Camp road, NW of Cooktown, May 2010, *Forster PIF36860 & Thomas* (BRI); Cape Melville NP, Nookai Creek, May 2014, *McDonald KRM15738* (BRI, NSW); Big Fish Camp waterhole, Silver Plains station, Jun 2014, *McDonald KRM16018* (BRI, DNA, MEL).

***Distribution and habitat*:** *Anisomeles languida* is endemic to Queensland. It occurs in four disjunct areas of Cape York Peninsula, viz. Battle Camp road near Cooktown, Cape Melville, Silver Plains, and Lockerbie (**Map 2**). It grows in riparian woodland, or its margin with *Eucalyptus* woodland on sandstone or granite hillslopes.

***Phenology*:** Flowers have been recorded from April to June; fruits in May and June.

***Notes*:** *Anisomeles languida* is distinguished by the prostrate habit, the presence of patent hispid hairs on the upper stems, the hairs 1–2.4 mm long on leaves and calyces, the hairs appressed on the upper leaf surface, the widely spaced fruiting calyces, and the glabrous platform of the corolla.

***Conservation status*: Least Concern**.

***Etymology*:** From the Latin *languidus*, meaning listless or weary. This is an oblique reference to the prostrate habit of the plant; it seems too weary to battle against gravity.

15. Anisomeles lappa A.R.Bean **sp. nov.** habitu prostrato vel procumbente, pilis hispidis crebris caulibus insidentibus, foliis basalibus paribus 4–10 loborum marginalium praeditis, monochasiis paucifloris et bracteis floralibus longitudine verticillos superantibus distinguitur**. Typus:** Australia: Queensland. Cook District: 1 km S of Lappa on Mt Garnet Road, 12 April 2005, *P.I. Forster PIF30742 & K.R. McDonald* (holo: BRI; iso: MEL, NSW).

Anisomeles salviifolia var. *tomentoso-hirsuta* Domin, *Biblioth. Bot.* 89: 567 (1928). **Type:** Australia: Queensland. Cook District: Walsh River near Chillagoe, February 1910, *K. Domin s.n.* (holo: PR 530817).

Prostrate or procumbent shrub, 0.15–0.5 m high. Upper stems and rachises with

patent hispid hairs; short curved hairs retrorse, moderately dense or dense; stalked glandular hairs absent; sessile glands 8–80 mm². Cauline leaves 26–49 mm long, 12–25 mm wide, 2–3.3 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes dentate or serrate, irregular or regular, 4–10 on each side, acute or obtuse, 0.9–1.5 mm deep; petioles 4–13 mm long, 11–33% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.4–1 mm long, sparse (hairs < 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 8–64 mm²; lower surface indumentum erect or curved, eglandular, 0.4–0.7 mm long, confined to veins or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 64–112 mm²; transition from leaves to floral bracts gradual. Floral bracts 16–46 mm long, 8–17 mm wide, consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes once dichasial at base then monochasial, with 3–7 flowers per monochasium, peduncles 1–6 mm long on lowermost cluster; bracteoles obovate or spathulate, 4–13 mm long, 0.7–5 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 2.2–3 mm from base of corolla, annulus hairs 0.1–0.3 mm long; upper lip ovate or elliptical, 4.1–6.2 mm long, with glandular hairs on outer surface; lower lip 6.2–7.7 mm long to end of lateral lobes, 14–15.5 mm long overall, glabrous or with 1–20 eglandular hairs on platform. Longest stamens 13–15 mm long from base of corolla tube; filament hairs 0.9–1.3 mm long, mainly at distal end. Style 13–15 mm long; longer stigma lobe 0.65–0.8 mm long, shorter stigma lobe 0.45–0.5 mm long. Fruiting calyces 1–2 mm apart on rachilla; fruiting calyx cylindrical, 7–10 mm long, 4.3–5.5 mm wide at lobe apices, 1.7–2.5 times longer than wide, exterior surface with hairs of different sizes or types or with all hairs same size and type, hairs eglandular, 0.4–1.9 mm long, sessile glands 32–96 mm²; lobes acute, 2–3 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.3 mm long at apical end, 0.15–0.25 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 2.1–2.5 mm long. **Figs. 4F, 7E, 9H.**

***Additional selected specimens examined*: Australia: Queensland.** Cook District: Alma-den, undated, *Bick 176* (BRI); Springmount Station, *c.* 13 km from the Mareeba – Dimbulah Road, on the road to Collins Weir, Apr 1983, *Clarkson 4664* (BRI, CNS, DNA, K, MEL, MO, PERTH); 10 km from Alma-den on road to Mt Surprise, Jan 1992, *Forster PIF9593* (BRI); 16 km from Mt Garnet on road to Lappa, 1 km past Mt Cardwell turnoff, Jan 1993, *Forster PIF12777 & Bean* (BRI, CNS, MEL); Pannikin Springs area, 29 km W of Mungana, Jan 1993, *Forster PIF13013 & Bean* (BRI, DNA); Copperfield River, Kidston Goldmine water supply dam, Gilbert Range, Feb 1994, *Forster PIF14902 & Bean* (BRI, CNS, MEL); Donkey Spring Creek, Bulleringa NP, 80 km NW of Mt Surprise, Apr 1998, *Forster PIF22414 & Booth* (BRI); Stannary Hills, 11 km S of Mutchilba, Portion 603, May 2006, *Forster PIF31593 & McDonald* (BRI); Chillagoe, Jan 1931, *Hubbard 6815 & Winders* (BRI); Kent Holdings, W of road from Mt Garnet to Minnamoolka, May 1999, *Jago 5239 & Wannan* (BRI); 1 km from Walsh River crossing, N of Chillagoe, Mar 2000, *McDonald KRM329* (BRI); near Barwidgi Road turnoff, S of Mt Garnet, Apr 2004, *McDonald KRM2176 & Covacevich* (BRI); 51 km along Alma-den road from junction with Gulf Development Road, near Mt Surprise, May 2004, *McDonald KRM2596* (BRI); Undara NP, 5.1 km along northern boundary firebreak with St Ronan's station, Dec 2006, *McDonald KRM6032* (BRI); Gorge Creek, Mareeba, Apr 1962, *McKee 9257* (CANB); Pinnacle Springs Road, 4 km W from Kennedy Highway, Apr 2004, *Purdie 5924* (BRI, CANB); 2 km downstream of junction of Graves and Fulford Creeks, Burlington Station, N of Mt Surprise, Jun 1999, *Thompson SLT2467 & Newton* (BRI); 100 mile swamps, 'Rosella Plains', Jul 1981, *Williams 81134* (BRI). North Kennedy District: 12 km along Deadmans Road, off Silver Valley Road, Feb 1996, *Forster PIF18415 & Ryan* (BRI, CNS, NSW); *c.* 1.2 km ESE of Hidden Valley township, Paluma Road, Feb 2000, *Pollock ABP853 & Edginton* (BRI).

***Distribution and habitat*:** *Anisomeles lappa* is endemic to Queensland. It is found in the north-east of the state, including the western parts of the Atherton Tableland, Bulleringa NP, Alma-den, and Undara NP (**Map 2**). It grows in eucalypt woodland. Almost all records are from granite hills or sandy soils adjacent to granite outcrops.

***Phenology*:** Flowers and fruits are recorded from December to July inclusive.

***Notes*:** *Anisomeles lappa* can be distinguished by the prostrate or procumbent habit, the abundant patent hispid hairs on flowering stems, the short cauline leaves, and the long

lower lip of the corolla. It may be distinguished from the geographically close species *A. moschata* by the prostrate to procumbent habit, the floral bracts exceeding the verticils, and the calyx fringe hairs only 0.15–0.25 mm long at sinus end.

***Conservation status*: Least Concern**.

***Etymology*:** The epithet refers to the locality of Lappa, a railway siding near the township of Petford, near where the type was collected. It is used as a noun in apposition.

16. Anisomeles leucotricha A.R.Bean **sp. nov.** foliis ellipticis praeditis tomento brevi albo, verticillis omnino vel partim superpositis, pilis marginalibus longis loborum calycis, pilis 1–20 labio inferiori corollae insidentibus et bracteis floralibus parvis distinguitur. **Typus:** Australia: Northern Territory. 3.4 km S of Goodparla airstrip (abandoned), Kakadu National Park, 29 April 1990, *A.V. Slee & L.A. Craven 3034* (holo: DNA; iso: CANB).

Erect or spreading shrub, 0.7–1.5 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, sparse or moderately dense; stalked glandular hairs absent; sessile glands 16–112 mm². Cauline leaves 48–97 mm long, 13–43 mm wide, 2.2–3.7 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes crenate, regular, 15–37 on each side, obtuse, 0.6–1.5 mm deep; petioles 10–26 mm long, 12–29% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.15–0.3 mm long, sparse (hairs > 0.2 mm apart), sessile glands 8–32 mm²; lower surface indumentum erect or curved, eglandular, 0.2–0.3 mm long, dense (hairs < 0.1 mm apart), sessile glands 64–112 mm²; transition from leaves to floral bracts abrupt. Floral bracts elliptical, 3.5–25 mm long, 1–9 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all overlapping, forming continuous terminal inflorescence or overlapping near apex, cymes once dichasial at base then monochasial or twice dichasial (± globose), with 2–9 flowers per monochasium, peduncles 0–12 mm long on lowermost cluster; bracteoles linear, 2.8–4.5 mm long, 0.2–0.4 mm wide. Corolla tube longer than calyx, or same length as calyx, or shorter than calyx; annulus 2.5–3.2 mm from base of corolla, annulus hairs 0.2–0.3 mm long; upper lip elliptical, 3.9–5.2 mm long, with glandular hairs on outer surface or with eglandular hairs on outer surface or glabrous; lower lip 5.6–6.5 mm long to end of lateral lobes, 8.8–12.3 mm long overall, with 1–20 eglandular hairs on platform. Longest stamens 11–12 mm long from base of corolla tube; filament hairs 0.9–1.5 mm long, mainly at distal end. Style 11–12 mm long; longer stigma lobe 0.75–0.85 mm long, shorter stigma lobe 0.4–0.5 mm long. Fruiting calyces 0.8–1.2 mm apart on rachilla; fruiting calyx cylindrical, 7.2–9.3 mm long, 3.1–3.6 mm wide at lobe apices, 2.1–2.9 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.25–0.5 mm long, sessile glands 80–128 mm²; lobes acute, 2.5–3.7 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.7–1.4 mm long at apical end, 1–1.5 mm long at sinus end, sinus hairs present, inner surface of tube glabrous. Nutlets 1.9–2.3 mm long. **Figs. 4G, 10A**.

***Additional selected specimens examined*: Australia: Northern Territory**. Bukbuk Hill, near Arnhem Highway, 4–5 km E of Kapalga turnoff, Feb 1991, *Brennan Bre995* (DNA); Kakadu NP, fire plot 202, Jabiluka Outlier, Mar 1999, *Brennan 3752* (DNA); Litchfield Road, 2 miles [3 km] from HS, Apr 1967, *Byrnes N237* (DNA, NT); 3 miles [5 km] W of, and 8 miles [13 km] S of, Adelaide River township, Jan 1972, *Byrnes & McKean B259* (DNA); Kakadu Highway, Nellie Creek Range, Mar 1987, *Clark 882* (CANB, DNA); Tipperary Station, Jun 1990, *Clark 2347* (DNA); 13 miles [21 km] SE of Darwin, May 1958, *Chippendale 4443* (BRI, DNA); 13 miles [21 km] W of Burrundie, Mar 1961, *Chippendale 7629* (DNA, MEL); Port Essington, S of Wangewanga Cove, Apr 1993, *Cowie 3356* (DNA); Port Essington, in 1819, *Cunningham 270* (MEL); Melville Island, SE coast, Apr 1992, *Fensham 1280* (DNA); Shoal Bay, 34 km NE of Darwin, Apr 1992, *Halford Q1101* (BRI, DNA); Port Darwin, undated, *Holtze 54* (MEL); Mary River Station, Mar 2001, *Liddle 2605* (DNA); Bathurst Island, Nguiu Forestry Suburb, May 1998, *Michell & Risler 1520* (DNA); 0.5 miles [0.8 km] N of CSIRO block, Tipperary, May 1963, *Muspratt SSO610* (DNA); 2.5 miles [4.0 km] W of Mud Spring, May 1963, *Muspratt SSO542* (DNA); 10 miles [16 km] out from Daly River, Feb 1964, *Robinson R79* (DNA, NT); Koolpinyah Station, 1 km S of Banka's Jungle, Mar 1990, *Taylor SMT12* (DNA); Jindare Station, Stray Creek catchment, Jun 2010, *Westaway 3251* (B, DNA, MO); White Cliffs beach, west of airstrip, Croker Island, Mar

2013, *Westaway JOW4142* (BRI, CANB, DNA); Bynoe Harbour, *c*. 200 m from MacKenzie Arm boat ramp off Barramundi Drive, Mar 2006, *Wirf 247* (DNA).

***Distribution and habitat*:** *Anisomeles leucotricha* is endemic to the Northern Territory, from Melville Island to Kakadu NP and Litchfield NP (**Map 3**). It grows on a variety of habitats, including vine thicket on foreshore, open woodland with *Corymbia foelscheana* (F.Muell.) K.D.Hill & L.A.S.Johnson and/or *Erythrophleum chlorostachys* (F.Muell.) Baill. on hills. Substrate is quaternary sand or sandstone.

***Phenology*:** Flowers are recorded from January to July; fruits between April and July.

***Notes*:** *Anisomeles leucotricha* is distinguished by the elliptical leaves with an attenuate base and a short even indumentum, the exceptionally long calyx fringe hairs, the closely arranged fruiting calyces (0.8–1.2 mm apart), the adjacent verticils sometimes overlapping to form a dense cluster, and the tiny floral bracts. The leaves have many crenate lobes. The lower leaf surfaces have short antrorse hairs, very often conspicuously white, especially along the veins.

This species possibly intergrades with *A. brevipilosa* to the east of (and west of) Katherine, as some specimens from these areas are difficult to allocate to either species.

***Conservation status*:** Least Concern (IUCN 2012).

***Etymology*:** The epithet is from the Greek *leucos* – white, and *trichos* – hair or trichome. In this species, the hairs on the underside of the leaf are frequently conspicuously white, especially along the veins.

17. Anisomeles macdonaldii A.R.Bean **sp. nov.** abundantia pilorum glandularium et absentia pilorum eglandularium retrorsorum caulibus insidentibus, foliis basalibus latis basi obtusa et petiolo longo (longitudine 32–54% laminae aequante) praeditis distinguitur. **Typus:** Australia: Queensland. Cook District: *c*. 8 km by road E of Chillagoe, 21 April 2013, *K.R. McDonald KRM14083 & G.P. Guymer* (holo: BRI; iso: MEL, *distribuendi*).

Anisomeles salviifolia var. *hispida* Domin, *Biblioth. Bot*. 89: 567 (1928). **Type:** Australia: Queensland. Cook District: Smelling Bluff near Chillagoe, February 1910, *K. Domin s.n*. (syn: PR 530815); limestone hill near Chillagoe, February 1910, *K. Domin s.n*. (syn: PR 530816).

Erect or spreading shrub, 0.4–2 m high. Upper stems and rachises with patent hispid hairs; short curved hairs absent or retrorse, sparse to moderately dense; stalked glandular hairs abundant; glandular hairs extending to lower stems; sessile glands 8–80 mm². Cauline leaves 51–91 mm long, 32–63 mm wide, 1.2–1.9 times longer than wide, base obtuse or broadly cuneate (> 60°); marginal lobes crenate or dentate, regular, 10–18 on each side, acute or obtuse, 0.9–2.4 mm deep; petioles 19–40 mm long, 32–54% of lamina length. Lamina upper surface indumentum of erect glandular and curved eglandular hairs, 0.15–1.3 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–48 mm²; lower surface indumentum of erect glandular and curved eglandular hairs, 0.15–1.3 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–80 mm²; transition from leaves to floral bracts gradual. Floral bracts ovate or broadly ovate, 14–47 mm long, 11–28 mm wide, not consistently exceeding verticils or consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 4–11 flowers per monochasium, peduncles 2–28 mm long on lowermost cluster; bracteoles spathulate or linear, 2.5–5.5 mm long, 0.4–1.1 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 3–3.4 mm from base of corolla, annulus hairs 0.2–0.3 mm long; upper lip ovate or elliptical, 5.8–6.7 mm long, with glandular hairs on outer surface or with eglandular hairs on outer surface; lower lip pink, 8.2–9 mm long to end of lateral lobes, 14–16.5 mm long overall, with 1–20 or 20–100 eglandular hairs on platform. Longest stamens 12.8–13.5 mm long from base of corolla tube; filament hairs 1.3–1.6 mm long, mainly at distal end. Style 12.8–14

mm long; longer stigma lobe 0.65–0.75 mm long, shorter stigma lobe 0.4–0.5 mm long. Fruiting calyces 1–7 mm apart on rachilla; fruiting calyx cylindrical, 7.4–10 mm long, 3–4.8 mm wide at lobe apices, 2.1–2.7 times longer than wide, exterior surface with hairs of different sizes or types, hairs glandular and eglandular, 0.8–1.3 mm long, sessile glands 8–48 mm²; lobes acute, 1.8–3.2 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.25 mm long at apical end, 0.15–0.3 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 1.8–2.3 mm long. **Figs. 1D, 4H, 10B.**

***Additional specimens examined*: Australia: Queensland.** Cook District: McDonald Creek area, 42 km from Mt Surprise township, Mt Surprise Gemfield, Apr 1985, *Champion 135* (BRI); Mt Mulligan, between the abandoned mine site and the falls on Richards Creek along the water supply pipeline, Apr 1984, *Clarkson 5272* (BRI, MEL); Royal Arch Tower, *c*. 5 km SW of Chillagoe, Mar 1987, *Clarkson 6832 & McDonald* (BRI, DNA, L, NSW, PERTH); Near Royal Arch Cave, Chillagoe, Jun 1992, *Fensham 243* (BRI); on Chillagoe Road, 14 km from Almaden, Mar 1990, *Forster PIF6524* (BRI, CNS, DNA); Mt Pinnacle, SSW of Dimbulah, Jan 1993, *Forster PIF12952 & Bean* (BRI); Bridle Logging Area, SF 607 Dinden, Jul 1995, *Forster PIF17353 et al.* (BRI); NE slopes of Hann Tableland above the Southedge HS, Jul 2002, *Fox IDF1648* (BRI); on a bench alongside the water-supply pipeline between Ngarrabullgan and the Mt Mulligan HS, Jul 2003, *Fox IDF2072* (BRI); Mungana, Aug 1995, *Hyland 15355* (BRI); *c*. 1.9 km ENE of Mt Carbine, *c*. 1.7 km along Mt Spurgeon road, Apr 2013, *Jensen 2801 & Kemp* (BRI, CANB); Pinchgut Hill, NE of Chillagoe, Mar 2005, *McDonald KRM3899 & Little* (BRI); Chillagoe, Jan 1918, *Michael 289* (BRI); Mt Mulligan, 40 km NW of Dimbulah, Apr 1989, *Neldner 2758* (BRI). North Kennedy District: NW of Pear Rock, Mt Stewart Range, 'Allandale', May 1995, *Forster PIF16624 & Figg* (BRI); 9.5 km W of Homestead, 83 km SW of Charters Towers, Aug 1992, *Thompson CHA196 & Sharpe* (BRI).

***Distribution and habitat*:** *Anisomeles macdonaldii* is endemic to Queensland. It is found in several disjunct populations from Mt Carbine to Chillagoe, with disjunct occurrences near Mt Surprise and Pentland. It appears to be especially prevalent around limestone outcrops near Chillagoe (**Map 1**). It grows in low eucalypt woodland or on the margins of vine thicket. The substrate can be granite, limestone or sandstone.

***Phenology*:** Flowers and fruits are recorded from January to August inclusive.

***Notes*:** *Anisomeles macdonaldii* is distinguished by the broad cauline leaves, the abundant stalked glandular hairs on the stems, and the abundant patent hispid hairs on the stems.

***Conservation status*: Least Concern**.

***Etymology*:** Named for Keith Raymond McDonald (b. 1950), an expert on the taxonomy and identification of many faunal groups, especially frogs, and for the last 15 years, an avid plant collector. He has increased our knowledge of Queensland plant species considerably through his many high-quality specimens, and has discovered or rediscovered a number of species.

18. Anisomeles malabarica (L.) R.Br. in Sims, *Bot. Mag.* 46: t. 2071 (1819); *Nepeta malabarica* L., *Mant. Pl. Altera* 566 (1771); *Ajuga fruticosa* Roxb., *Hort. Bengal.* 44 (1814), *nom. illeg.*; *Epimeredi malabaricus* (L.) Rothm., *Repert. Spec. Nov. Regni Veg.* 53: 12 (1944). **Type:** Herb. Linn. no. 726.26 (lecto: LINN, *fide* Cramer 1981).

Nepeta pallida Salisb., *Prodr. Stirp. Chap. Allerton* 78 (1796), *nom. illeg.* (*Nepeta malabarica* L. cited in synonymy).

Stachys mauritianus Pers., *Syn. Pl. [Persoon]* 2(1): 123 (1806); *Craniotome mauritianum* (Pers.) Bojer, *Hortus Maurit.* 249 (1837). **Types:** Isle de France, undated [June 1769], *P. Commerson s.n.* (syn: P 00541421; P 00541422; P 04359606).

Erect or spreading shrub, 0.9–1.5 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, very dense, obscuring stem surface at ×40 magnification; stalked glandular hairs absent. Cauline leaves 47–90 mm long, 13.5–32 mm wide, 2.8–3.6 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes serrate, regular, 14–29 on each side, acute or obtuse, 0.2–0.9 mm deep; petioles 9–13 mm long, 14–21% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.4–1.2 mm long, moderately dense (hairs 0.1–0.2 mm apart) or

dense (hairs < 0.1 mm apart), sessile glands 8–48 mm²; lower surface indumentum lanate, tangled or erect or curved, eglandular, 0.9–1.2 mm long, very dense, obscuring surface at ×40 magnification; transition from leaves to floral bracts abrupt. Floral bracts lanceolate or elliptical, 6–17 mm long, 2–5 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all overlapping, forming continuous terminal inflorescence or overlapping near apex, cymes once dichasial at base then monochasial or twice dichasial (± globose), with 5–14 flowers per monochasium, peduncles 0–1 mm long on lowermost cluster; bracteoles linear, 4.2–6.5 mm long, 0.3–0.5 mm wide. Corolla tube shorter than calyx; annulus 3.5–4.2 mm from base of corolla, annulus hairs 0.1–0.15 mm long; upper lip elliptical, 4.5–5.2 mm long, with eglandular hairs on outer surface; lower lip 5–5.4 mm long to end of lateral lobes, 8.5–10.7 mm long overall, with 20–100 eglandular hairs on platform. Longest stamens 13–14 mm long from base of corolla tube; filament hairs 0.4–0.6 mm long, mainly along middle part. Style 13–13.5 mm long; longer stigma lobe 0.7–1 mm long, shorter stigma lobe 0.3–0.5 mm long. Fruiting calyces 1.5–2.2 mm apart on rachilla; fruiting calyx cylindrical, 8–12.2 mm long, 2.8–3.7 mm wide at lobe apices, 3–4.3 times longer than wide, exterior surface with hairs of different sizes or types, hairs glandular and eglandular, 1.2–1.5 mm long, sessile glands 8–16 mm²; lobes attenuate, 3.1–5.3 mm long. Fruiting calyx fringe hairs about the same length throughout or longer at sinus end than at apical end, 0.3–0.6 mm long at apical end, 0.5–0.7 mm long at sinus end, sinus hairs present, inner surface of tube with dense ring of long hairs in medial section. Nutlets 1.9–2.2 mm long. **Figs. 4I, 10C.** *Malabar catmint.*

***Additional specimens examined*: India.** San Thome, in 1856, *Cleghorn s.n.* (E); Kulasegaram, S. Travancore, Feb 1934, *Erlanson 5378* (NY); Pondicherry, May 1837, *Gaudichaud s.n.* (P); Cuddalore, Nov 1959, *Govindarajalu 3699* (L); Bounds of Vedanthangal Sanctuary, Tamil Nadu, Jan 1976, *Henry 47027* (MH); Tiruchi, Nov 1978, *Matthew et al. RHT19392* (L); Banavar – Arsikere road, Jan 1970, *Saldanha 16079* (E); Kanjamalai, Apr 1944, *Sinclair 3464* (E); Papanasam project area, Madras State, Jun 1964, *Subramanian 1653* (L); Perur, Noyal riverbank, Jun 1956, *Subramanyam 45* (MH); way to Pachakumatchi, Jun 1959, *Subramanyam 8259* (L); Susindram, Tamil Nadu, Dec 1980, *Swaminathan 68985* (MH); Walayar Dam, outlet canal, Kerala State, May 1964, *Vajravelu 19064* (MH); Peninsula Ind. orientalis, undated, *Wight 2173* (NY); Pulicat, Madras, Mar 1837, *Wight 2173* (E). **Sri Lanka.** Kaddaikadu, Mar 1973, *Bernardi 14265* (L); beside Trincomalee – Kinniya Road, Sep 1974, *Cramer 4325* (E); Palaiyutta, Mar 1994, *Cramer 6960 et al.* (E); 9 miles [14 km] NNE of Jaffa, along road to Palai, Dec 1974, *Davidse 9090 & Sumithraarachchi* (K, L); Trincomalee, Oct 1976, *Fosberg 56390* (E, NY, P); Foul Point, Trincomalee district, Feb 1972, *Jayasuriya 651 et al.* (E); Talankuda, Batticaloa district, Apr 1973, *Stone 11188* (L); Just N of Trincomalee, Mar 1973, *Townsend 73/245* (E); Kinniyai, Trincomalee district, Sep 1974, *Waas & Tirvengadum 809* (L, NY). **Malaysia.** Penang, in 1822, *Wallich 2037/2* (NY). **Western Indian Ocean**. Mauritius, undated, *Sieber s.n.* (NY).

***Distribution and habitat*:** *Anisomeles malabarica* is native to Sri Lanka and southern India (**Map 6**). In addition, it is (or was) naturalised on Penang Island, Malaysia, and on the island of Mauritius. It inhabits open sunny areas; sandy flats on dunes near the coast, stream banks, and "waste ground".

***Phenology*:** Flowers are recorded for every month of the year; fruits are recorded in January, April, September and December.

***Nomenclature*:** The authorship for *Anisomeles malabarica* has often been given as "(L.) R.Br. ex Sims", but the notation 'Brown mss' after the description in the protologue indicates that the author was Brown and not Sims. Hence the correct authorship is "(L.) R.Br. in Sims" or, where the plant name stands alone, just "(L.) R.Br.".

Notes: *Anisomeles malabarica* is a very distinctive species because of its very densely tomentose stems, relatively narrow leaves, long attenuate calyx lobes and long hairs on the external surface of the calyx.

Baker (1877) accepted *A. malabarica* as being native on Mauritius, but it seems far more likely that it was transported there by man, as specimens of the Mauritian plant are identical to those from India, and the species has no means of long-range seed dispersal.

***Conservation status*: Least Concern**.

19. Anisomeles moschata R.Br., *Prodr. Fl. Nov. Holl*. 503 (1810); *Anisomeles salviifolia* var. *moschata* (R.Br.) Domin, *Biblioth. Bot*. 89: 567 (1928); *Epimeredi moschatus* (R.Br.) Rothm., *Repert. Spec. Nov. Regni Veg*. 53: 12 (1944). **Type:** [Australia: Queensland. Port Curtis District:] Keppel Bay, 9 August 1802, *R. Brown [Bennett Number 2357]* (lecto: BM 001041069 [here designated]; isolecto: CANB 278977, E 00649579, P 04358989).

Anisomeles salviifolia var. *subtomentosa* Domin, *Biblioth. Bot*. 89: 567 (1928), *pro parte*. **Type:** Australia: Queensland. [?North Kennedy District]: Rockingham Bay, undated, *J. Dallachy s.n*. (syn: K).

Procumbent, erect or spreading shrub, 0.3–2.5 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, sparse to dense; stalked glandular hairs absent; sessile glands 8–112 mm². Cauline leaves 11–100 mm long, 6–43 mm wide, 1.7–2.8 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate, dentate or serrate, irregular or regular, 3–18 on each side, acute or obtuse, 0.3–2 mm deep; petioles 4–22 mm long, 21–38% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.25–0.7 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 8–96 mm²; lower surface indumentum erect or curved, eglandular, 0.25–0.6 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 48–160 mm²; transition from leaves to floral bracts abrupt, or gradual. Floral bracts elliptical or ovate, 8–22 mm long, 3–9 mm wide, not consistently exceeding verticils or consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial or twice dichasial (± globose), with 2–10 flowers per monochasium, peduncles 0–11 mm long on lowermost cluster; bracteoles spathulate or linear, 2.8–4.7 mm long, 0.2–1.1 mm wide. Corolla tube longer than calyx, or same length as calyx, or shorter than calyx; annulus 2.3–3.5 mm from base of corolla, annulus hairs 0.15–0.3 mm long; upper lip ovate or elliptical, 3.6–5.3 mm long, with glandular hairs on outer surface or with eglandular hairs on outer surface; lower lip purple, 4.7–6.6 mm long to end of lateral lobes, 8.6–12 mm long overall, glabrous on platform. Longest stamens 10.5–12.5 mm long from base of corolla tube; filament hairs 1.1–1.9 mm long, mainly at distal end. Style 10.5–14 mm long; longer stigma lobe 0.55–0.7 mm long, shorter stigma lobe 0.3–0.45 mm long. Fruiting calyces 1.2–2.8 mm apart on rachilla; fruiting calyx cylindrical, 6.2–8.6 mm long, 2.5–4.5 mm wide at lobe apices, 1.7–2.7 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.2–0.6 mm long, sessile glands 64–176 mm²; lobes acute, 1.5–2.5 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.2–0.4 mm long at apical end, 0.5–1.1 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 1.8–2.1 mm long. **Figs. 2B, 4J, 5A, 5B, 7A, 7B, 7C, 7D, 7F, 7H, 10D.**

***Additional selected specimens examined*: Australia: Queensland**. Cook District: between Cairns and Kuranda, May 1952, *Everist 5139* (BRI, CANB); Daintree NP, Orania Creek off Little Daintree River head, May 1998, *Forster PIF22858 et al.* (AD, BRI, CNS, MEL); Luster Creek, Aug 1995, *Jago 3571* (BRI, MEL); Cairns, Koombal, Jun 1993, *Lyons 142* (BRI); Mt Misery Road, Turnoff, S of Shiptons Flat, Jul 2001, *McDonald KRM938* (BRI). North Kennedy District: Mt Abbot, 50 km W of Bowen, Aug 1992, *Bean 4833* (BRI); Adjacent to Proserpine Dam, *c*. 25 km W of Proserpine, Jul 2007, *Bean 26462* (BRI); Sinclair Bay, Cape Gloucester, Jul 1992, *Batianoff 9209206* (BRI); NW of Pentland, near 'Lowholm', Jul 1954, *Blake 19380* (BRI, CANB, MEL); SF 605 Koombooloomba, Tully Falls, Mar 2002, *Forster PIF28444* (BRI, K, MEL, NSW). South Kennedy District: St Bees Island, 38 km NE of Mackay, Mar 1989, *Batianoff 11152* (AD, BRI, PNH); Rabbit Island, 6 km N of Seaforth, Jun 1994, *Batianoff 940683 & Price* (BRI). Leichhardt District: slopes of Ropers Peak, NE of Capella, May 1987, *Bean 577* (BRI); Ropers Peak, E of Capella, Jan 2006, *Fensham 5361 & Butler* (BRI); eastern slopes of Dilly Pinnacle, 7 km NNE of Springsure, Oct 1998, *Bean 14179* (BRI, NSW); Consuelo Tableland, upper tributary of Rocky Creek, Mar 2006, *Eddie CPE1511* (BRI, NSW). Port Curtis District: Mt Slopeaway, 5 km from Marlborough, May 1991, *Batianoff MS9105121 & Franks* (BRI); Mt Archer, Rockhampton, Feb 1980, *Stanley 592* (BRI); Middle

Percy Island, 87 miles [140 km] SE of Mackay, Apr 1956, *Lazarides 5604* (BRI, CANB, PERTH); 5 miles [8 km] NE of Tynan HS, Jun 1963, *Lazarides 6889* (BRI, CANB, L). Wide Bay District: Biggenden, May 1931, *White 7716* (BRI). Moreton District: SW end of Macleay Island, Jun 1976, *Elsol 9* (BRI); Mt Greville, *c*. 20 km W of Boonah, Apr 1975, *Sharpe 1211 & Saul* (BRI); Wilson's Peak, Apr 1949, *White 13006* (BRI, CANB).

***Distribution and habitat*:** *Anisomeles moschata* is endemic to Queensland where it is widely distributed in eastern areas, from just north of Cooktown to within a few kilometres of the New South Wales border, and extending up to 400 km from the east coast (**Map 3**). It inhabits eucalypt forests and woodlands on wide range of topographies and geologies, where the soils are well drained and frosts are absent or few.

***Phenology*:** Flowers and fruits have been recorded from every month of the year.

***Notes*:** This is a very widespread and variable species. Specimens have been assigned to this species on the basis of their glabrous corolla platform, the calyx fringe hairs longer at the sinus end than at the apical end, the petioles 21–38% of lamina length, and the moderately dense to dense tomentum on the lower leaf surface. Three or four regional forms exist – for instance, many specimens from the Leichhardt pastoral district of Queensland are consistently small-leaved and have verticils with short monochasia; specimens from Cairns and surrounding areas have large leaves with numerous marginal lobes. Because of apparently intergrading forms and lack of data on floral characteristics, I have not erected any new species from *A. moschata sens. lat*. However, it seems highly likely that such a division will be possible if further studies are undertaken.

The syntypes of *Anisomeles salviifolia* var. *subtomentosa* at K comprise a mixture of *A. moschata* and *A. dallachyi*. It is the K specimens that Domin examined before describing that variety (Orchard 1999); he did not see material at MEL or P.

***Conservation status*: Least Concern**.

20. Anisomeles ornans A.R.Bean **sp. nov.** affinis A. eriodi sed foliis praeditis lobis marginalibus paucioribus, floribus paucioribus in monochasiis, praesentia pilorum in labio inferiore corollae et calycibus fructificantibus brevioribus differens. **Typus:** Australia: Queensland. Cook District: Simpson's Gully, Agate Creek fossicking area, 30 April 2006, *K.R. McDonald KRM5243* (holo: BRI; iso: CNS, MEL, *distribuendi*).

Erect or spreading shrub, 0.3–0.6 m high. Upper stems and rachises without patent hispid hairs; short curved hairs no fixed direction, very dense, obscuring stem surface at ×40 magnification; stalked glandular hairs absent. Cauline leaves 29–68 mm long, 11–32 mm wide, 2–3.6 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes dentate or serrate, irregular or regular, 7–14 on each side, acute or obtuse, 0.5–1 mm deep; petioles 6–13 mm long, 16–27 % of lamina length. Lamina upper surface indumentum lanate, tangled, 0.4–0.6 mm long, dense (hairs < 0.1 mm apart), sessile glands 16–48 mm²; lower surface indumentum lanate, tangled, 0.4–0.7 mm long, dense (hairs < 0.1 mm apart) or very dense, obscuring surface at ×40 magnification; transition from leaves to floral bracts abrupt. Floral bracts lanceolate or elliptical, 6–26 mm long, 2–8 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 3–6 flowers per monochasium, peduncles 0–2 mm long on lowermost cluster; bracteoles linear, 2–6.6 mm long, 0.2–0.4 mm wide. Corolla tube same length as calyx; annulus 2–2.5 mm from base of corolla, annulus hairs 0.25–0.4 mm long; upper lip elliptical, 4.3–5 mm long, with glandular hairs on outer surface; lower lip purple or pink, 6.3–7.7 mm long to end of lateral lobes, 11–13.6 mm long overall, with 1–20 or 20–100 eglandular hairs on platform. Longest stamens 10.5–11.5 mm long from base of corolla tube; filament hairs 0.6–0.9 mm long, mainly at distal end. Style 11.5–12 mm long; longer stigma lobe 0.7–0.8 mm long, shorter stigma lobe 0.45–0.55 mm long. Fruiting calyces 1–1.9 mm apart on rachilla; fruiting calyx narrowly campanulate or cylindrical, 6.7–8.1 mm long, 2.4–3.9 mm wide at lobe apices, 2.1–2.8 times longer than

wide, exterior surface with all hairs same size and type, hairs eglandular, 0.5–0.9 mm long; lobes acute, 2–2.5 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.2–0.4 mm long at apical end, 0.7–1.1 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section. Nutlets 2–2.1 mm long. **Figs. 5C, 10E.**

***Additional specimens examined*: Australia: Queensland.** Burke District: The Crater, Blackbraes NP, N of Hughenden, Apr 2002, *Bean 18853* (BRI). Cook District: Cave Creek, Gilbert River, undated, *Daintree s.n.* (MEL 684767); Chadshunt, Gilbert River, May 1954, *Everist 5401* (BRI, MEL); Flat Creek, *c.* 50 km S of Georgetown, May 2011, *Mathieson MTM1076* (BRI, NSW); 5 km along Blacksoil Creek Road, Agate Creek fossicking area, Apr 2006, *McDonald KRM5202* (BRI, NSW); Rungulla Station HS area, S of Georgetown, Sep 2013, *McDonald KRM14725 & Little* (BRI, CANB); Gilbert River Holding, about 300 m along track, Apr 2014, *McDonald KRM15524* (BRI, CANB); Gilbert River, Feb 1922, *White 1425* (BRI). North Kennedy District: *c.* 25 km N of Wando Vale HS, Broken River, Poley Cow Creek, Apr 1988, *Fell DF882* (BRI); Gregory Springs Station, N of Hughenden, Feb 1931, *Hubbard 7710 & Winders* (BRI, K).

***Distribution and habitat*:** *Anisomeles ornans* is endemic to Queensland. It is found from 'Wando Vale' (N of Pentland) to Gilbert River (E of Croydon) (**Map 7**). It grows on sandstone escarpments and basalt hills, with a variety of species including *Eucalyptus chartaboma* D.Nicolle and *Corymbia erythrophloia* (Blakely) K.D.Hill & L.A.S.Johnson. Soils may be clayey, sandy or skeletal.

***Phenology*:** Flowers recorded from February to September; fruits from April to September.

***Notes*:** *Anisomeles ornans* is allied to *A. eriodes*, but differs by the leaves with fewer marginal lobes (7–14), the more widely separated verticils, the fewer flowers (3–6) in the monochasia, the corolla tube the same length as the calyx; the corolla platform with 1–20 hairs, and the shorter fruiting calyces.

***Conservation status*: Least Concern**.

***Etymology*:** Derived from the Latin *ornatus* meaning ornate or embellished. It refers to the pleasing appearance of the silvery stems and leaves in this species.

21. Anisomeles papuana A.R.Bean **sp. nov.** foliis lobis marginalibus praeditis, labio infero breviore corollae, calycibus fructificantibus brevissimis et nuculis tantum 1.5–1.7 mm longis distinguitur. **Typus:** Papua New Guinea. Western Province: Near Morehead Patrol Post, 30 August 1967, *R. Pullen 7199* (holo: BRI; iso: A, CANB, K *n.v.*, L, LAE *n.v.*).

Erect or spreading shrub, 1.2–2 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, moderately dense or dense; stalked glandular hairs absent; sessile glands 8–64 mm². Cauline leaves 62–112 mm long, 26–60 mm wide, 1.8–2.8 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or dentate, irregular or regular, 19–33 on each side, acute or obtuse, 0.7–3.5 mm deep; petioles 8–24 mm long, 13–25% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.3–0.6 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 8–48 mm²; lower surface indumentum erect or curved, eglandular, 0.3–0.6 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 16–144 mm²; transition from leaves to floral bracts abrupt. Floral bracts elliptical or ovate, 4.5–14 mm long, 3–5 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) overlapping near apex or all separated on rachis, cymes once dichasial at base then monochasial or twice dichasial (± globose), with 5–14 flowers per monochasium, peduncles 0–5 mm long on lowermost cluster; bracteoles spathulate or linear, 1.8–4.2 mm long, 0.15–0.45 mm wide. Corolla tube same length as calyx; annulus 2.1–3 mm from base of corolla, annulus hairs 0.15–0.25 mm long; upper lip elliptical, 4–4.2 mm long, with eglandular hairs on outer surface; lower lip 5–5.9 mm long to end of lateral lobes, 7.5–9.3 mm long overall, with 20–100 eglandular hairs on platform. Longest stamens 10.5–11.5 mm long from base of corolla tube; filament hairs 1–1.4 mm long, mainly at distal end. Style 10–12 mm long; longer stigma lobe 0.45–0.7 mm long, shorter stigma lobe 0.25–0.4 mm long. Fruiting

calyces 1–1.6 mm apart on rachilla; fruiting calyx cylindrical, 6.2–8.3 mm long, 3.1–3.5 mm wide at lobe apices, 2.1–2.5 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.2–0.6 mm long, sessile glands 8–160 mm²; lobes acute, 1.4–2.7 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.1–0.25 mm long at apical end, 0.45–1.1 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or glabrous. Nutlets 1.5–1.7 mm long. **Figs. 5D, 10F**.

***Additional specimens examined*: Indonesia**. Moluccas: Yamdena Island, road from Saumlakki to Olilit, Mar 1938, *Buwalda 4043* (L). **Papua New Guinea.** Central Province: Baroka, Mekeo district, Apr 1933, *Brass 3715* (BRI); Roger's airstrip, *c*. 8 miles [13 km] W of Kanosia Plantation, Jul 1962, *Darbyshire 653* (BRI, CANB, L); Nebiri Quarry, Port Moresby sub-district, Apr 1970, *Gebo 369* (CANB); near Jackson's Airport, Port Moresby, Aug 1963, *Heyligers 1006* (CANB); Tovobada Hills, 12 miles [19 km] N of Port Moresby, May 1965, *Heyligers 1180* (BRI, CANB, L); S coast near Kwikila, Abau subdistrict, Jun 1969, *Paijmans 767* (CANB); Rubulogo Creek, *c*. 18 miles [29 km] N of Port Moresby, Apr 1967, *Pullen 6689* (CANB); north vicinity of Rigo, Aug 1962, *Schodde 2700* (BRI, CANB); Port Moresby, Jul 1918, *White 61* (BRI). Gulf Province: Near Malalaua, Mar 1966, *Craven & Schodde 904* (CANB); Malalaua, lower Tauri River area, Feb 1966, *Pullen 6528* (CANB). Morobe Province: Bulolo, Feb 1950, *Fryar 3948* (BRI, CANB); Bulolo, Wau subdistrict, Jul 1970, *Streimann & Kairo NGF47869* (BRI, CANB). Northern Province: Between Dabora and Wabubu, Cape Vogel Peninsula, Apr 1953, *Brass 21876* (CANB). Western Highlands Province: Baiyer River, Nov 1954, *Floyd & Womersley 6826* (BRI). Western Province: Near Rouku, Morehead subdistrict, Jul 1973, *Henty NGF49713* (BRI, CANB, L). **Australia: Queensland.** Cook District: Thursday Island, Jun 1897, *Bailey s.n.* (BRI [AQ160154]); Darnley Island, Torres Strait, Apr 2005, *Hucks LAH285* (BRI, CANB); Yorke Island, Torres Strait, Oct 1971, *Lawrie s.n.* (BRI [AQ3927]); Mabuyag Island, Torres Strait, Aug 2008, *McKenna SGM222* (BRI, CANB); Gabba island, Torres Strait, Feb 2000, *Waterhouse BMW5655* (BRI, CANB).

Distribution and habitat: *Anisomeles papuana* is widely distributed in lowland New Guinea, also Torres Strait, Queensland, and the southern Moluccas Islands of Indonesia (**Map 5**). It inhabits savannah woodland at altitudes from 0–100 metres and mostly below 30m (except the three specimens mentioned below).

Phenology: Flowers and fruits are recorded from February to November inclusive.

Notes: *Anisomeles papuana* is distinguished by the many lobes per leaf, the relatively short petioles, the consistently short cylindrical calyces and the nutlets only 1.5–1.7 mm long.

Three specimens (*Floyd & Womersley 6826*, *Fryar 3948*, *Streimann & Kairo NGF47869*) are known from relatively high altitude (from 750 to 1150 metres) in Papua New Guinea. These specimens have a more compact infructescence, and the floral bracts exceed the verticils; they may represent an additional undescribed taxon.

***Conservation status*: Least Concern**.

***Etymology*:** The epithet refers to Papua New Guinea, where the great majority of collections have been made.

22. Anisomeles principis A.R.Bean **sp. nov.** pilis antrorsis retrorsisve plusminusve patentibusve, eglandularibus, densis in caulibus, bracteolis latis, pilis 1–20 labio inferiori corollae insidentibus et pilis marginalibus brevibus loborum calycis distinguitur. **Typus:** Australia: Western Australia. South-west Osborne Island, Bonaparte Archipelago, 29 June 1973, *P.G. Wilson 11152* (holo: PERTH).

Erect or spreading shrub, 0.5–1.5 m high. Upper stems and rachises without patent hispid hairs, or with patent hispid hairs; short curved hairs retrorse or antrorse, sparse to dense; stalked glandular hairs absent; sessile glands 16–160 mm². Cauline leaves 63–104 mm long, 24–42 mm wide, 2–2.7 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or serrate, regular, 10–21 on each side, acute or obtuse, 0.9–2.1 mm deep; petioles 16–19 mm long, 18–25% of lamina length. Lamina upper surface indumentum erect, glandular or erect or curved, eglandular, 0.25–0.8 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 16–80 mm²; lower surface indumentum erect, glandular or erect or curved, eglandular, 0.25–0.7 mm long, moderately dense (hairs

0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 48–176 mm²; transition from leaves to floral bracts abrupt, or gradual. Floral bracts elliptical or ovate, 7–30 mm long, 3.5–18 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 5–14 flowers per monochasium, peduncles 0–15 mm long on lowermost cluster; bracteoles obovate or spathulate or linear, 4.8–7.8 mm long, 0.5–2.5 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 2.5–3 mm from base of corolla, annulus hairs 0.2–0.3 mm long; upper lip elliptical, 3.6–4.7 mm long, with eglandular hairs on outer surface; lower lip 4–5.8 mm long to end of lateral lobes, 8–10.5 mm long overall, with 1–20 eglandular hairs on platform. Longest stamens 12–14 mm long from base of corolla tube; filament hairs 0.7–1.2 mm long, mainly at distal end. Style 12–14 mm long; longer stigma lobe 0.65–0.7 mm long, shorter stigma lobe 0.4–0.55 mm long. Fruiting calyces 0.8–1.5 mm apart on rachilla; fruiting calyx cylindrical, 8.2–11 mm long, 3.4–4.8 mm wide at lobe apices, 2–2.6 times longer than wide, exterior surface with hairs of different sizes or types or with all hairs same size and type, hairs glandular or hairs eglandular, 0.4–1 mm long, sessile glands 80–144 mm²; lobes acute, 2.3–3 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.25 mm long at apical end, 0.15–0.25 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or glabrous. Nutlets 1.9–2.3 mm long. **Figs. 5E, 10G**.

***Additional specimens examined*: Indonesia**. Lesser Sunda Islands: Timor, undated, herb. *Drake* (P); Timor, Apr 1821, *Reinwardt s.n.* (L). **Australia: Western Australia.** 8.5 km ENE of Mt Agnes, near headwaters on N side of Prince Regent River, Jan 2001, *Barrett & O'Connor RLB1588* (PERTH); Secure Bay, side arm on W side of bay, Yampi Peninsula, Mar 2001, *Barrett & Handasyde RLB2047* (PERTH); Ellenbrae Station, Jul 2004, *Brennan & Done 6328* (DNA, PERTH); slopes overlooking campsite, Margaret Island, Buccaneer Archipelago, Jun 1982, *Hopkins BA0475* (PERTH); Boongarie Island, 18.3 km NE of Mt Knight, Jun 1988, *Keighery & Alford 1817* (PERTH); E side of Mindjau Creek, Port Warrender, Admiralty Gulf, Jan 1982, *Kenneally 7764* (PERTH); Campsite on unnamed tributary of Prince Regent River, arising 19 km SE of the mouth, north-west Kimberley, Jun 1984, *Kenneally 8922* (MEL, PERTH); unnamed island in Prince Frederick Harbour at entrance to Hunter River, Jun 1984, *Kenneally 8978* (PERTH); junction of unnamed creek and Sale River, 30 km ESE of mouth, May 1986, *Kenneally 9603* (MEL, PERTH); Heywood Island (South island), Naturalist Island, E side, directly opposite 'Ninepin', or the Sentinel, Prince Frederick Harbour, May 1987, *Kenneally 9963* (PERTH); Boomerang Bay, Bigge Island, Jun 1972, *Marchant 72/60* (PERTH); adjacent to creek running out of Koolan townsite, May 1993, *Mitchell 3112* (PERTH); *c*. 5 km SW of Crystal Head on E side of major river and adjacent to W.A. Water Authority gauging station, Mar 1994, *Mitchell 3403* (PERTH); junction of two creeks where G. Grey had his main base camp in 1837, 15° 22' 04"S 124° 45' 19"E, Mar 1994, *Mitchell 3465* (NSW, PERTH); beach on Hanover Bay, north Kimberley, May 1998, *Mitchell 5401* (PERTH); Bachsten Creek, Jul 2001, *Russell-Smith & Handasyde TH01-171* (DNA, PERTH); Mallam Spring, SE side of Augustus Island, Jul 1990, *Willing 187* (PERTH); above Moran River Gorge, Prince Regent Nature Reserve, May 1991, *Willing 420* (PERTH); Bonaparte Archipelago, May 1972, *Wilson 10896* (CANB, PERTH).

***Distribution and habitat*:** *Anisomeles principis* is found in the Kimberley region of Western Australia and on the island of Timor (**Map 5**). In Australia, it reportedly grows on sandstone hills and gullies, in *Triodia* hummock grassland, eucalypt woodland or on the edges of vine thicket. Two specimen labels mention basalt as the substrate.

***Phenology*:** Flowers collected from January to July; fruits from May to July.

***Notes*:** *Anisomeles principis* is variable with regard to indumentum types present on the stems. Several specimens (including *Kenneally 8922, Wilson 10896*) have dense antrorse hairs, and one (*Kenneally 9603*) has abundant spreading hispid hairs. These may prove to be taxonomically distinct. Distinguishing features of the species as currently circumscribed are: monochasial or once-dichasial cymes of the verticils; short petioles (16–19 mm); short calyx fringe hairs, often pedunculate lower verticils; crowded flowers and fruits; and broad bracteoles.

***Conservation status*: Least Concern** (IUCN 2012).

***Etymology*:** From the Latin *principis* – of the prince. This is in reference to the Prince Regent River, where the distribution of this species is centred.

23. Anisomeles salviifolia R.Br., *Prodr. Fl. Nov. Holl.*: 503 (1810); *Anisomeles salviifolia* var. *typica* Domin, *Biblioth. Bot.* 89: 567 (1928), *nom. illeg.*; *Epimeredi salviifolius* (R.Br.) Rothm., *Repert. Spec. Nov. Regni Veg.* 53: 12 (1944**). Type:** [Australia: Northern Territory] Maria Island, Gulf of Carpentaria, 1 January 1803, *R. Brown s.n. [Bennett Number 2355]* (lecto [here designated]: BM 001041064; isolecto: BM 001041065; CANB 278978).

Erect or spreading shrub, 0.8–2 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse or antrorse or no fixed direction, very dense, obscuring stem surface at ×40 magnification; stalked glandular hairs absent. Cauline leaves 39–100 mm long, 11–36 mm wide, 1.7–5.4 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or serrate, irregular or regular, 12–20 on each side, acute or obtuse, 0.3–1.8 mm deep; petioles 9–19 mm long, 14–40% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.3–0.6 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–48 mm²; lower surface indumentum lanate, tangled, 0.5–0.8 mm long, dense (hairs < 0.1 mm apart) or very dense, obscuring surface at ×40 magnification, sessile glands 16–64 mm²; transition from leaves to floral bracts abrupt. Floral bracts elliptical or ovate, 7–25 mm long, 2–12 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) overlapping near apex or all separated on rachis, cymes once dichasial at base then monochasial or twice dichasial (± globose), with 4–7 flowers per monochasium, peduncles 0–12 mm long on lowermost cluster; bracteoles spathulate, 4.8–7.5 mm long, 0.9–1.2 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 3.3–3.4 mm from base of corolla, annulus hairs 0.2–0.3 mm long; upper lip ovate or elliptical, 4.2–4.8 mm long, with glandular or eglandular hairs on outer surface; lower lip 5.1–6.1 mm long to end of lateral lobes, 9.7–11 mm long overall, with 20–100 eglandular hairs on platform. Longest stamens 10.5–12 mm long from base of corolla tube; filament hairs 0.9–1.1 mm long, mainly at distal end. Style 10.5–11.5 mm long; longer stigma lobe 0.75–0.9 mm long, shorter stigma lobe 0.4–0.5 mm long. Fruiting calyces 1.5–2 mm apart on rachilla; fruiting calyx cylindrical, 7.2–10.5 mm long, 3.3–4.8 mm wide at lobe apices, 1.6–2.5 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.5–0.7 mm long, sessile glands 16–80 mm²; lobes acute, 1.8–2.9 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.5–1 mm long at apical end (or 0.15–0.3), 0.6–1 mm long at sinus end (or 0.15–0.3), sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section. Nutlets 2–2.4 mm long. **Figs. 5F, 10H**.

***Additional specimens examined*: Australia: Northern Territory.** west side of South West Island, Sir Edward Pellew group, Feb 1976, *Craven 3725* (BRI, CANB, DNA); Maria Island, Jul 1972, *Dunlop 2747* (DNA, NT); Bing Bong Station, Jun 1971, *Henry 94* (BRI, DNA, NSW); 6 km SSE of Lake Eames, Vanderlin Island, Aug 1988, *Latz 11067* (DNA, NT); Buchanan Bay, May 1977, *McKey 125* (DNA, NT); point at the N end of Eagle Bay, Maria Island, Mar 2008, *Mitchell 8789* (CANB, DNA, NSW); northern end, West Island, Jul 1988, *Parsons 63* (DNA, NT); Camp Beach, Centre Island, Jun 2010, *Randell 821* (DNA, K, NT); South West Island, Sir Edward Pellew group, Feb 1976, *Rice 2392* (CANB); Watson Island, Sir Edward Pellew group, Jul 1988, *Thomson 2536* (DNA, NT); South West Island, Sir Edward Pellew group, Jul 1984, *Wightman 1577* (CANB, DNA).

***Distribution and habitat*:** *Anisomeles salviifolia* is endemic to the Northern Territory. It is confined to the south-western Gulf of Carpentaria, including Maria Island, the islands of the Sir Edward Pellew group, and on the mainland at Bing Bong Station (**Map 2**). It grows in dune swales never far from the ocean, usually with grasses and woodland species, but sometimes on the edge of vine thicket. Soils are sandy and infertile.

***Phenology*:** Flowers are recorded from February to August; fruits are recorded from May to August.

***Notes*:** Specimens of *Anisomeles salviifolia* seen from Maria Island differ consistently from those collected in the Sir Edward Pellew islands or Bing Bong station by the narrower leaves. Two collections from Maria Island have long calyx fringe hairs, contrasting with the short calyx fringe hairs in specimens from other locations. However, the type of *A. salviifolia* has short calyx fringe hairs. Because the calyx fringe hairs difference is not consistent and only leaf shape seems consistently different, no taxonomic distinction has been made.

***Conservation status*: Least Concern**.

24. Anisomeles viscidula A.R.Bean **sp. nov.** pilis glandularibus abundantibus et hispidis sparsis usque crebris insidentibus caulibus, foliis comparate angustis et carpis late dispositis in cymis distinguitur. **Typus:** Australia: Western Australia. Cave Spring Gap on Kununurra to Legune road, 26 April 1977, *H. Eichler 22501* (holo: DNA; iso: CANB, L, MEL, MO, PERTH).

Procumbent shrub, or erect or spreading shrub, 0.45–1.5 m high. Upper stems and rachises with patent hispid hairs; short curved hairs absent or retrorse, sparse to moderately dense; stalked glandular hairs abundant, or occasional; glandular hairs extending to lower stems; sessile glands 8–48 mm². Cauline leaves 71–110 mm long, 19–42 mm wide, 2.4–3.8 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes serrate, irregular or regular, 15–30 on each side, acute or obtuse, 0.6–1 mm deep; petioles 14–43 mm long, 19–43% of lamina length. Lamina upper surface indumentum of erect glandular and curved eglandular hairs, 0.1–0.7 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–48 mm²; lower surface indumentum of erect glandular and curved eglandular hairs, 0.25–0.4 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–128 mm²; transition from leaves to floral bracts abrupt or gradual. Floral bracts lanceolate or elliptical, 5–44 mm long, 1–16 mm wide, not consistently exceeding verticils or consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes entirely monochasial or once dichasial at base then monochasial, with 3–11 flowers per monochasium, peduncles 0–13 mm long on lowermost cluster; bracteoles spathulate or linear, 4–7.5 mm long, 0.4–1.2 mm wide. Corolla tube longer than calyx, or same length as calyx; annulus 2.5–3.4 mm from base of corolla, annulus hairs 0.2–0.25 mm long; upper lip elliptical, 3.8–5.7 mm long, with eglandular hairs on outer surface; lower lip 7–9 mm long to end of lateral lobes, 13.5–16 mm long overall, with 1–20 eglandular hairs on platform. Longest stamens 12.5–14 mm long from base of corolla tube; filament hairs 0.6–1.2 mm long, mainly at distal end. Style 11.5–13.5 mm long; longer stigma lobe 0.7–0.85 mm long, shorter stigma lobe 0.5–0.65 mm long. Fruiting calyces 1.5–4.8 mm apart on rachilla; fruiting calyx cylindrical, 8.9–12.5 mm long, 3.5–5.2 mm wide at lobe apices, 1.9–2.6 times longer than wide, exterior surface with hairs of different sizes or types, hairs glandular and eglandular, longest hairs 0.4–1.3 mm long, sessile glands 8–128 mm²; lobes acute, 2.3–3.7 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.15–0.4 mm long at apical end, 0.15–0.4 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section or glabrous. Nutlets 1.9–2.2 mm long. **Figs. 2C, 5G, 11A**.

***Additional specimens examined*: Australia: Western Australia.** SW side of Mt Page, S of Walcott Inlet, Yampi Peninsula, Mar 2001, *Barrett & Start RLB2339* (PERTH); Point Springs, 40 km N of Kununurra, May 1988, *Kenneally 10692* (NSW, PERTH); head of Tin Can Gully, Mornington Peninsula, May 2005, *Legge 976* (PERTH); 2 km E of junction of Charnley and Calder Rivers, Eastern Walcott Inlet, May 1983, *Milewski 205* (PERTH); Foot of Cave Spring Range, 30 km NNE of Kununurra, Mar 1978, *Paijmans 2543* (CANB). **Northern Territory.** 10 km from Jim Jim Falls, Sep 1984, *Brennan 2675* (DNA); Katherine Gorge NP, Apr 1968, *Byrnes NB618* (BRI, DNA); *c.* 450 m from Top Car Park, on track to Upper Falls, Edith Falls, Nitmiluk NP, May 1993, *Conn 3703 & Doust* (DNA, NSW); McArthur River area, near the Glyde River, Jan 1976, *Craven 3567*

(BRI, CANB, DNA); Mt McMinns Station, 11.8 km E of station turnoff on road to Roper Bar, Mar 2002, *Dixon & Harwood 1016* (DNA); Fitzmaurice River basin, May 1994, *Dunlop 9922 & Latz* (DNA, MEL); Keep River NP, Jarrarm area, Jun 1995, *Egan 5038* (DNA); Nitmiluk NP, Feb 1991, *Evans 3639* (BRI, DNA, K); Wearyan River headwaters, Jan 1989, *Latz 11262* (DNA, MEL, NT); 28 km S of Nathan River HS, Sep 1995, *Latz 14580* (DNA, NT); 2.5 km ESE of Katherine Gorge ranger station, May 2009, *Latz 24344 & Quarmby* (DNA, NT); Yamburran Range, 10 km NNE of Mt Millikmonmir, May 1994, *Leach 4555 & Albrecht* (DNA, MEL); Nitmiluk NP, Feb 2001, *Michell 3348* (B, DNA); Hayes Creek, May 1963, *Muspratt SS0603* (DNA); Edith Falls, Katherine Gorge NP, Apr 1983, *Thompson 249* (CANB); Bullo River Station, Mar 2009, *Westaway 2792* (DNA, MO).

***Distribution and habitat*:** *Anisomeles viscidula* is endemic to Australia and is distributed from the north-west Kimberley region of Western Australia, to the north-eastern Northern Territory (**Map 7**). It grows in open woodland dominated by species such as *Erythrophleum chlorostachys*, *Eucalyptus miniata* A.Cunn. ex Schauer or *E. phoenicea* F.Muell. It is apparently confined to quartzose sandstone plateaux and outcrops on sandy or skeletal soil.

***Phenology*:** Flowers are recorded from January to June. There is also a single flowering record from September, but that specimen was collected from a spring with permanent water supply. Fruits are recorded from April to September.

Notes: *Anisomeles viscidula* is characterised by the relatively lax inflorescences exceeded by the floral bracts on the lower verticils, the relatively narrow leaves, and the presence of stalked glandular hairs and hispid hairs on the stems and leaves. Eastern populations (adjacent to the Gulf of Carpentaria) have relatively few glandular hairs, but in all other populations, they are abundant. It differs from *A. macdonaldii* by the narrower cauline leaves with serrate marginal lobes, and the mostly longer fruiting calyces.

***Conservation status*: Least Concern**.

***Etymology*:** From the diminutive form of the Latin word *viscidus* meaning sticky or clammy. This is in reference to the densely glandular leaves and stems of this species.

25. Anisomeles vulpina A.R.Bean **sp. nov.** pilis densis retrorsis in caule, foliis latis basi obtusa, in pagina superiore folii pilis 1.0–1.3 mm longitudine et pilis marginalibus loborum calycis ubique 0.3–0.6 mm longitudine distinguitur. **Typus:** Australia: Queensland. North Kennedy District: *c.* 50 metres from the top of Mt Fox crater, SW of Ingham, 4 October 2014, *R. Jensen 3350 & J.E. Kemp* (holo: BRI; iso: CANB, CNS, E, MEL, NSW, NY, *distribuendi*).

Erect or spreading shrub, 0.3–0.4 m high. Upper stems and rachises without patent hispid hairs; short curved hairs retrorse, moderately dense or dense; stalked glandular hairs absent; sessile glands 8–48 mm². Cauline leaves 27–50 mm long, 16–30 mm wide, 1.6–2.1 times longer than wide, base obtuse or broadly cuneate (> 60°) or narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or dentate or serrate, regular, 9–14 on each side, acute or obtuse, 0.4–1.8 mm deep; petioles 3.5–20 mm long, 13–44% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.9–1.3 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 8–32 mm²; lower surface indumentum lanate, tangled or erect or curved, eglandular, 1–1.2 mm long, dense (hairs < 0.1 mm apart), sessile glands 16–64 mm²; transition from leaves to floral bracts gradual. Floral bracts elliptical or ovate or broadly ovate, 4.5–20 mm long, 3–14 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) overlapping near apex or all separated on rachis, cymes entirely monochasial, with 3–6 flowers per monochasium, peduncles 0–1 mm long on lowermost cluster; bracteoles spathulate or linear, 2.4–3.5 mm long, 0.3–0.5 mm wide. Corolla tube same length as calyx, or shorter than calyx; annulus 2.7–3 mm from base of corolla, annulus hairs 0.25–0.4 mm long; upper lip elliptical, 3.4–4.9 mm long, with eglandular hairs on outer surface; lower lip purple or pink, 5.3–6.4 mm long to end of lateral lobes, 9.5–12.1 mm long overall, glabrous or with 1–20 eglandular hairs on platform. Longest stamens 11.5–12 mm long from base of corolla tube; filament hairs 0.9–1.9 mm long, mainly at distal end. Style

12–13 mm long; longer stigma lobe 0.6–0.65 mm long, shorter stigma lobe 0.4–0.45 mm long. Fruiting calyces 0.9–1.5 mm apart on rachilla; fruiting calyx cylindrical, 7.3–8 mm long, 3.8–4.4 mm wide at lobe apices, 1.7–2.1 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.6–1 mm long, sessile glands 64–112 mm²; lobes acute, 1.8–2.4 mm long. Fruiting calyx fringe hairs about the same length throughout, 0.3–0.5 mm long at apical end, 0.3–0.5 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section or with sparse long hairs in medial section. Nutlets 1.9–2.1 mm long. **Figs. 5H, 11B.**

***Additional specimens examined*: Australia: Queensland.** North Kennedy District: Mt Fox crater, Seaview Range, Apr 1985, *Rodd 4462 & Hardie* (BRI, NSW).

***Distribution and habitat*:** *Anisomeles vulpina* is endemic to Queensland where it is known only from Mt Fox, a volcanic crater south-west of Ingham (**Map 5**). It grows in fertile volcanic soil amongst basalt rocks and boulders, in an open grassland habitat.

***Phenology*:** Flowers are recorded in April and October; fruits in October.

***Notes*:** *Anisomeles vulpina* differs from *A. moschata* by the much longer hairs on both the upper and lower leaf surfaces, and by the shorter calyx fringe hairs.

***Conservation status*:** A status of **Vulnerable**, criteria D1 and D2, is recommended.

***Etymology*:** From the Latin *vulpes*, meaning "fox". This is in reference to the type locality, Mount Fox.

26. Anisomeles xerophila A.R.Bean **sp. nov.** absentia pilorum glandularium, pagina interiore labii inferioris corollae longa, calycibus fructificantibus brevibus (5.2–7.1 mm longitudine) et pilis folii 0.3–0.5 mm longitudine distinguitur. **Typus:** Australia: Northern Territory. North Hayward Creek on Stuart Highway, 58 km N of Tennant Creek, 19 April 1983, *R.M. Barker 186* (holo: DNA; iso: AD).

Erect or spreading shrub, 0.3–1.5 m high. Upper stems and rachises with or without patent hispid hairs; short curved hairs retrorse, moderately dense or dense; stalked glandular hairs absent; sessile glands 48–96 mm². Cauline leaves 24–78 mm long, 9–23 mm wide, 2.1–3.9 times longer than wide, base narrowly cuneate (< 60°) or attenuate; marginal lobes crenate or dentate, irregular or regular, 7–17 on each side, acute or obtuse, 0.4–2.1 mm deep; petioles 3.5–11 mm long, 13–22% of lamina length. Lamina upper surface indumentum erect or curved, eglandular, 0.25–0.4 mm long, sparse (hairs > 0.2 mm apart) or moderately dense (hairs 0.1–0.2 mm apart), sessile glands 32–112 mm²; lower surface indumentum erect or curved, eglandular, 0.25–0.4 mm long, moderately dense (hairs 0.1–0.2 mm apart) or dense (hairs < 0.1 mm apart), sessile glands 16–128 mm²; transition from leaves to floral bracts abrupt. Floral bracts lanceolate or elliptical, 6–27 mm long, 1.5–7 mm wide, not consistently exceeding verticils. Verticils (inflorescence clusters) all separated on rachis, cymes once dichasial at base then monochasial or twice dichasial (± globose), with 3–7 flowers per monochasium, peduncles 0–12 mm long on lowermost cluster; bracteoles spathulate or linear, 2.8–5 mm long, 0.3–0.8 mm wide. Corolla tube same length as calyx; annulus 2.3–3 mm from base of corolla, annulus hairs 0.25–0.3 mm long; upper lip ovate or elliptical, 4–5.1 mm long, with glandular or eglandular hairs on outer surface; lower lip 4–6 mm long to end of lateral lobes, 6.5–10.3 mm long overall, with 20–100 eglandular hairs on platform. Longest stamens 10–12.8 mm long from base of corolla tube; filament hairs 0.7–1.3 mm long, mainly at distal end. Style 10.5–13 mm long; longer stigma lobe 0.65–0.7 mm long, shorter stigma lobe 0.45–0.6 mm long. Fruiting calyces 1.2–2.2 mm apart on rachilla; fruiting calyx cylindrical, 5.8–7.9 mm long, 2.4–3.9 mm wide at lobe apices, 1.8–2.9 times longer than wide, exterior surface with all hairs same size and type, hairs eglandular, 0.3–0.5 mm long, sessile glands 128–160 mm²; lobes acute, 1.7–2.4 mm long. Fruiting calyx fringe hairs longer at sinus end than at apical end, 0.1–0.3 mm long at apical

end, 0.7–1 mm long at sinus end, sinus hairs absent, inner surface of tube with dense ring of long hairs in medial section. Nutlets 2–2.2 mm long. **Figs. 5J, 11C**.

***Additional specimens examined*: Australia: Northern Territory**. 2 miles [3 km] N of Katherine, Apr 1967, *Adams 1755* (CANB, L, NT); Attack Creek, W of Stuart Hwy, *c*. 66 km N of Tennant Creek, May 1996, *Albrecht 7633 & Latz* (NT); 'Nickson's Place', across river from Katherine, Apr 1956, *Burbidge 5111* (BRI, CANB, PERTH); Seven Emu Station, 34.3 km (by road) from junction with main road to Wollogorang, May 1993, *Conn 3767 & Doust* (DNA, NSW); Robinson River Station, May 1983, *Cowen 6* (CANB, DNA); Settlement Creek (below jump-up) on road between Redbank Mine and Wollogorang, May 1984, *Halford 845123* (NT); *c*. 30 miles [48 km] E of Borroloola, Jun 1973, *Henry 836* (NT); Whittington Range, 70 km N of Tennant Creek, Oct 2006, *Latz & Albrecht 22238* (MEL, NT); Wollogorang Station, Branch Creek gorge, Jul 1998, *Michell & Risler 1640* (DNA); Nitmiluk NP, Mar 2001, *Michell 3349 & Deichmann* (DNA); Gibson Creek, 35 miles [56 km] N of Tennant Creek, Jul 1968, *Must 209* (MEL, NT); 15 miles [24 km] S of McArthur River station, Jul 1948, *Perry 1735* (MEL, NT, PERTH); Hayward Creek, W of highway, Phillip Creek Station, Feb 1984, *Strong 45* (NT); Attack Creek, Banka Banka station, Jul 1983, *Thomson 353* (NT). **Queensland.** Burke District: Cloncurry, Nov 1935, *Blake 10133* (BRI); Westmoreland Station, just W of Hells Gate, 15 km SE of HS, May 2005, *Booth 4293* (BRI, NSW); Norfolk Station, on remote station track, Jun 2006, *Booth 4619 & Kelman* (BRI); Cabbage Tree Creek, Little Eva crossing, Apr 1962, *Cole 223 & Provan* (BRI); Westmoreland, Lagoon Creek, off track to Camp Ridgeway, May 1997, *Forster PIF21036 & Booth* (BRI); 49 km from Mt Isa on Duchess road, May 1997, *Forster PIF21172 & Booth* (BRI, DNA, MEL); 12 km S of Mt Isa, on road to Duchess, Jun 1991, *Halford Q519* (BRI); Lawn Hill Station, Jul 1971, *Latz 1607* (CANB, MEL, NSW, NT); 2 miles [3 km] S of Mt Isa township, Mar 1954, *Lazarides 4377* (BRI, CANB, MEL, NT); Mt Isa, Aug 1928, *MacGillivray 2213* (BRI).

***Distribution and habitat*:** *Anisomeles xerophila* is widely distributed from Katherine south to Tennant Creek in the Northern Territory and to Cloncurry in north-western Queensland (**Map 1**). In the more inland areas, it is confined to creek banks, but closer to the coast, it inhabits eucalypt woodland on flats or sandstone scree slopes; occasionally it sometimes grows in limestone areas.

***Phenology*:** Flowers mostly recorded from January to July, but with a single record from November; fruits from January to October.

***Notes*:** *Anisomeles xerophila* is closely related to *A. leucotricha*, but differs by the leaves broadest towards the base, leaves with fewer marginal lobes, the longer hairs of the lower leaf surface, the well separated verticils (verticils overlapping for *A. leucotricha*), and the more widely spaced fruiting calyces. *A. xerophila* is also closely related to *A. brevipilosa*, and possibly intergrades with it in the Wollogorang – Borroloola area, but differs by the mostly broader leaves, the longer hairs on the upper and lower leaf surfaces, and the shorter lower lip of the corolla.

This species usually has verticils that are short and compact, twice dichasially branched, but occasionally (e.g. *Must 209*, *Booth 4293*, *Burbidge 5111*) they are once-dichasial and elongate with a rachis up to 25mm long.

***Conservation status*: Least Concern**.

***Etymology*:** From the Greek *xeros* (dry) and *philus* (loving). This species alone extends to the semi-arid parts of Australia, where the annual rainfall is about 450 mm.

Excluded names

Anisomeles australis Spreng., *Syst. Veg. (ed. 16) [Sprengel] 4(2, Cur. Post.)* 226 (1827). = **Teucrium corymbosum** R.Br.

Anisomeles furcata (Link) Sweet, *Hort. Brit. [Loudon]* 232 (1830). = **Craniotome furcata** (Link) Kuntze.

Anisomeles glabrata Benth. ex Wall., *Numer. List* n. 2041 (1829), *nomen nudum*.

Anisomeles indica f. *albiflora* Kuntze, *Revis. Gen. Pl.* 2: 512 (1891), *nomen nudum*.

Anisomeles indica f. *rubicunda* Kuntze, *Revis. Gen. Pl.* 2: 512 (1891), *nomen nudum*.

Anisomeles intermedia Wight ex Benth., *Labiat. Gen. Spec.* 703 (1835). **Type:** India. Madurai [Madura], undated, *R. Wight 2172/42* (lecto: MH, *fide* Cramer (1981), *n.v.*; isolecto: E, K).

Bentham (1835) speculated that *Anisomeles intermedia* could be a hybrid between *A. ovata* (= *A. indica*) and *A. malabarica*, and I think that this must be the case. Its morphological characteristics are intermediate between *A. indica* and *A. malabarica*, and both

of the original localities (Madura, India and Peradeniya, Sri Lanka) are within the geographical overlap zone of *A. indica* and *A. malabarica*. Of the more than 200 Indian and Sri Lankan *Anisomeles* specimens seen by the present author, none matches the type of *A. intermedia*, further supporting the idea that it is an infrequent hybrid. Aluri (1992) reported the existence of a single plant of a presumed hybrid between these two species, occurring at Turimella, India.

Anisomeles nepalensis Spreng., *Syst. Veg. (ed. 16) [Sprengel]* 2: 706 (1825). = **Craniotome furcata** (Link) Kuntze

Anisomeles secunda f. *albiflora* Kuntze, *Revis. Gen. Pl.* 2: 512 (1891), *nomen nudum*.

Anisomeles secunda f. *rubicunda* Kuntze, *Revis. Gen. Pl.* 2: 512 (1891), *nomen nudum*.

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References

Abu-Asab, M.S. & Cantino, P.D. (1994). Systematic implications of pollen morphology in Subfamilies Lamioideae and Pogostemonoideae (Labiatae). *Annals of the Missouri Botanic Gardens* 81: 653–686.

Aluri, R.J.S. (1992). The Mint genus *Anisomeles* (Lamiaceae). *Proceedings of the Indian National Science Academy*, part B, 58: 387–393.

Aluri, R.J.S. & Subba Reddi, C. (1989). Pollination biology of *Anisomeles indica* and *A. malabarica* (Lamiaceae). *Plant Species Biology* 4: 157–167.

Apd (2013). *African Plants Database* (version 3.4.0). Conservatoire et Jardin botaniques de la Ville de Genève and South African National Biodiversity Institute: Pretoria. http://www.ville-ge.ch/musinfo/bd/cjb/africa/, accessed 22 December 2013.

Arisawa, M., Nimura, M., Ikeda, A., Hayashi, T., Morita, N., Momose, Y., Takeda, R. & Nakanishi, S. (1986). Biologically active macrocyclic diterpenoids from Chinese drug "fáng féng cáo". I. Isolation and structure. *Planta Medica* (1): 38–41.

Avh (2015). *Australia's Virtual Herbarium*. Commonwealth Heads of Australasian Herbaria. http://avh.chah.org.au/, accessed 18 January 2015.

Backer, C.A. & Bakhuizen Van Den Brink, R.C. (1965). *Flora of Java* Volume 2. N.V. Noordhoff: The Netherlands.

Baker, J.G. (1877). *Flora of Mauritius and The Seychelles*. L. Reeve & Co.: London.

Baranwal, V.K., Irchhaiya, R. & Singh, S. (2012). *Anisomeles indica*: An overview. *International Research Journal of Pharmacy* 3: 84–87.

Bean, A.R. (2015). 2362. Proposal to conserve *Anisomeles* against *Epimeredi* (Lamiaceae). *Taxon* 64: 640–641.

Bendiksby, M., Thorbek, L., Scheen, A., Lindqvist, C. & Ryding, O. (2011). An updated phylogeny and classification of Lamiaceae subfamily Lamioideae. *Taxon* 60: 471–484.

Bentham, G. (1835). *Labiatarum genera et species*, fascicle 7. J. Ridgeway & Sons: London.

—— (1848). *Anisomeles*. In A.P. de Candolle (ed.), *Prodromus systematis naturalis regni vegetabilis* 12: 455–457. Treuttel & Wurtz: Paris.

—— (1870). *Anisomeles*. In *Flora Australiensis* 5: 88–89. L. Reeve & Co.: London.

Bhatti, G.R. & Ingrouille, M.J. (1996). The systematics of *Anisomeles* R.Br. (Lamiaceae). *Fontqueria* 44: 77–84.

Bostock, P.D. & Holland, A.E. (eds.) (2010). *Census of the Queensland Flora 2010*. Queensland Herbarium, Department of Environment and Resource Management: Brisbane.

—— (2014). *Introduction to the Census of the Queensland Flora 2014*. Queensland Department of Science, Information Technology, Innovation and the Arts: Brisbane. http://www.qld.gov.au/environment/assets/documents/plants-animals/herbarium/qld-flora-census.pdf, accessed 10 April 2015.

Brown, R. (1810). [1960 fascimile]. *Prodromus Flora Novae Hollandiae et Insulae Van Diemen*. J. Cramer: New York.

Brown, R.W. (1956). *Composition of Scientific Words*, revised edition. Smithsonian Books: Washington.

Cantino, P.D. (1992). *Toward a phylogenetic classification of the Labiatae*. In R.M. Harley & T. Reynolds (eds.), *Advances in Labiate Science*, pp. 27–37. Royal Botanic Gardens: Kew.

Chopra, R.N., Nayar, S.L. & Chopra, I.C. (1956). *Glossary of Indian Medicinal Plants*. Council of Scientific and Industrial Research: New Delhi.

Cramer, L.H. (1981). *Anisomeles*. In M.D. Dassanayake & F.R. Fosberg (eds.), *Revised Handbook to the Flora of Ceylon* 3: 176–178. Amerind Publishing: New Dehli.

Dallwitz, M.J., Paine, T.A. & Zurcher, E.J. (1995 onwards). User's guide to Intkey: a program for interactive identification and information retrieval. http://delta-intkey.com, accessed 11 January 2015.

—— (1999 onwards). User's guide to the DELTA Editor. http://delta-intkey.com, accessed 11 January 2015.

Domin, K. (1928). *Anisomeles*. In *Beiträge zur Flora und Planzengeographie Australiens. Bibliotheca Botanica* 89: 566–567. E. Schweizerbart: Stuttgart.

Efloraofindia (2007–2015). *Anisomeles heyneana*. https://sites.google.com/site/efloraofindia/species/a---l/l/lamiaceae/anisomeles/anisomeles-heyneana, accessed 12 March 2015.

Fryer, R. (2006). Appendix 1: seed germination records. In L. Sweedman & D. Merritt (eds, *Australian Seeds – a guide to their collection, identification and biology*. CSIRO Publishing: Collingwood, Victoria.

Geoscience Australia (2015). http://www.ga.gov.au/place-names/index.xhtml, accessed 12 March 2015.

Govaerts, R., Dransfield, J., Paton, A., Harvey, Y., Navarro, T. & Rosario Garcia Pena, M. Del (2013). *World Checklist of Lamiaceae*. Facilitated by the Royal Botanic Gardens, Kew. http://apps.kew.org/wcsp/, accessed 6 January 2013.

Harley, R.M., Atkins, S., Budantsev, A.L., Cantino, P.D., Conn, B.J., Grayer, M., Harley, M.M., Kok, R. De, Krestovskaya, T., Moralaes, R., Paton, A.J., Ryding, O., & Upson, T. (2004). Labiatae. In J. Kadereit (ed.), *The Families and Genera of Vascular Plants. VII. Flowering Plants. Dicotyledons. Lamiales (except Acanthaceae including Avicenniaceae)*, 167–275. Springer: Berlin.

Hedge, I.C. (1998). *Anisomeles*. In P. Morat (ed.), *Flore de Madagascar et des Comores* 175, pp. 42–44. Muséum National d'Histoire Naturelle: Paris.

Henderson, R.J.F. (ed.) (2002). *Names and Distribution of Queensland Plants, Algae and Lichens*. Queensland Herbarium, Environmental Protection Agency: Brisbane.

Iucn (2012). *IUCN Red List Categories and Criteria, version 3.1*, 2nd ed. https://portals.iucn.org/library/efiles/documents/RL-2001-001-2nd.pdf, accessed 29 September 2014.

Jeyachandran, R., Mahesh, A. & Cindrella, L. (2007). DEN-Induced Cancer and its alleviation by *Anisomeles malabarica* (L.) R.Br. ethanolic leaf extract in Male Albino mice. *International Journal of Cancer Research* 3: 174–179.

Kavitha, T., Nelson, R., Thenmozhi, R. & Priya, E. (2012). Antimicrobial activity and phytochemical analysis of *Anisomeles malabarica* (L.) R.Br. *Journal of Microbiology and Biotechnology Research* 2: 1–5.

Keng, H. (1969). Flora Malesianae Precursores XLVIII, A revision of Malesian Labiatae. *The Gardens Bulletin Singapore* 24: 13–180.

—— (1978). Labiatae. In C.G.G.J. Van Steenis (ed.), *Flora Malesiana* 8: 301–394. Sijthoff & Noordhoff: The Netherlands.

Krishnappa, D. G. & Basavaraj, I. (1982). In IOPB chromosome number reports LXXV. *Taxon* 31: 361–362.

Mohanraj, R., Someshwar, N. & Pankaj, J. (2012). Bioactivity studies on *Anisomeles malabarica* (AM) R.Br. *Journal of Biotechnology and Biotherapeutics* 2(9): 1–8.

Murata, G. (1971). Contributions to the Flora of Southeast Asia. IV. A list of Labiatae known from Thailand. *Tonan Ajia Kenkyu (The Southeast Asian Studies)* 8: 489–517.

Orchard, A.E. (1999). A History of Systematic Botany in Australia. *Flora of Australia*, 2nd edition, 1: 11–103. ABRS, CSIRO Publishing: Melbourne.

Parkinson, P.G. (1987). Adanson's generic names for seed plants: Validation and typification, part 1. *Taxon* 36: 81–87.

Preethy, C.P., Alshatwi, A.A., Gunasekaran, M. & Akbarsha, M.A. (2013). Analysis of the cytotoxic potential of Anisomelic Acid isolated from *Anisomeles malabarica*. *Scientia Pharmaceutica* 81: 559–566.

Rothmaler, W. (1944). Nomina generica neglecta 1753–1763. *Repertorium Novarum Specierum Regni Vegetabilis* 53: 1–37.

Scheen, A., Bendiksby, M., Ryding, O., Mathiesen, C., Albert, V.A. & Lindqvist, C. (2010). Molecular phylogenetics, character evolution, and suprageneric classification of Lamioideae (Lamiaceae). *Annals of the Missouri Botanic Gardens* 97: 191–217.

Sims, J. (1819). *Anisomeles malabarica*, Malabar Anisomeles, t. 2071. *Botanical Magazine* 46: t. 2071.

Subramanyam, K. & Henry, A.N. (1969). Proposal to conserve the generic name 7284. *Anisomeles* R.Br. (1810) against *Epimeredi* Adans. (1763) [Labiatae]. *Taxon* 18: 595–596.

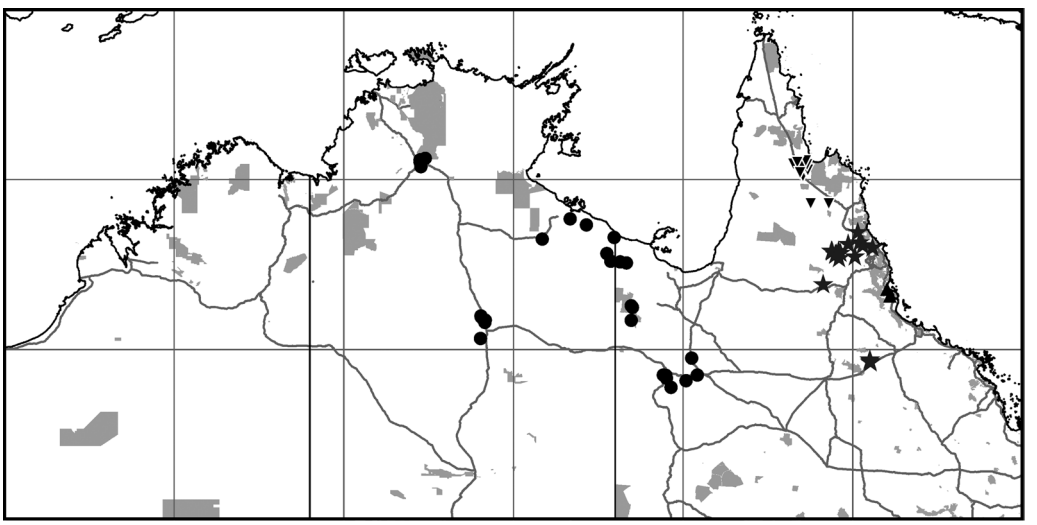
Suddee, S. & Paton, A. (2009). A revision of *Anisochilus* Wall. ex Benth. (Lamiaceae). *Kew Bulletin* 64: 235–257.

Thoppil, J. E. & Jose, J. (1998). Chromosome configuration and evolution of base numbers in *Anisomeles* R.Br. (Lamiaceae). *Glimpses in Plant Research* 12: 173–177.

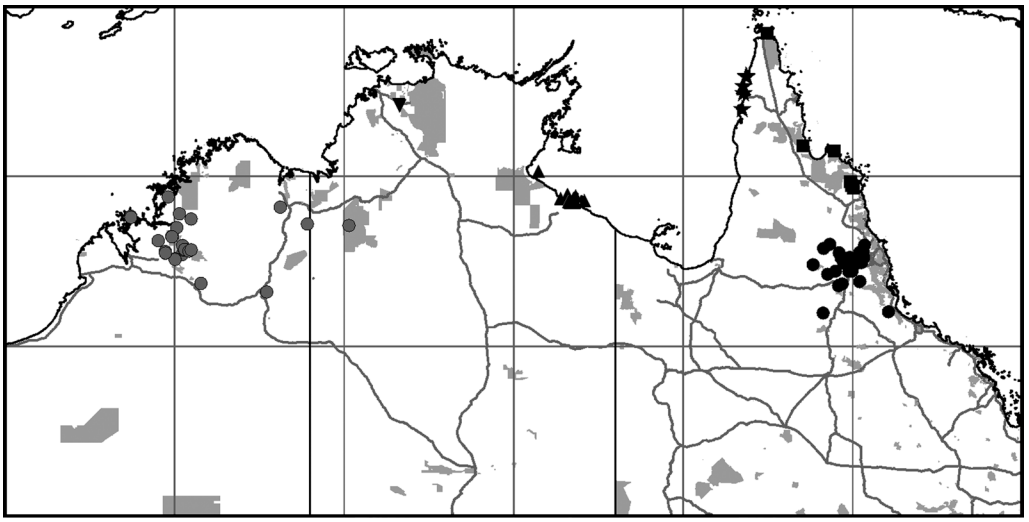
Warrier, P.K., Nambiar, V.P.K., Ramankutty, C. (eds.) (1994). *Indian Medicinal Plants, a compendium of 500 species*. Volume 1. Orient Longman Private Limited: Chennai.

Wilbur, R.L. (1989). The type species of the genus *Sabatia* Adanson (Gentianaceae). *Rhodora* 91: 167–171.

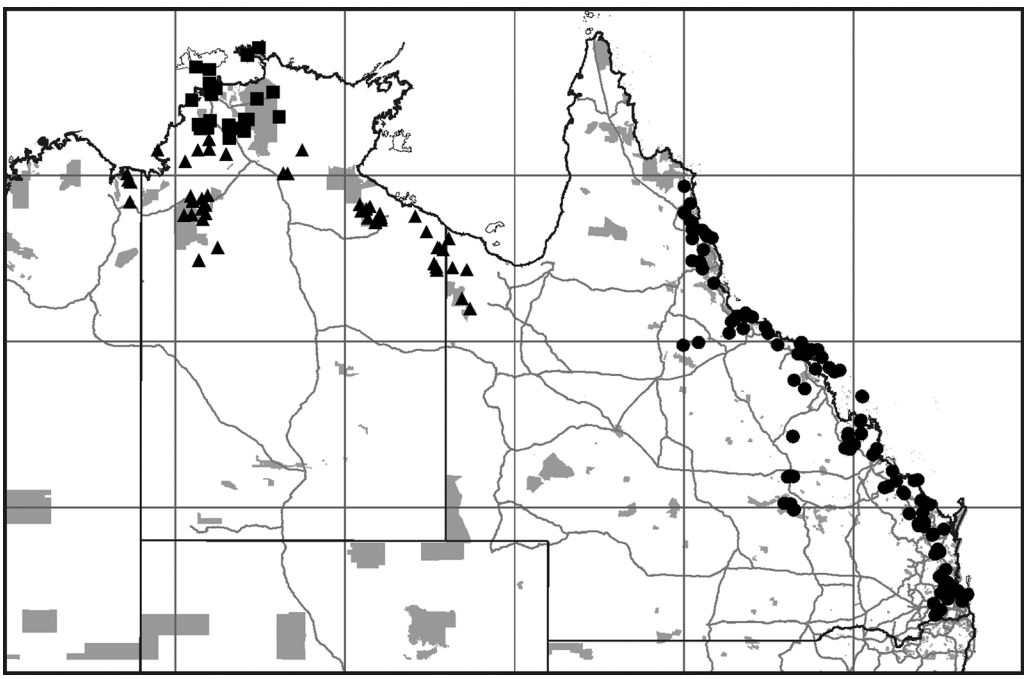
Yadava, R.N. & Barsainya, D. (1998). Chemistry and antimicrobial activity of the essential oil from *Anisomeles indica* (L.). *Ancient Science of Life* 18: 41–45.



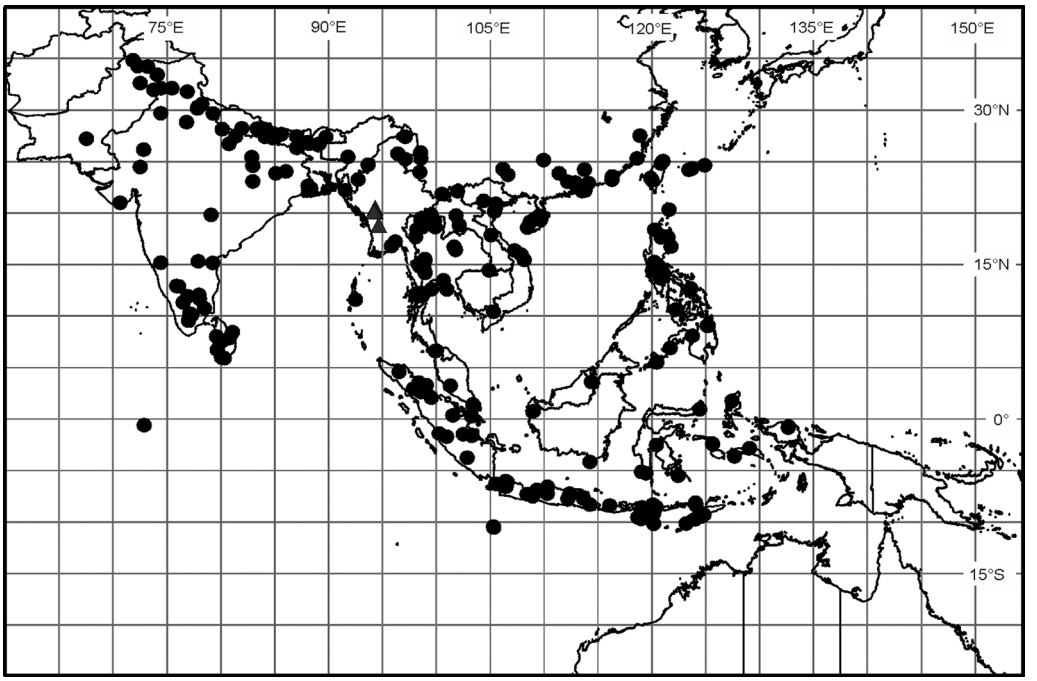
Map 1. Distribution of *Anisomeles* spp. *A. ajugacea* ▼, *A. dallachyi* ▲, *A. macdonaldii* ★, *A. xerophila* ●. National Parks and other conservation reserves in grey.



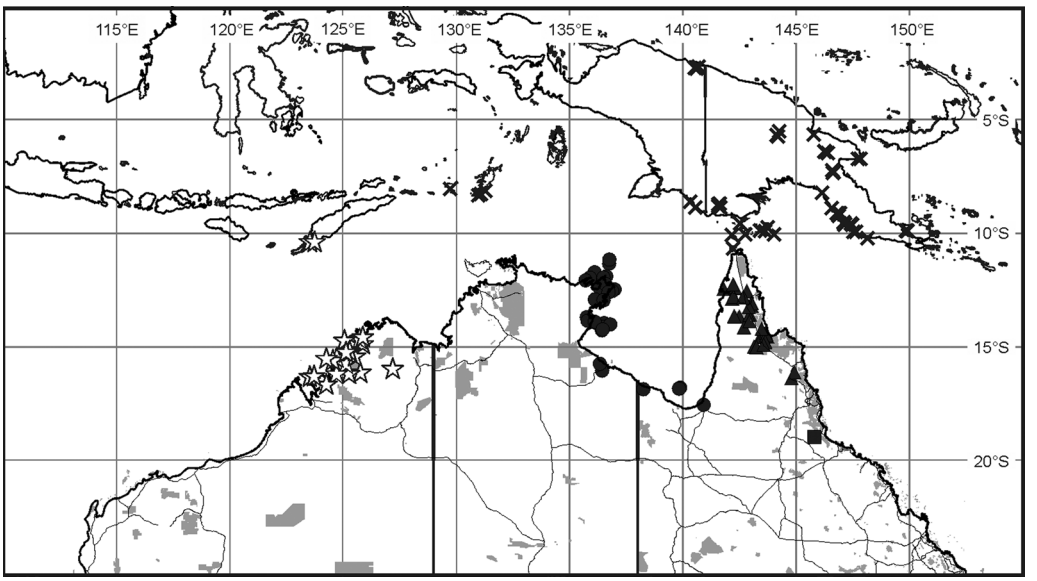
Map 2. Distribution of *Anisomeles* spp. *A. antrorsa* ★, *A. bundeyensis* ▼, *A. farinacea* ●, *A. languida* ■, *A. lappa* ●, *A. salviifolia* ▲. National Parks and other conservation reserves in grey.



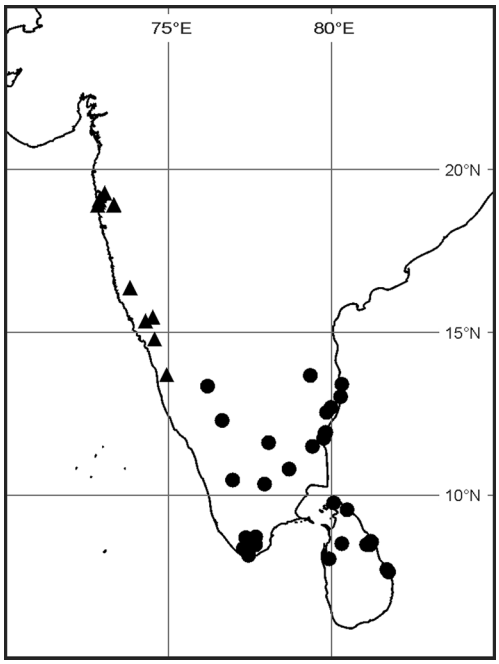
Map 3. Distribution of *Anisomeles* spp. *A. brevipilosa* ▲, *A. leucotricha* ■, *A. moschata* ●. National Parks and other conservation reserves in grey.



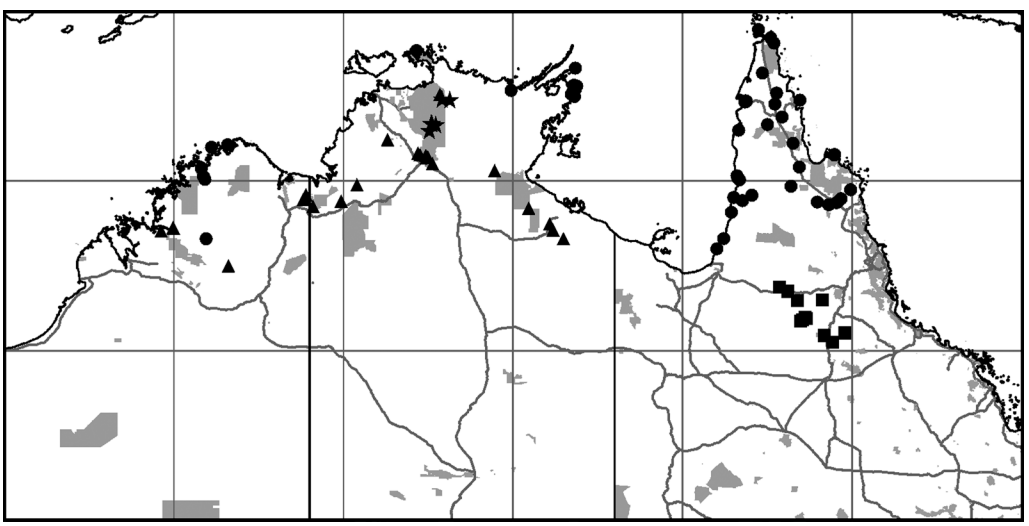
Map 4. Distribution of *Anisomeles* spp. *A. candicans* ▲, *A. indica* ●.



Map 5. Distribution of *Anisomeles* spp. *A. carpentarica* ●, *A. eriodes* ▲, *A. papuana* ✕, *A. principis* ☆, *A. vulpina* ■. National Parks and other conservation reserves in grey.



Map 6. Distribution of *Anisomeles* spp. *A. heyneana* ▲, *A. malabarica* ●.



Map 7. Distribution of *Anisomeles* spp. *A. grandibractea* ★, *A. inodora* ●, *A. ornans* ■, *A. viscidula* ▲. National Parks and other conservation reserves in grey.